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INTERNATIONAL ANALYSIS OF VENTURE CAPITAL PROGRAMS OF LARGE CORPORATIONS AND FINANCIAL INSTITUTIONS

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International Analysis of Venture Capital Programs of Large Corporations and Financial Institutions [1]

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Abstract

In this paper, we investigate what drives companies to set up corporate venture capital (CVC) programs, specifically targeting Global Fortune 500 companies. We find that about 20% of these companies have a CVC program. Companies with a low return on assets are more likely to initiate such a program. This is consistent with the strategic renewal hypothesis implying that large corporations build CVC programs in order to seek new growth opportunities outside their boundaries, as a means to boost future revenue. Moreover, the innovative and entrepreneurial environments in which these large companies operate substantially affect whether or not they initiate CVC programs. CEO tenure as a measure of managerial stability has however no impact. A surprising result is the lack of difference between US and Western European CVC programs, in contrast with the situation of private VC funds. In line with our predictions, the CVC programs of financial institutions are not motivated by strategic renewal but are affected by the degree of development of the national later-stage venture capital market. The greater their size relative to GDP (and thus the greater the competition in this segment from independent funds), the lower the likelihood that they will have their own corporate venture program.

KEYWORDS:

Corporate venture capital programs, financial venture capital programs, strategic renewal, managerial stability, innovative and entrepreneurial environments.

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1. Introduction

The five largest companies in the United States spent five times more in R&D in 2006 than what was invested in early-stage technologies by the entire US venture capital (VC) market in the same year (Gilson, 2009). Still, in the last few decades, private VC funds have made it possible to engage in capital-intensive R&D activities outside large entities, thereby creating viable alternatives to in-house R&D (Saxenian, 2000). In some industries, a significant number of the largest companies that are less than 30 years old have relied on venture capital in their initial phases of development.[1] This indicates that while many well established corporations do invest heavily in R&D, certain types of innovation however, especially path-breaking innovations related to novel technologies, tend to be implemented outside corporations (Hull and Covin, 2010), by entrepreneurial ventures. Having understood the advantages of this distinct organizational form of venturing, several large corporations have made attempts to replicate the VC model for themselves by setting up their own programs, commonly called *corporate venture capital* (CVC) programs.[2]

The question as to when large corporations use CVC programs to foster their innovation capabilities has attracted attention in recent years. The findings of Dushnitsky and Lenox (2005a) support the idea that CVC programs help mitigate intellectual property right issues and are mostly found in industries with high "*technological ferment*". More recently, Sahaym et al. (2009), taking an industry-level approach, confirm this complementarity, finding that investments made by CVC programs are primarily concentrated in R&D-intensive industries.

Despite its advantages, one major difficulty in taking an industry approach is that it does not allow the examination of *which* companies rely on CVC programs, nor does it enable the inclusion of company-specific characteristics into the analysis. To address the latter shortcoming, other studies have examined actual investments made by corporations into new ventures. This however does not allow drawing of conclusions as to why the CVC programs are actually set up, since this requires having a control sample of corporations having no CVC programs. A noticeable exception is the recent study by Basu et al. (2009) of the 1990 sample of Fortune 500 companies (the top 500 US companies ranked by revenue, compiled annually by Fortune Magazine). A panel was constructed from the VentureXpert database in order to assess which companies made investments in new ventures and in which year.

[1] For instance, Google was created in 1998, Dell in 1984, Oracle in 1977, and Microsoft in 1975. All these companies are today among the largest publicly listed companies in the US, and not just within their respective industries.

[2] A large-scale survey of European companies with CVC programs (EVCA, 2005) indicates that 68% of these programs are organized as subsidiaries and 32% as departments. This is very different from independent VC funds that are structured as limited partnerships. According to the same survey, 30% of respondents consider that strategic synergies are more important than financial gains while 40% consider both objectives equally important. Only 30% consider the financial gains pursued by independent VC as more important.

This yielded a sample of companies that did not engage in CVC activities. In their sample, about 17% of companies had made at least one CVC investment during the period 1990-2000.

In this paper, we focus our attention on the 2008 Fortune Global 500 list of companies, a comprehensive league table of the largest companies worldwide (the top 500 global companies ranked by revenue, compiled annually by Fortune Magazine). Similar to Basu et al. (2009), we use such a league table to examine what drives large companies to set up corporate CVC programs[3]. Let us stress that we use the global top 500 international list, instead of only the US league table as used by Basu et al. (2009), in order to broaden the analysis to include cross-country differences. This allows us in particular to investigate the impact of the general innovation and entrepreneurial environment. This appears critical as the success of CVC programs is likely to depend on the availability of entrepreneurial activities and innovative ideas outside corporations that set up a program. For each of these 500 companies, we investigate which ones run a CVC program. We use a novel approach to construct the sample of corporations that have a CVC program, using a broad range of sources such as national (e.g., National Venture Capital Association [NVCA]), supra-national (e.g., European Private Equity and Venture Capital Association [EVCA]) and various regional VC trade associations, the comprehensive VentureXpert database as well as the corporate websites and annual reports of the companies considered. This allows us to shed light on the question of which corporations pursue CVC programs and why. This yields a distinct measure of CVC activities, which, to the best of our knowledge, is different from all other studies conducted so far including the one by Basu et al. (2009), which typically study actual investments rather than investment programs.[4]

A further contribution of our analysis is to include in our investigation the affiliated programs of financial institutions. Indeed, while research on venture capital typically neglects CVC, research on CVC conversely typically neglects VC funds established by financial institutions (hereafter called *financial venture capital* [FVC] funds).[5] Just like CVC programs, FVC funds are typically a subsidiary

[3] A further advantage of our approach is that it does not presuppose actual investments. Studies relying solely on databases such as VentureXpert limit their analysis to CVC programs having made actual investments (i.e., conditional on having found investment opportunities). Since corporations do not necessarily make investments every year, this gives an imprecise picture of which corporations truly run CVC programs. Here, we measure the CVC approach as a strategic intention of the company to achieve an initial critical mass of investments through CVC programs.

[4] While this novel approach is motivated by the desire to shed light on CVC activities from a new angle, we also perform an analysis of the actual investments by non-US companies, which tend to be poorly reported in databases such as VentureXpert. Focusing on CVC programs rather than investments allows us to address this problem.

[5] A notable exception is Hellmann et al. (2008), who show that banks build their own VC funds to participate in later-stage investments of innovative ventures and to establish a relationship for future credit lending. This study reports that even in the US, banks can now make investments in private companies since the enactment of the Gramm-Leach-Bliley Act in 1999 (also called the Financial Services Modernization Act of 1999) — which largely reverses the Glass-Steagall Act of 1933 that prohibited banks from investing in private

or division of a parent company, in this case however a financial institution. CVC and FVC funds share several commonalities but also have some differences.[6] While they are both seen as ways to invest strategically (for FVC programs, cf. Hellmann et al., 2008), their motives tend to be different. Indeed, with the exception of a few investments in financial service ventures, FVCs tend to have no industrial focus. In contrast, most CVC funds are investing in ventures that are in the same or adjacent industry segments as their parent company. This has important implications regarding the capability to offer technological and market synergies, which constitutes one of the great benefits of a CVC involvement in young, innovative ventures. As such, FVC funds therefore more closely resemble independent VC (IVC) funds. The latter however tend not to invest strategically, in the sense of expecting benefits other than the return on the actual investment in the venture, which makes FVCs essentially hybrid structures between "pure" CVC programs and "independent" VC funds.

From an aggregate perspective, it is worth mentioning that the capital committed to FVC and CVC funds combined is about 15-18% of the total capital commitments made to venture capital funds (see Figures 1 and 2). Most of this capital actually comes from FVC funds, which most likely have greater capacity to channel financial resources to the VC markets in addition to committing capital to IVC funds. Figure 3 shows the percentage change of these capital commitments from year to year. Interestingly, CVC programs tend to be the most volatile, especially in boom periods such as 1998-2000 and 2004-2005. As argued by Chesbrough (2002), CVC programs tend to be quite unstable, notably due to the organizational structure of such funds. However, this conclusion cannot be extended to FVCs, which seem to be as stable as IVC funds. Thus, the analysis of FVC funds in comparison to CVC funds is highly relevant.

We document the following key findings. About 20% of Global Fortune 500 companies run a CVC or FVC program. US companies do not run proportionately more programs than companies based in other countries, except for Asian companies, where the range of organizational forms for R&D and corporate collaborations is different. It is surprising that US companies do not differ much from Western European companies, who run CVC programs as often as US companies. Our results using multivariate analysis confirm this observation. This is in stark contrast to the usual findings on independent VC funds and the development of VC markets outside the US, which tend to indicate that Western Europe and Asia-Pacific lag far behind the United States (Bottazzi and Da Rin, 2004; Lerner and Schoar, 2005; Hege et al., 2009; Da Rin et al., 2006; Schwienbacher, 2008; Kaplan et al., 2007; Armour and Cumming, 2008).

companies — thus enabling banks to structure VC funds as subsidiaries. Before 1999, US banks primarily made such investments through Small Business Investment Companies (SBICs).

[6] Several other similarities and differences between VC fund types are provided by Cumming et al. (2007).

Further, we find significant support for the hypothesis of strategic renewal, as companies with low returns on assets (ROA) are more likely to have a CVC program. Indeed, a two-standard deviation decrease in ROA increases the likelihood of a corporation having a CVC program by 10.2%. This however is not true for financial institutions, where new technological opportunities are not expected to provide significant strategic benefits as for industrial companies.

Moreover, the innovative and entrepreneurial environments in which companies operate positively affects their propensity to engage in a CVC program, however again only for non-financial (industrial) companies. This is consistent with the notion that such an environment is vital to a successful CVC program, since it relies heavily on an active external market for innovative opportunities, managed by people with a strong entrepreneurial mindset and supported by investors ready to co-invest with CVCs.

A distinct feature of FVC programs is the impact of later-stage VC investments in the considered country, consistent with the findings reported by Hellmann et al. (2008). While early-stage investments (as a percentage of GDP) have no significant impact on the prevalence of venture programs of financial institutions, a better developed market for later-stage investments (expansion and replacement capital) does reduce the likelihood of FVC programs. Increasing later-stage investments (as % of GDP) by the equivalent of a two-standard deviation change reduces the likelihood by a remarkable 47%. One possible reason is that financial institutions may find it less worthwhile to enter the later-stage market directly (where synergy gains could be achieved for them) if there is strong competition from a large number of independent VC funds.

The remainder of this paper is structured as follows. The next section reviews the literature regarding CVCs and their motivation. Section 3 presents our research hypotheses and Section 4 discusses our data and variables. In Section 5, we provide the analysis. Section 6 concludes.

2. Literature Review

In the recent CVC literature, some interesting contributions have been made regarding the use of different theoretical perspectives (Weber and Weber, 2009). These studies for instance incorporate the resource-based perspective (Basu et al., 2009); the knowledge-based view (Maula, 2001; Weber and Weber, 2007), transaction cost economics (Maula, 2001), organizational learning (Schildt et al., 2005), absorptive capacity (Dushnitsky and Lenox, 2005a), and the relational view (Maula et al., 2003). Recently, Basu et al. (2009) contribute in particular to the CVC literature by using a resource-based view model of inter-firm collaboration in order to analyze the influence of incumbent's industry on its motivations to pursue a CVC program. They found evidence of the interactions between industry and firm’s technological, marketing and network resources and conclude that resource-rich firms are in a

better position than resource-poor firms to pursue CVC exploratory initiatives. Our study builds on the same literature stream and uses the strategic renewal motives of organization learning and the transaction cost economics of inter-firm collaboration to analyze why large corporations and financial institutions set up a CVC program.

Knowledge is indisputably considered as a strategically significant resource of firms (Grant, 1996) and also as a source of sustainable competitive advantages (Grant, 1996; Kogut and Zander, 1992; Spender, 1996). Generating and transferring knowledge is important for innovation-driven corporations and technology-based ventures because such companies demand a continuous regeneration of knowledge (Lane and Lubatkin, 1998). In other words, firms that expect to growth, maintain their sustainable competitive advantage or intend to renew, may implement organizational learning processes that facilitate access to and accumulation of knowledge and capabilities, which are critical for current and future competition (Wadhwa and Kotha, 2006). Organizational learning and the rush towards critical new knowledge may motivate corporations to set up a CVC program. Shildt et al. (2005) describe CVC programs as conducive to exploratory organizational learning: CVC programs may either invest in ventures that operate in their own sector or other sectors with the intention of stimulating their own innovation process, building new options, or leveraging their existing resources and capabilities (Dushnitsky and Lenox, 2005a and 2005b; Maula, 2007). Benson and Ziedonis (2009) report for instance that CVC programs have been used in the IT sector to facilitate access to acquisition candidates and their technologies and know-how. Consequently, CVC investments may help the corporate investor to quickly access novel knowledge about new ventures and thereby avoid costly and time-consuming R&D (Dushnitsky and Lenox, 2005b; Basu et al., 2009). Various other studies have attempted to quantify other financial and non-financial benefits of CVC programs. Gompers and Lerner (1998) show that entrepreneurial ventures backed by a CVC program from companies with sufficient complementarity to their parent company are more successful than other ventures. Other scholars show that complementarities influence both the formation of inter-organizational relationships and their performance (Chung et al., 2000; Gulati, 1995; Hitt et al., 2000; Rothaermel and Boeker, 2008; Sarkar et al., 2001; Maula, 2007; Maula et al., 2009). Dushnitsky and Lenox (2005b) find that CVC programs are central to generating benefits from many highly innovative ventures since they may help overcome intellectual property rights issues. However, this requires significant own investments in R&D from the parent companies as a way to create sufficient absorptive capacity necessary to exploit the innovation, as confirmed by the findings of Sahaym et al., 2009. Dushnitsky and Lenox (2006) stress the fact that CVC success may depend on its ability to attract both independent venture capitalists and new ventures as well as to build good relationships. Indeed, CVC relies for instance on independent venture capitalists to identify quality investment opportunities, for reducing overall risks and transaction costs, for increasing the quantity and the quality of its own deal flow, and for exposure to entrepreneurial thinking and culture (Manigart et al.,

2006; Seppä and Jääskeläinen, 2002; Lockett and Wright, 2001; Sorenson and Stuart, 2001; Lerner, 1994). Moreover, Chesbrough (2000) highlights the necessity for the corporate investor to hire and maintain a skilled fund management team, i.e. comprising strong venture capitalists or managers with an entrepreneurial background.

Based on the fact that CVC involves various partners with their potential opportunistic behavior, transaction costs may be critical when the corporation decides to set up a CVC program and to enter into a transaction with an entrepreneurial firm. Indeed, higher transaction costs may hamper organizational learning efforts that may enable strategic renewal. Nevertheless, organizations that economize on transaction costs by attenuating uncertainty, complexity, information asymmetry and opportunistic risks in general, building reputation, trust and transactional experience may expect to extract more value from their transactions with entrepreneurial firms (Maula, 2001). A closely related strand of literature highlights the costs and benefits of CVC financing from the perspective of entrepreneurial ventures, such as the recent study by Maula et al. (2009). CVC investments may improve new venture performance by providing access to valuable strategic resources such as research facilities and technical expertise, management and board support, customer references and sales channels, market presence, and branding. This may increase the new venture visibility and value and at the same time the chance of a successful exit (e.g. high IPO). Maula and Murray (2000) report for instance that ventures co-financed by industry-led corporate investors received superior IPO valuations than firms financed by venture capitalists alone, particularly when the resources are complements rather than substitutes. In fact, CVCs may help new ventures to attract new business partners and customers and therefore may be more attractive to entrepreneurs than independent VCs or banks (Maula et al., 2005). On the other hand, Hellmann (2002) shows how conflicts of interest between the parent company and the entrepreneurial venture can make CVC programs difficult to manage and less attractive, especially when the parent company provides substitute products of the startup. Riyanto and Schwienbacher (2006) derive optimality conditions for large corporations to help innovative ventures to grow in order to secure demand for their own products in the future.

Examining ventures that eventually do an IPO, Masulis and Nahata (2009) provide further insights into the nature of these complementarities and sources of value-added. CVC programs with high strategic fit to the entrepreneurial ventures tend to receive less control, notably in response to information asymmetries due to entrepreneurs' fear of possible expropriation or conflicts of interest with the parent company (Dushnitsky and Lenox, 2005a). Dushnitsky and Lenox (2006) conclude that important value creation for large companies from the CVC programs may stem from the access to novel technology and knowledge, as strategically focused CVC programs generate more value (measured by Tobin's Q) for their parent companies than purely financially focused CVC investments.

3. Research Hypotheses

In Section 2, we presented various studies examining the strategic motives of large corporations and financial institutions for setting up CVC programs. In this section, we present several hypotheses that will be then tested in Section 4. Section 3.1 focuses on the motivations for corporations. Section 3.2 discusses the differences between financial and non-financial institutions.

3.1 Why corporations engage in CVC activities

Firms often engage in corporate entrepreneurship initiatives in order to strengthen their performance and growth through both strategic renewal and the capture of new venture opportunities (Guth and Ginsberg, 1990; Lumpkin and Lichtenstein, 2005). Our primary hypothesis is related to the need of corporations as their product portfolio matures to achieve "corporate" or "strategic" renewal (Kelley et al., 2002; Guth and Ginsberg, 1990) and employ a more entrepreneurial strategic approach (Kuratko et al., 2005). The underlying idea is that companies lacking sufficient internal innovation capabilities may more likely seek new opportunities outside their own boundaries, especially if returns from existing assets diminish considerably. In such case, setting up a CVC program can allow them to become more innovative in the future and take greater risks, which has proved to contribute positively to the financial performance and strategic value not only of SMEs but also of large corporations (Dess et al., 1997; Lumpkin and Dess, 2001).

Recent literatures on organizational science and corporate entrepreneurship (in which CVC programs are included) shed more light on the motives of strategic renewal. They highlight particularly how the ability to explore and capture future growth opportunities is critical for enabling corporate strategic renewal and how inter-firm collaboration mechanisms may facilitate and support this renewal process (Agarwal and. Helfat, 2009). It refers to the revitalization of a company's business, the changes of its competitive profile (Narayanana et al., 2009) and the creation of new wealth through new combinations of resources (Guth and Ginsberg, 1990). In other words, strategic renewal also means building or acquiring new capabilities and then creatively leveraging them to add value for shareholders (Zahra, 1996). CVC is used by many established firms as an intermediate approach toward this restructuring, in order to explore or acquire external new capabilities (Covin and Miles, 2007).

Organizational learning is at the heart of the strategic renewal process that enables the firm to adapt and respond to challenges in new markets (Zahra, Nielsen and Bogner, 1999). Corporate entrepreneurship has been viewed as the driver of organizational learning, new knowledge harvesting and new business creation within existing enterprises (Dess et al., 2003). Entrepreneurial research has demonstrated that corporate entrepreneurship efforts offer an important means of securing growth and

responding to competitive pressure (Block and MacMillan, 1993), improving corporate profitability and performance (Zahra and Coving, 1995; Zahra, 1991), generating strategic renewal (Guth and Ginsberg, 1990). Corporate entrepreneurship in general and particularly corporate venture capital may be used to boost firm´s financial performance (e.g. ROA), facilitate strategic renewal and increase organizational growth (Zahra and Covin, 1995; Burgers, et al., 2009). In other words, these efforts allow an incumbent firm to make a better utilization of its resources and to capture new opportunities to facilitate organizational learning, build and acquire new capabilities (Zahra, 1996) that enable innovation and renewal (Zahra, Neubaum, and Huse, 2000; Keil, 2002; Yiu and Lau, 2008; Basu et al. 2009).

The recent literature particularly points out external sources of renewal via acquisitions and corporate venture capital investments (Capron and Mitchell, 2009; Benson and Ziedonis, 2009; Puranam et al., 2009). Indeed, for incumbent firms, CVC initiatives may contribute significantly to the evolution of corporate strategy, lead to changes in corporate competitive profile (Ireland et al., 2001) by building new capabilities, which in the end facilitates strategic renewal by reinforcing well performing businesses, building up new businesses and/or shedding the less profitable businesses to increase the firm overall performance.

> Hypothesis 1 (on strategic renewal): *The return on assets of the corporation is negatively related to the likelihood of having a CVC program.*

While Sahaym et al. (2009) found inconclusive results on a related hypothesis, we shed light on this empirical prediction with a novel approach using Fortune Global 500 companies instead of industry-level data. Also, our metric is not the number of investments but whether or not there is a CVC program in place.

Previous studies (Fazzari and Athey, 1987; Fazzari et al., 1988) have examined firm investment response to liquidity constraints or financing behavior. They show that corporate investments in general, particularly internal and external R&D expenditures, are highly sensitive to corporate cash flow (i.e., to the availability of internal funds). Schroth and Szalay (2010) study how firm's financing constraints affect its decision to pursue innovations and particularly how it affects the patenting race. They identify that innovative success depends on how much more cash the firm has relative to its rivals. Furthermore, Souder and Shaver (2010) examine the conditions under which firms make long-horizon investments (i.e., investments that take a long period of time to pay off). Capital availability is a function of performance and provides an organization with slack, and high performers are able to use slack search to foster future growth through the development of new businesses (March, 1981; Souder and Shaver, 2010). Souder and Shaver (2010) find a positive and significant effect of relative

operating cash flow on long-horizon investments. They demonstrate that high performing firms (e.g. in term of cash flow) make more long-horizon investments, although the strength of this relationship atrophies as firms age. Additionally, they show that firms select high risk investments or are constrained from making long-horizon investments when short-term performance is poor, in order to enhance firm survival. For incumbent firms, CVC investments may be viewed as long-horizon investments due to their strategic orientation and may therefore be sensitive to the firm's cash flow.

Dushnitsky and Lenox (2005a) demonstrate a connection between corporate changes in cash flow and CVC investments. They indicate a positive relationship between firm CVC investments and firm internal cash flow. Related to the first hypothesis and in line with the resource-based view discussed in Section 2, we therefore expect that corporations with significant financial reserves are more likely to have a CVC program, since financial slack is needed to respond to opportunities offered by any promising investments made by the CVC program. In a similar vein, investments in internal R&D can generate human resources useful for benefiting from opportunities that may arise from a CVC program.

> Hypothesis 2 (on resource availability): *A corporation with significant internal resources is more likely to run a CVC program.*

Next, we investigate the overall impact of industry conditions. Well-established firms must adapt their organizational strategies towards innovation to industrial changes and the industry lifecycle (Strebel, 1987). During the "emergence" and "growth" phases of their industry, corporations may stimulate their innovation and entrepreneurial activities by adopting "open innovation" strategies like CVC programs (Strebel, 1987). Given the type of investments made by venture capital, growth opportunities are likely to impact the decisions on and value of CVC programs. In the financial literature, market-to-book ratios are used for instance to capture factors, such as firms or industries with many intangible assets, with high growth opportunities, and with low risk (Chen and Zhao 2006; Liu, 2009). The market-to-book ratio proxies the industry growth opportunities the market observes, since firms or industries with high market-to-book ratios should have high growth opportunities.

> Hypothesis 3 (on industry growth opportunities): *Corporations active in industries with significant growth opportunities are more likely to have a venture capital program.*

Moreover, we investigate the impact of the economic and cultural environments on the incentives of large companies to promote CVC programs. Supportive and opportunistic economic environments have been found to influence the success of CVC programs and startups (Bygrave and Timmons, 1992). Indeed, an environment that fosters innovation and entrepreneurial initiatives is important for any successful CVC program, since otherwise there would be little opportunity available for the

program to (co-)invest. In fact, CVC programs are intended to benefit from innovative opportunities initiated outside their own boundaries that need to be pursued in smaller, less hierarchical entities. Several recent studies have shown that the intensity of entrepreneurial activities has an impact on national economic growth (Reynolds et al., 2005; Wong et al., 2005; De Clercq et al., 2010).

Hypothesis 4 (on the effect of the environment): *A corporation based in an environment with a higher level of innovativeness or entrepreneurial activity is more likely to run a CVC program.*

Finally, we examine whether managerial stability has an impact on CVC programs. Investment decisions may be influenced by CEO tenure (e.g., Hambrick and Fukutomi, 1991). As pointed out in the Introduction, a potential weakness of CVC programs is the lack of stability in the long run (see, e.g., Chesbrough, 2002), since they depend on the readiness of top management to commit to such programs. This lack of stability can also be seen in Figure 3, which shows that investments by CVC programs are much more volatile than FVC and IVC funds. This also potentially impacts the underlying CVC programs.

Hypothesis 5 (on managerial stability): *A corporation with greater managerial stability is more likely to pursue long-horizon investments and thus have a CVC program.*

3.2 Why Financial Institutions engage in FVC activities

We now turn to a discussion on how these hypotheses may be extended to financial institutions. As mentioned in the Introduction, FVCs seem to combine the features and objectives of CVCs and IVCs. This potentially impacts the hypotheses mentioned in Section 3.1. Since financial institutions typically differ from other corporations in terms of financial structure and capital requirements (for liquidity and risk management purposes), we test all the hypotheses separately for financial institutions. While we expect that Hypothesis 2 may hold in both cases, the magnitude of the effect of resource availability might differ and thus the estimated coefficient.

In particular, FVC funds, as they are mostly financial institution investors, are not expected to seek stakes in entrepreneurial ventures for the sake of learning about novel technologies or accessing new markets, like CVC programs with their focus on strategic fit. In most cases, FVC funds are expected to rather invest in venture capital as part of their diversification strategy, next to committing capital in IVCs. Therefore, the effect mentioned in Hypothesis 1 should be weaker for FVC funds, since strategic investing is often not a motivation for financial institutions.

Hypothesis 6 (on strategic renewal motive of FVC funds): *The return on assets of the financial institutions is unrelated to the likelihood of having a FVC program.*

Although banks may at times have some strategic benefits from investing in new ventures, in line with the arguments made by Hellmann et al., (2008), it is probably less the case for insurance companies. The latter instead tend to extract only financial returns from the funds they have set up. However, both types of financial institutions share the fact that they do not tend to seek technological renewal with their FVCs. Therefore, we do not expect any difference between insurance companies and banks in regard to Hypothesis 6.

A potential distinction between CVC and FVC programs may come from the stage of involvement in the programs. Hellmann et al. (2008) find that financial institutions have incentives to establish relationships with promising ventures to secure future credit lending. Banks may even be able to more easily assist them with their IPO process. This most likely will motivate financial institutions to contribute capital to these ventures in the later-stage only (not in early-stage). However, the profitability of such a strategy will depend on the degree of competition in this specific segment of the VC market. In well developed national markets, this type of strategy is less likely to yield significant benefits since competition is fiercest in such markets.

Hypothesis 7 (on the effect of competition on FVC funds): *The better the development of the local later-stage venture capital market, the less likely to have an FVC fund.*

For the early-stage segment, we should also expect a negative impact, but presumably smaller than that for the later-stage segment. In the same vein as for the later-stage market, competition may discourage financial institutions from providing capital directly to innovative ventures as opposed to committing capital directly to independent VC funds as specialized intermediaries. Since the strategic motive of financial institutions discussed above requires more mature ventures, early-stage investments are less attractive for FVC programs. Thus, the effect stated in Hypothesis 7 should be smaller for early-stage investments.

4. Data and Variables

As argued by Chesbrough (2002), corporate venture capital is essentially relevant for “large” companies. This is the approach we take in this study. As sample data, we take the complete list of the Global Fortune 500 Companies for the year 2008. This league table is based on revenue, not income.

All the variables are defined in Table 1, which also reports the sources of the data used. Most accounting data come from the database provided by Fortune Magazine in connection with their league table. Others have been extracted from Datastream and Compustat, depending on data availability. More details on this are provided in Table 1 as well as the other data sources used for constructing the other variables.

For testing our research hypotheses, we use the following measures. For Hypothesis 1, we use return of assets (the variable *ROA*). A negative effect on the likelihood of having a CVC/FVC program is in line with the strategic renewal hypothesis.

For Hypothesis 2, we measure financial resources in two ways: annual revenues generated by existing operating activities (the variable *Revenues*) and the ratio of net operating cash flows over total assets (the variable *Resource Availability*) as an alternative measure of financial resources, as done by Dushnitsky and Lenox (2005a). Building on the work of Sahaym et al. (2009), we further explore alternative resources deployed by corporations using *Internal R&D Intensity*.

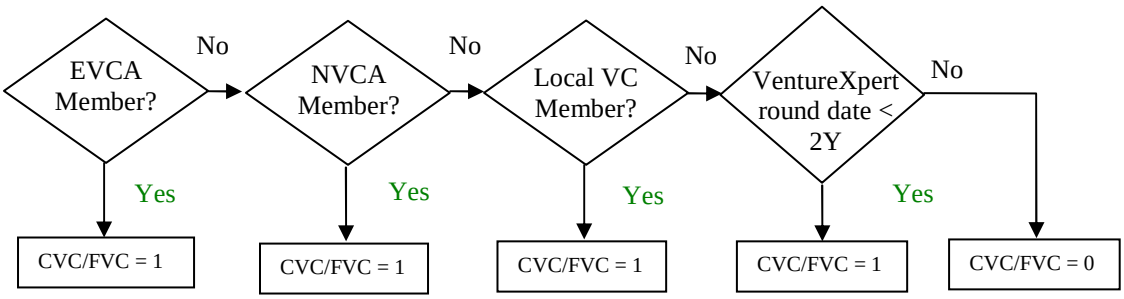
For Hypothesis 3, we proxy industry growth opportunities by the variable *Industry Market-to-Book Ratio*.

For Hypothesis 4, we use the *Global Innovation Index*, the *TEA* index, and *Early-Stage Investments (% GDP)* to measure the effect of the national environment in which a company operates. The Global Entrepreneurship Monitor 2008 dataset assesses the role of entrepreneurship in national economic growth (Reynolds et al., 2005) and comprises entrepreneurship propensity data. Based on several previous studies (Reynolds et al., 2005 Wong et al., 2005; De Clercq et al., 2010), we use particularly the "Early-Stage Entrepreneurial Activity Index" (denoted TEA as constructed by the Global Entrepreneurship Monitor) for this analysis, to assess the creation of new business and explore cross-country differences. The "Global Innovation Index" (constructed annually by Business World and INSEAD) assesses the level of innovation activities in the country where the corporation's headquarters are located. It is based on a worldwide study that shows the degree to which individual nations and regions currently respond to the challenge of innovation (Maxwell, 2009).

As proxy for managerial stability (Hypothesis 5), we calculate CEO tenure at the time of analysis, i.e., the number of years that the CEO has been in place. To test Hypothesis 6, we re-run the same analysis on the sample of financial institutions only to check whether the effect of *ROA* is similar. Finally, we include the variable *Later-Stage Investments (% GDP)* for testing Hypothesis 7.

A further note is warranted with respect to our identification strategy of whether a company or a financial institution under consideration has a CVC/FVC program (our dependent variable *CVC/FVC (Dummy)*). To our knowledge, the only comprehensive list of CVC programs active in the US is from the *Corporate Venturing Directory and Yearbook 2001* used by Hill et al. (2009), which appears to be the most recent issue of this directory available. As this data is too old for our study, we therefore rely on an alternative approach.

We use the membership directories of the EVCA, the NVCA and other local VC associations of the same year (2008) to identify whether the Global Fortune 500 Companies have a CVC/FVC unit set up or not. For those Global Fortune 500 companies not members of any of these VC associations, we further take into account the corporations that are listed as parent companies in the VentureXpert database and for which CVC/FVC deals' dates are not earlier than 2006.[7] The figure below shows this identification process.



We classify companies' economic activities according to the Industry Classification Benchmark (ICB) used by the Dow Jones and the FTSE Indexes. Multi-business companies have been classified in the industrial sector that represents the greatest volume of their revenues. Finally, we include in all our specifications dummies for the major industry classification to account for differences in opportunities across industries.

[7] We performed cross-checks to assess the reliability of our approach. For US companies, we looked at whether all investments made by the companies in our sample that were reported in VentureXpert were also NVCA members. This was the case for all the companies, lending support to the quality of our approach that relies on VC associations. However, this double-check is more difficult to perform outside the US, since the quality of the data in VentureXpert is poor for other countries (except perhaps for Western Europe in more recent years). Overall however, around 55% of the CVC programs identified show up in VentureXpert, despite the fact that a large fraction of our sample is composed of non-US companies.

5. Analysis

In this section, we use our hand-collected dataset to investigate the motivations of large corporations and financial institutions for setting up a VC program. In Section 5.1, we discuss our dataset. Section 5.2 provides a detailed analysis by testing each of our research hypotheses.

5.1 Descriptive Statistics: Affiliated VC Programs Worldwide

In this subsection, we provide the summary statistics of our sample. The first four columns in Table 2 Panel A provide general summary statistics on our full sample of 500 companies, representing a broad range of industries. In 2008, we identified that 20.2% of the Fortune Global 500 companies had CVC programs. Table 2 Panel A also gives relevant indications of to the composition of the Fortune Global 500 league table. While a third of the companies are from the United States, 36.5% are based in Western Europe and 26.7% in the Asia-Pacific region. Very few companies stem from Eastern Europe and other regions such as South America (Brazil and Mexico).

In total, 25.6% of the companies in our sample are financial institutions, primarily banks and insurance companies. These two groups — non-financial and financial corporations — should be very different in terms of their motivations for setting up a CVC program, as discussed in Section 3. The two follow-up columns therefore restrict the sample to non-financial companies ("true" corporations), of which 16.9% run a CVC program. This contrasts with financial institutions, of which 29.7% have a FVC program. Both samples differ in terms of industry-specific variables (number of employees, revenue, change in revenues, ROA and assets on the balance sheet), but this is little surprising as it captures differences in industry structure, risks, and determinants. Perhaps more surprising however is that the geographical distribution of both subsamples does not significantly differ at all, enabling us to perform a relatively good comparison between the two subsamples.

The average ROA in 2008 for the whole sample is 4.5%. However, there is great variability, notably due to differences across industries. There is also significant variation within the same industries. This can be best seen by examining more closely the subsample of financial institutions only, where the standard deviation is not smaller than in the remaining subsample, but the average ROA differs significantly (2.47% against 5.20% for the subsample of non-financial companies).

From the sample of firms with their own CVC program (see Table 2 Panel B), 37.6% are financial institutions, while the rest are "true" corporations. Half of them are located in Europe, one third in North America (USA and Canada), and the rest spread over the other continents. More importantly,

those with a CVC/FVC program tend to be significantly larger companies as measured by total assets and annual revenue.

Finally, Panel C of Table 2 shows the summary statistics comparing the three major regions: North America, Western Europe and Asia-Pacific. While there seems to be no significant difference between the first two regions in terms of propensity to use a CVC/FVC program, large companies in Asia-Pacific rely much less on these programs. One possible explanation for this finding is that Asian companies in particular may tend to rely on different types of external structures such as the Keiretsu model in Japan and the Chaebol model in South Korea[8]. These country-specific conglomerates indeed permit somewhat looser corporate structures. Asia-Pacific contrasts further with the two other regions by their significantly greater importance of family businesses (Claessens et al., 2000). It should also be pointed out that the VC market is still nascent in most Asian countries (Cumming et al., 2008). However, company characteristics are quite similar across the three regions, with the exception of annual revenues (for Asia-Pacific) and total assets (for Western Europe).

Table 3 reports the correlations between our most important variables. Overall, the correlations tend to be sufficiently low, thus avoiding multi-collinearity problems. Worthwhile pointing out are the significant correlations (at 5% level) of the *CVC/FVC (Dummy)* with the three major explanatory variables: *ROA*, *Assets*, and *Financial (Dummy)*. These results lend support to the Strategic Renewal Hypothesis (Hypothesis 1), and also indicate that financial institutions tend to more often have a VC program than "true" (non-financial) corporations. The reason for this might be linked to the specific skills (due diligence, financing, etc.) relevant for VC activities that financial firms tend to have. This is however beyond the scope of our study. Finally, the positive correlation between *CVC/FVC (Dummy)* and *Assets* must be taken cautiously, since we already focus on a sample of large companies (based on annual revenue, which is obviously correlated with assets in place). The variable *Assets* nevertheless is important as a control variable in our multivariate analysis.

5.2 Determinants of Using CVC and FVC Programs

Let us now turn to testing the hypotheses developed in Section 3. In Table 4, we show Probit regressions with *CVC/FVC (Dummy)* as the dependent variable.

To report the economic significance of each variable, the coefficients are not the estimated ones but rather indicate the effect of a one-standard deviation change of each given variable on the probability of having a CVC/FVC program (i.e., standardized coefficients). Note that due to the strong correlation

[8] Examples of large Keiretsu groups are Mitsubishi Group (e.g., Mitsubishi Motors and Nikon as "subsidiaries") and Mitsui (e.g., Fujifilm, Toshiba, and Toyota). Examples of Chaebol groups are Daewoo, LG, and Samsung.

between *Nbr. Employees* and *Revenue*, we only include these two variables individually and report each specification throughout the analysis.[9]

The first two columns (Regressions (1) and (2)) show the results for the full sample. First, we find a positive and significant effect of ROA. This provides strong support for the strategic renewal hypothesis (Hypothesis 1). The effect is also economically meaningful. Recall from Table 2 that the standard deviation of *ROA* is 5.80%. This means that a two-standard deviation change of *ROA* downwards (i.e., a company moving from the 67% percentile to the 33% percentile of the distribution) has an 8.1% greater chance of using a CVC/FVC program (using Regression (1)). Most strikingly, a similar change (upwards now) for *Assets* leads to a 28% lower chance. Financial institutions however have an 11-15.7% lower probability of having a FVC program than "true" corporations (note though that this result is not statistically significant). However, the economic significance for *ROA* is even stronger when considering only the sample of "true" corporations (Regressions (5) and (6)). Indeed, a two-standard deviation decrease in *ROA* increases the likelihood of having a CVC program by 10.2%. The effect of *Assets* is however significantly reduced, since much of the very large asset variability stems from financial institutions. These results show how the decision to set up a corporate venture capital program is related to firm´s performance that signals a need for change trough strategic renewal actions such as building new capabilities, developing new businesses etc. In line with the intuitions derived in Table 2 Panel C, North American and Western European companies tend to have commonalities, standing out from the other regions.[10] This is confirmed by the tests of differences in coefficient estimates reported in Table 4 (lower panel) for comparisons between North America, Western Europe, and Asia-Pacific.

Table 4 further provides the test results for Hypothesis 2 on financial resource availability. We use annual revenues generated by existing operating activities and the ratio of net operating cash flows (which captures inflows and outflows of capital as they occur) over total assets to measure the availability of financial resources within corporations. Several authors demonstrate that corporate decision to pursue internal and external innovations and business opportunities, is highly sensitive to corporate resources in general and particularly to corporate cash flow (i.e., to the availability of internal funds) (Fazzari and Athey, 1987; Fazzari et al., 1988; Dushnitsky and Lenox, 2005a; Schroth and Szalay, 2010; Souder and Shaver, 2010).

[9] Our approach enables us to achieve a rather high R-squared value compared to other studies. For instance, Dushnitsky and Lenox (2005a) have values of around 2-3% for OLS regressions.

[10] In the specifications presented in Table 4, we merge the Eastern European countries with the "other countries", since there are too few Eastern European countries in our sample to be able to attain a reliable estimation. In fact, the *Eastern Europe* dummy is collinear with some of the industry dummies.

Although several studies predict that the availability of financial resources may facilitate corporation's decision to pursue externally innovations and business opportunities through its CVC activities, we do not find a significant support for Hypothesis 2 (Regressions (7) – (8)).

Additionally, we use CEO tenure as a measure of managerial stability, with the expectation that it has a positive impact on the existence of CVC programs. We found however no support for this prediction, regardless of whether or not the corporation is a financial institution. We examined the possibility that this relationship is non-linear; however we still could not find any support for Hypothesis 5 (results not reported in Table 4 but available upon request).[11] This result goes against the common wisdom that CVC funds tend to be unstable as compared to IVC funds due to their strong dependence on the managerial involvement of the parent company. One possibility is that while CVC investments may be highly volatile, the existence of CVC programs (as opposed to individual investments) is more stable over time. A closer look at the deal flow of some CVC funds of US companies indeed suggests that investments are not made every year in these programs. This may give an impression of volatile investments, while in fact these companies may keep their CVC program running for several years without interruption.

To test Hypothesis 6, we estimate the effect of *ROA* on the likelihood of having a CVC/FVC program (the dependent variable) separately. Results are reported in Regressions (3) – (6) of Table 4. They show, as expected, that the strategic renewal rationale only holds for "true" corporations, but not for financial institutions. The economic effects of *ROA* and *Assets* are reported above. This is not to say that FVCs have no strategic objectives, but simply that strategic renewal is not one of them.

These results raise the question as to whether the innovation and economic environments in which these corporations operate contribute to their decision to set up CVC programs. More specifically, since any CVC program is designed to nurture innovative opportunities created outside large companies, an environment that facilitates innovation in small ventures must exist. This is further critical in terms of entrepreneurial activities taking place in a specific country. In other words, a large company that operates in a country with little innovation and entrepreneurial activities would be less inclined to start a CVC program, since there would be little expected benefit that could accrue from it.

As mentioned above, our unique dataset enables testing this conjecture, since it includes companies from various countries that differ with regards to their domestic environment. For this purpose, we include in our analysis the "Global Innovation Index" that measures the level of innovation activities and the "Early-Stage Entrepreneurial Activity Index" (denoted TEA) that measures the degree of

[11] We also checked whether CEO age might have an impact, but it does not.

entrepreneurial activities both at country level. Due to strong correlation, we exclude the region dummies. Table 5 shows that for corporations (Regression (1)), the *Global Innovation Index* is statistically significant and has the expected sign. The level of innovation activities therefore has a positive effect on the likelihood of setting up a CVC program. This result is also economically important (recall that the values reported in Tables 4 and 5 are changes in probabilities). A two-standard deviation change in the *Global Innovation Index* (which corresponds to moving a company from India to the United States, while keeping everything else constant) increases the likelihood of having a CVC program by 11%. This lends support to the notion that the surrounding innovation environment is a necessary ingredient for a successful CVC program, since otherwise promising ideas would unlikely be found in the marketplace. This is not significant for FVC programs (Regression 4).[12]

The effect of entrepreneurial activities (measured by the variable *TEA*) is statistically insignificant and even negative (significant at the 10% level) for financial institutions. For FVC programs, this is at first sight surprising. There are several possible reasons for this result. One is directly due to the index itself. While the index is supposed to be a proxy of the level of early-stage activities, a closer look reveals that the index also measures different types of such activities, including probably entrepreneurial activities done by necessity. Indeed, some developing/emerging countries have quite high levels of TEA compared to some developed countries. For instance, the US has a value of 9.6 while Thailand 26.9 (the large value in our sample of countries). This may explain also why the measures *TEA* and *Global Innovation Index* are not at all correlated (see Table 3).

Better measures of innovative entrepreneurial activities are, to our knowledge, not available on a worldwide scale. To address this shortcoming, we can however test our conjecture on a sub-sample of well developed countries, since the Statistical Office of the European Commission (Eurostat, 2009) provides information on the level of VC investments in each of the EU member states as well as the United States and Switzerland. In Table 5 (Regressions (2) & (5)), as an alternative measure, we use the ratio of early-stage VC investments by GDP (labeled *Early-Stage Investment (% GDP)*). This measure turns out to be statistically significant for all corporations but not for financial institutions, meaning that countries with well developed early-stage VC markets will also have more corporations with VC programs. In terms of economic significance, a two-standard deviation increases the likelihood of having a CVC program by 21%. However the *Global Innovation Index* has now become largely insignificant through the inclusion of alternative measures of innovation activities. On the

[12] Note that in the specification reported in Table 5 we do not include continent dummies any more. This is because we wish to examine the inference of the environment, which more closely captures differences between countries (as opposed to continents only). Moreover, for several explanatory variables, we only have information for North America and Western Europe but not for most of the other countries. This makes the inclusion of continent dummies meaningless.

other hand, the variables *ROA* and *Assets* remain strongly significant; in fact, they are hardly affected, as their coefficients remain roughly similar (especially for *ROA*). This indicates that the strategic renewal hypothesis (Hypothesis 2) appears robust.

Next to this, industries may differ with respect to their degree of R&D intensity. While industry dummies might capture this difference, they are likely to capture many more. Therefore, we include a final measure for the innovative environment, but that is at the industry level. We take the ratio of R&D Investment over Net Sales of the largest companies (as calculated by Galan and Sanchez, 2006; Sahaym et al., 2009; European Commission, 2008). Interestingly, companies in R&D-intensive industries are more likely to run a VC program[13]. Overall, these findings provide strong support for Hypothesis 4 that conjectures that innovation and entrepreneurial environments impact the innovation structure of large corporations--in particular, whether or not to have a CVC program.

For the variable *Early-Stage Investment* (as a percentage of GDP), we find again no evidence for financial institutions.[14] One possible reason might be that in countries with high levels of early-stage investments, the VC market is very competitive; making it less worthwhile for financial institutions to invest directly in innovative ventures themselves. They may instead invest in independent VC funds. However, the size of the later-stage VC market strongly affects the propensity of financial institutions to develop their own program. This confirms our Hypothesis 7, arguing that in contrast to the early-stage VC market, competition in the later-stage market may negatively impact the value of FVC programs. In terms of economic significance, the impact is particularly strong: increasing later-stage investments (as % of GDP) by the equivalent of a two-standard deviation change reduces the likelihood of having a FVC program by a remarkable 47%.

6. Concluding Remarks

Our study contributes to a better understanding of which *large* companies initiate CVC programs at global level, and why. Further, our analysis is extended to programs run by financial institutions, an area poorly researched so far. Also, our focus is on the prevalence of venture programs rather than specific investments. We document distinctive drivers of CVC and FVC programs.

The approach adopted in this study, i.e., focusing on large corporations and whether or not they have a program, enables a better understanding of which companies use a CVC program. Other studies take

[13] Again, for the subsample of financial institutions (Regressions (4) – (6)), we could not include this variable, since it is a single industry.

[14] For the subsample of *Financial (Dummy)* = 1 (Regressions (5) & (6)), some variables are dropped due to the fact that this subsample represents a single industry. Thus, there is no variability in industry-level variables such as *R&D Industry Index*.

either an investment-level or an industry-level approach. While our approach has several advantages and allows complementing previous studies, it also has a few drawbacks. One is that we cannot control whether the VC program is within the industry focus of the parent company, which is best done with investment-level data. Similarly, our approach takes a binary variable, as we are interested in understanding which companies set up a CVC program in connection with their innovation strategy. We do not "weight" with the size of these programs as done with the other approaches. Therefore, our study is complementary to other analyses that cannot control well for companies that have no CVC program.

Another limitation of our approach, which could also be viewed as an advantage, is that the sample only considers very large companies, as measured by their revenues (not net income). Companies with "average" revenues are excluded, since they do not show up in the Global Fortune 500 list. It is therefore an open question as to whether our results can be extended to companies of any size. However, it should be noted that our sample includes most companies typically mentioned in articles citing specific CVC/FVC programs.

Our findings raise new questions, notably with respect to the motivations of financial institutions to dis-intermediate by setting up their own FVC programs instead of committing capital to independent VC funds and thereby acting as a limited partner. A recent step towards this direction was made by Cumming et al. (2008), who raise the questions of when do financial institutions hold comparative advantages and when do they rely on strategic synergies to make their own programs worthwhile.

Furthermore, how do CVC programs interact with IVC funds, for instance, in connection with deal syndications? Does it create potential conflicts due to the hybrid objectives of CVC programs, or do both types of VC structures complement each other by generating additional value-added to entrepreneurial ventures? The most recent initiative of Siemens (Financial Times; February 15, 2009) shows the desire of some companies that have set up successful VC funds to share their experience with other companies by acting as general partner. Indeed, Siemens is seeking to manage a new fund while at the same time opening it to limited partners (such as pension funds and insurance companies) that only have financial objectives.

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Figure 1: Capital Commitments Worldwide for Different Types of Venture Capital Funds (in USD billion), by Vintage Year from 1995-2008 [Data source: VentureXpert. IVC includes all the categories in "All Private Partnerships" (codes 11, 20, 21); CVC includes all the categories in "All Corporate Venturing Groups" (codes 24, 14, 64, 69, 62) and "All Corporations" (codes 54, 56); FVC includes all the categories in "All Financial Corporations" (codes 22, 51, 52, 26, 25, 28, 12, 61, 66, 68), "All Investment Banks" (codes 53, 23, 13, 63), and "All Investment Advisors" (code 29); and "Total VC" includes all capital commitments made to venture capital funds (all codes).**]**

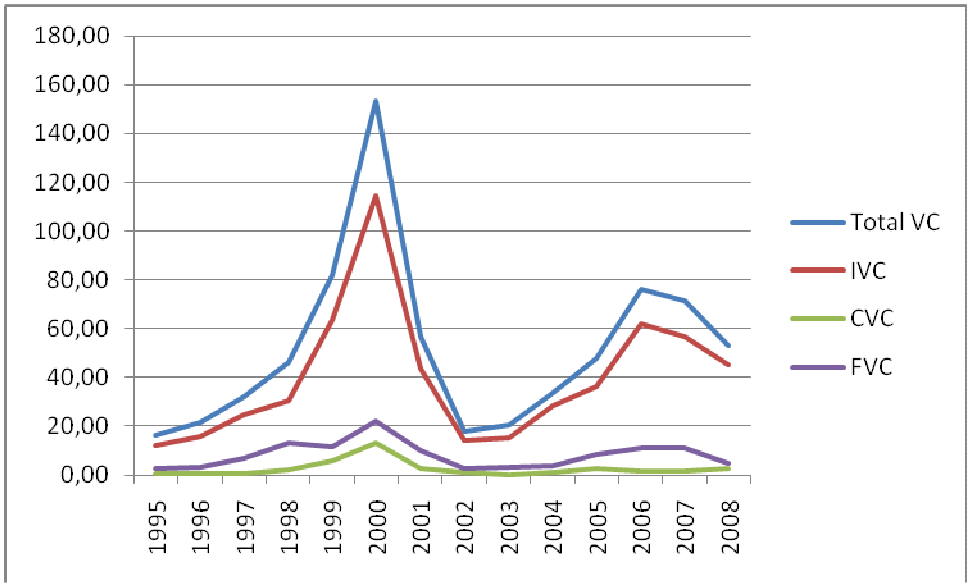

Figure 2: Relative Importance of Different Types of Venture Capital Funds (as Percentage of Total Capital Commitments Worldwide to the Industry), by Vintage Year from 1995-2008 [Data source: VentureXpert. IVC includes all the categories in "All Private Partnerships" (codes 11, 20, 21); CVC includes all the categories in "All Corporate Venturing Groups" (codes 24, 14, 64, 69, 62) and "All Corporations" (codes 54, 56); FVC includes all the categories in "All Financial Corporations" (codes 22, 51, 52, 26, 25, 28, 12, 61, 66, 68), "All Investment Banks" (codes 53, 23, 13, 63), and "All Investment Advisors" (code 29); and "Total VC" includes all capital commitments made to venture capital funds (all codes).**]**

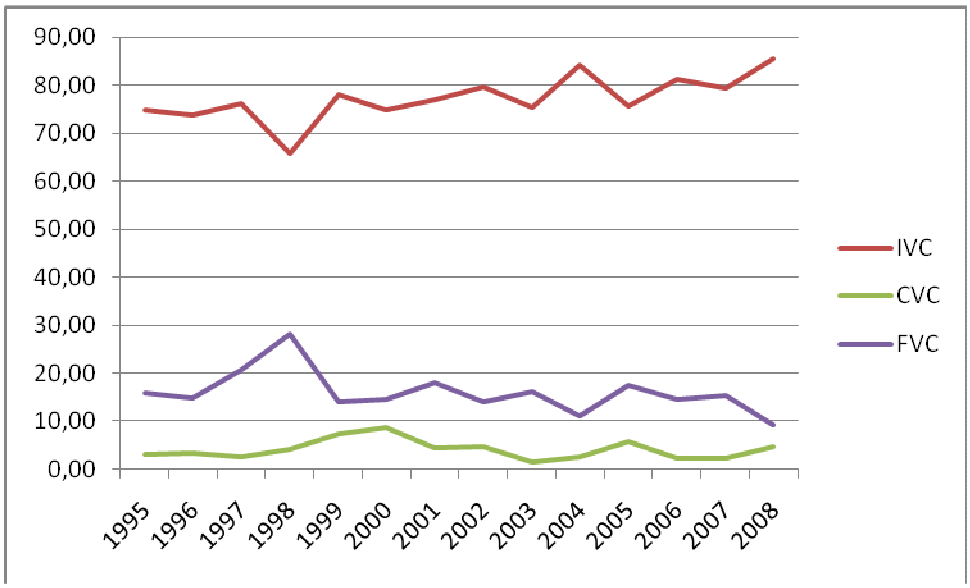

Figure 3: Annual Change in Capital Commitments Worldwide (in Percent compared to Previous Year) for Different Types of Venture Capital Funds, by Vintage Year from 1995-2008 [Data source: VentureXpert. IVC includes all the categories in "All Private Partnerships" (codes 11, 20, 21); CVC includes all the categories in "All Corporate Venturing Groups" (codes 24, 14, 64, 69, 62) and "All Corporations" (codes 54, 56); FVC includes all the categories in "All Financial Corporations" (codes 22, 51, 52, 26, 25, 28, 12, 61, 66, 68), "All Investment Banks" (codes 53, 23, 13, 63), and "All Investment Advisors" (code 29); and "Total VC" includes all capital commitments made to venture capital funds (all codes).**]**

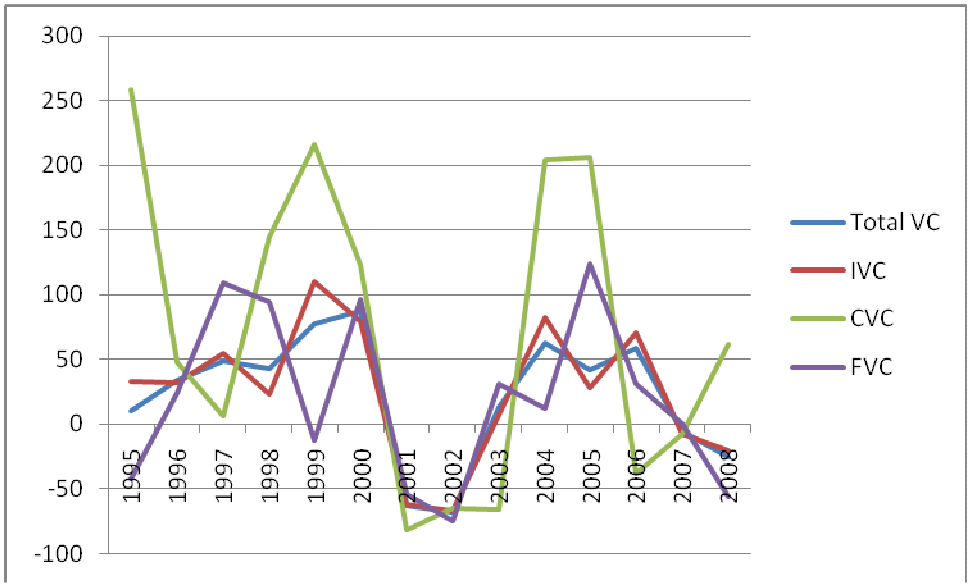

TABLE 1: Definition of Variables

Variable	Definition
CVC/FVC (Dummy)	Dummy = 1 if the corporation or financial institution has a CVC/FVC program; cf. Section 4 for the specific identification strategy to assess whether a corporation has a CVC program
Nbr. Employees	Number of employees, in thousands for the fiscal year ended Dec. 31, 2007
Revenue	Annual revenue of the corporation, in USD million for the fiscal year ended Dec. 31, 2007
ROA	"Return On Assets" of the corporation, as measured by the ratio of net income over total assets for the fiscal year ended Dec. 31, 2007
Assets	Total asset value (in accounting value) of the corporation, in USD 1000 billion for the fiscal year ended Dec. 31, 2007; this variable measures the size of the corporation
Financial (Dummy)	Dummy = 1 if the corporation is a financial institution (e.g. a bank)
North America (Dummy)	Dummy = 1 if the corporation's headquarters is located in North America (USA and Canada)
Western Europe (Dummy)	Dummy = 1 if the corporation's headquarters is located in Western Europe
Eastern Europe (Dummy)	Dummy = 1 if the corporation's headquarters is located in Eastern Europe
Asia-Pacific (Dummy)	Dummy = 1 if the corporation's headquarters is located in Asia-Pacific
Other Countries (Dummy)	Dummy = 1 if the corporation's headquarters is located in any other country than those specified above
Global Innovation Index	Value of the "Global Innovation Index" (as constructed by Business World/INSEAD) of the country where the corporation's headquarters is located
TEA	Value of the 2008 "Early-Stage Entrepreneurial Activity" index (as constructed by the Global Entrepreneurship Monitor) of the country where the corporation's headquarters is located
Industry Dummies	Dummy = 1 if the corporation is active in a specific industry sector; we use a dummy variable for each of the following industries: Automobiles & parts; Basic materials; Chemicals; Computer related industries (hardware, software, office equipments); Consumer goods; Consumer services & retail; Electronics, electrical components & equipment; Financials (banks, insurance & real estate); Health care equipment & services; Heavy construction & building materials; Industrial engineering & farm machinery; Industrial transportation; Oil & gas; Pharmaceuticals & biotechnology; Telecommunications; Utilities
Early-Stage Investments (% GDP)	Venture capital early-stage investments by country, as a percentage of GDP (Source: Eurostat, 2009)
Later-Stage Investments (% GDP)	Venture capital expansion-stage and replacement investments by country, as a percentage of GDP (Source: Eurostat, 2009)
R&D Industry Index	R&D investment expressed as a percentage of net sales for each industry (Source: 2008 EU Industrial R&D Investment Scoreboard database)
Resource Availability	Ratio of Net Operating Cash Flows over total assets (Source: Datastream; Compustat)
Internal R&D Intensity	R&D Expenditure as a percentage of total assets (Source: Datastream; Compustat)
Industry Market-to-Book Ratio	Value to book ratios by industry group for 2006 (Source: Damodaran's data site)
CEO Tenure	Number of years that the CEO was already in place at the time of the analysis (Source: Businessweek database)

TABLE 2: Summary Statistics

Variables are defined in Table 1.

PANEL A

	Full Sample				Corporations Only (Financial = 0)		Financial Institutions Only (Financial = 1)		Diff. in mean
Variable	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Mean	Standard Deviation	P-value
CVC/FVC (Dummy)	0.202	0.402	0.000	1.000	0.169	0.376	0.297	0.459	0.005
Nbr. Employees	108327	153505	172	2055000	115925	170042	86244	86367	0.011
Revenue	47237	44722	16691	378799	46029	45772	50747	41491	0.280
Change in Revenue	17.157	24.360	-45.900	353.200	17.884	26.826	15.035	14.883	0.137
ROA	4.502	5.798	-46.000	45.000	5.202	5.670	2.469	5.707	0.000
Assets	0.210	0.430	0.005	3.783	0.055	0.056	0.660	0.667	0.000
Financial (Dummy)	0.256	0.437	0.000	1.000	0.000	0.000	1.000	0.000	- - -
North America (Dummy)	0.335	0.472	0.000	1.000	0.326	0.469	0.359	0.482	0.498
Western Europe (Dummy)	0.365	0.482	0.000	1.000	0.350	0.478	0.406	0.493	0.265
Eastern Europe (Dummy)	0.014	0.118	0.000	1.000	0.016	0.126	0.008	0.088	0.412
Asia-Pacific (Dummy)	0.267	0.443	0.000	1.000	0.288	0.454	0.203	0.404	0.046
Other Countries (Dummy)	0.020	0.140	0.000	1.000	0.019	0.136	0.023	0.152	0.763
Industry Market-to-Book Ratio	2.809	1.892	1.460	17.020	3.100	2.119	2.055	0.666	0.000
Global Innovation Index	4.628	0.938	2.530	5.800	4.637	0.945	4.605	0.922	0.737
TEA	7.524	3.732	2.400	26.900	7.524	3.823	7.522	3.468	0.995
R&D Industry Index	2.156	2.804	0.380	15.150	2.655	3.099	0.710	0.000	- - -
CEO Tenure	6.344	6.267	1.000	42.000	6.222	6.120	6.742	6.744	0.441
Nbr. Observations	500				372		128		

PANEL B

	Sub-sample with a CVC/FVC Program (CVC/FVC Dummy = 1)		Sub-sample without CVC/FVC Program (CVC/FVC Dummy = 0)		Diff. in mean
Variable	Mean	Standard Deviation	Mean	Standard Deviation	P-value
CVC/FVC (Dummy)	1.000	0.000	0.000	0.000	- - -
Nbr. Employees	117733	168865	105946	149502	0.522
Revenue	54334	45705	45440	44348	0.079
Change in Revenue	16.712	17.459	17.271	25.841	0.796
ROA	3.089	4.205	4.860	6.089	0.001
Assets	0.494	0.772	0.138	0.238	0.000
Financial (Dummy)	0.376	0.487	0.226	0.418	0.004
North America (Dummy)	0.366	0.484	0.327	0.470	0.459
Western Europe (Dummy)	0.495	0.502	0.332	0.471	0.003
Eastern Europe (Dummy)	0.000	0.000	0.018	0.132	0.008
Asia-Pacific (Dummy)	0.129	0.337	0.302	0.459	0.000
Other Countries (Dummy)	0.010	0.100	0.023	0.149	0.305
Industry Market-to-Book Ratio	2.978	1.747	2.764	1.929	0.282
Global Innovation Index	4.833	0.830	4.575	0.958	0.007
TEA	6.820	2.783	7.702	3.919	0.009
R&D Industry Index	3.125	4.253	1.914	2.245	0.006
CEO Tenure	6.419	6.344	6.324	6.256	0.893
Nbr. Observations	101		399		

PANEL C

	North America Sample	Western Europe Sample	Asia-Pacific Sample	Diff. in mean: North America vs. Western Europe	Diff. in mean: North America vs. Asia-Pacific	Diff. in mean: Europe vs. Asia-Pacific
Variable	Mean	Mean	Mean	P-value	P-value	P-value
CVC/FVC (Dummy)	0.222	0.275	0.098	0.250	0.003	0.000
Nbr. Employees	110999	100655	115636	0.551	0.806	0.347
Revenue	51500	50266	39684	0.819	0.015	0.012
Change in Revenue	16.004	17.325	17.950	0.661	0.529	0.728
ROA	4.719	4.335	4.241	0.573	0.400	0.876
Assets	0.165	0.312	0.142	1.000	1.000	1.000
Financial (Dummy)	0.275	0.286	0.195	0.832	0.102	0.061
North America (Dummy)	1.000	- - -	- - -	- - -	- - -	- - -
Western Europe (Dummy)	- - -	1.000	- - -	- - -	- - -	- - -
Eastern Europe (Dummy)	- - -	- - -	- - -	- - -	- - -	- - -
Asia-Pacific (Dummy)	- - -	- - -	1.000	- - -	- - -	- - -
Other Countries (Dummy)	- - -	- - -	- - -	- - -	- - -	- - -
Industry Market-to-Book Ratio	2.916	2.931	2.381	0.944	0.000	0.005
Global Innovation Index	5.654	4.323	3.969	0.000	0.000	0.000
TEA	9.390	4.779	9.011	0.000	0.430	0.000
R&D Industry Index	2.595	1.881	2.151	0.028	0.182	0.326
CEO Tenure	7.727	5.153	5.522	0.000	0.004	0.519
Nbr. Observations	167	182	133			

TABLE 3: Correlation Matrix

Variables are defined in Table 1. Values shown are pairwise correlations. An "*" refers to a significance level below 5%.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) CVC/FVC (Dummy)	1.00																	
(2) Nbr. Employees	0.03	1.00																
(3) Revenue	0.08	0.47*	1.00															
(4) Change in Revenue	-0.001	-0.02	-0.05	1.00														
(5) ROA	-0.12*	-0.05	-0.01	0.04	1.00													
(6) Assets	0.33*	0.03	0.21*	-0.02	-0.17*	1.00												
(7) Financial (Dummy)	0.14*	-0.08	0.05	-0.05	-0.21*	0.61*	1.00											
(8) North America (Dummy)	0.03	0.01	0.07	-0.03	0.03	-0.07	0.03	1.00										
(9) Western Europe (Dummy)	0.13*	-0.04	0.05	0.01	-0.02	0.18*	0.05	-0.54*	1.00									
(10) Eastern Europe (Dummy)	-0.06	0.03	-0.01	-0.03	0.02	-0.03	-0.03	-0.08	-0.09*	1.00								
(11) Asia-Pacific (Dummy)	-0.16*	0.03	-0.10*	0.02	-0.03	-0.10*	-0.08	-0.43*	-0.46*	-0.07	1.00							
(12) Other Countries (Dummy)	-0.04	-0.03	-0.07	0.03	0.05	-0.03	0.01	-0.10*	-0.11*	-0.02	-0.09	1.00						
(13) Industry Market-to-Book Ratio	0.05	0.01	-0.09*	-0.001	0.07	-0.19*	-0.25*	0.04	0.05	0.02	-0.13*	0.09	1.00					
(14) Global Innovation Index	0.11*	-0.02	0.10*	-0.06	-0.01	-0.02	-0.01	0.78*	-0.25*	-0.26*	-0.41*	-0.27*	0.03	1.00				
(15) TEA	-0.10*	0.09*	-0.02	0.05	0.04	-0.09*	-0.0003	0.35*	-0.56*	-0.11*	0.24*	0.06	-0.06	0.001	1.00			
(16) Early-Stage Investments (% GDP)	0.08	0.07	0.03	-0.004	0.07	-0.05	0.03	0.28*	-0.26*	-0.12*	.	.	0.05	0.26*	0.32*	1.00		
(17) R&D Industry Index	0.17*	-0.03	-0.04	0.04	0.09	-0.19*	-0.30*	0.11*	-0.07	-0.05	-0.001	-0.07	0.16*	0.20*	-0.04	0.08	1.00	
(18) CEO Tenure	0.01	0.06	-0.06	-0.03	0.03	-0.06	0.04	0.17*	-0.14*	0.05	-0.07	0.09	0.06	0.05	0.05	-0.01	-0.01	1.00

TABLE 4: Determinants of the Choice for Setting Up a CVC/FVC Program

The dependent variable in all the Probit regressions is "CVC/FVC (Dummy)", a dummy variable equal to one if the corporation or financial institution has a CVC/FVC program. The method of estimation is the Probit regression. For ease of interpretation, we report changes in probabilities instead of direct coefficient estimates. All the variables are defined in Table 1. Robust standard errors are used. Significance levels: *** for 1%, ** for 5%, and * for 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	Full sample		Financial Institutions Only		Corporations Only		Corporations Only	
Revenue	-0.382	-0.370	-0.916	-1.477	-0.588	-0.537	-0.654	-0.716
ROA	-0.006 *	-0.006 *	0.006	0.003	-0.006 **	-0.007 **	-0.009 **	-0.010 **
Assets	0.340 ***	0.331 ***	0.430 ***	0.412 ***	1.040 ***	1.212 ***	1.283 ***	1.394 ***
Resource Availability							-0.285	-0.102
Internal R&D Intensity							-0.609	-0.519
Financial (Dummy)	-0.110	-0.157						
North America (Dummy)	0.161	0.992 ***	-0.134	0.989 ***	0.994 ***	0.994 ***	0.998 ***	0.997 ***
Western Europe (Dummy)	0.204	0.996 ***	-0.072	0.990 ***	0.995 ***	0.998 ***	0.998 ***	0.998 ***
Asia-Pacific (Dummy)	-0.054	0.982 ***	-0.290	0.919 ***	0.984 ***	0.992 ***	0.990 ***	0.988 ***
Industry Market-to-Book Ratio	0.043 **	0.046 **	- -	- -	0.022 *	0.027 *	0.047 **	0.046 *
CEO Tenure		0.002		-0.001		0.004		0.002
Industry Dummies Included?	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Difference in Coefficient Tests (test values reported):								
North America vs. Western Europe	0.75	0.60	0.45	0.18	0.10	0.28	0.07	0.44
North America vs. Asia-Pacific	11.74 ***	7.26 ***	2.66	1.17	10.92 ***	7.99 ***	8.18 ***	5.54 **
Western Europe vs. Asia-Pacific	16.53 ***	10.56 ***	4.77 **	2.08	11.81 ***	9.48 ***	8.75 ***	8.36 ***
Number of Observations	460	364	128	93	332	271	223	200
Log Pseudo-Likelihood	-171.47	-138.07	-58.04	-43.18	-106.37	-89.68	-81.46	-76.07
Pseudo-R squared	26.7%	28.5%	25.5%	25.2%	30.5%	32.7%	29.8%	30.3%

TABLE 5: Impact of Innovative and Entrepreneurial Environments

The dependent variable in all the Probit regressions is "CVC/FVC (Dummy)", a dummy variable equal to 1 if the corporation or financial institution has a CVC/FVC program. The method of estimation is the Probit regression. For ease of interpretation, we report changes in probabilities instead of direct coefficient estimates. All the variables are defined in Table 1. A constant term is included in all the regressions whose coefficient is not reported. Robust standard errors are used. Significance levels: *** for 1%, ** for 5%, and * for 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	Corporations Only			Financial Institutions Only		
Revenue	-0.530	-1.358 *	-0.719	-0.482	-1.361	-1.236
ROA	-0.007 **	-0.009 **	-0.009 **	0.004	0.006	0.009
Assets	1.390 ***	2.485 ***	2.032 ***	0.401 ***	0.506 ***	0.521 ***
Industry Market-to-Book Ratio	0.036 **	0.034	0.041 *	- -	- -	- -
Global Innovation Index	0.057 **	-0.013	-0.001	0.052	-0.035	0.011
TEA	-0.006			-0.023 *		
Early-Stage Investments (% GDP)		7.955 ***			0.712	
Later-Stage Investments (% GDP)			-0.051			-1.961 ***
R&D Industry Index		0.031 ***	0.026 **		- -	- -
Industry Dummies Included?	Yes	Yes	Yes	No	No	No
Number of Observations	325	221	221	127	90	90
Log Pseudo-Likelihood	-111.78	-79.83	-84.80	-59.03	-45.98	-43.48
Wald Chi-squared	69.49 ***	56.29 ***	55.13 ***	28.45 ***	25.17 ***	26.50 ***
Pseudo-R squared	26.2%	32.6%	28.4%	23.8%	22.9%	27.1%