DBJ Discussion Paper Series, No. 2402

The Role of Corporate Venture Capital in Japan

Vladimir I. Ivanov
(McDonogh School of Business
Georgetown University)

September 2024

Discussion Papers are a series of preliminary materials in their draft form. No quotations, reproductions or circulations should be made without the written consent of the authors in order to protect the tentative characters of these papers. Any opinions, findings, conclusions or recommendations expressed in these papers are those of the authors and do not reflect the views of the Institute.

The Role of Corporate Venture Capital in Japan

Vladimir I. Ivanov*
Adjunct Professor
McDonogh School of Business
Georgetown University
vii2@georgetown.edu

September 2024

Abstract: This paper examines the effect of corporate venture capital (CVC) on startups in the Japanese venture capital industry. I find that startups backed by CVCs are more likely to get acquired than startups backed only by traditional venture capitalists (TVCs). Additionally, CVC backing is associated with higher valuations, measured by a market-to-book ratio, at the time of going public. The results are robust when controlling for the potentially endogenous nature of CVC financing using a propensity score matching.

Keywords: Corporate Venture Capital, Venture Capital, Startups, Valuation, Exits, Initial Public Offering

* I thank seminar participants at Development Bank of Japan Inc. Part of this research was conducted while the author was the Shimomura Fellow at the Development Bank of Japan Inc.

I. INTRODUCTION

Corporate venture capital (CVC) stands for the organized efforts of non-financial corporations to make private equity investments in young and risky firms. Since its inception in the early 1960s, CVC investment has gone through boom-and-bust cycles that mirrored the peaks and troughs of the overall VC industry (Gompers and Lerner (2000)) and have been approximately 15% of total VC investments. Based on the types of companies they target (startups). CVCs are just like traditional venture capitalists (TVCs). There are, nonetheless, some significant differences between the two. CVCs are not organized like limited partnerships with predetermined life span. They are corporate units who often have strategic interest and might derive important strategic benefits from investing in startups (Gompers and Lerner (2000)), rather than going for pure financial returns like TVCs. CVCs also lack the profit-sharing compensation schemes of the general partners of TVCs that incentivize TVCs to try and identify the best startups to invest in. Overall, the finance literature has documented some important benefits and shortcomings of CVCs, with the net effect of CVC financing on startups being largely an empirical question.

While existing studies on the benefits of CVC for their portfolio companies have mainly relied on U.S. or U.K. data, international CVC is still one of the relatively under-explored areas in venture capital. It is interesting to see whether CVC in other countries behaves similarly to or different than in the U.S. For example, do CVCs consistently add value to startups across the globe, or is this mostly a US phenomenon? Also, if the net impact of CVC on startups is positive, does it lead to higher valuations of these startups? Is IPO the most likely exit strategy (like in the US) for international CVCs, or is merger a more important exit venue? This paper tries to provide answers to some of these questions.

In this study, I examine the effect of CVC on startups in Japan. I use data on Japanese CVC-backed and TVC-backed startups during the period 1990-2023. I also control for the potentially endogenous nature of CVC backing (see, e.g., Ivanov and Xie (2010)) by using a propensity score matching approach. I find evidence of important CVC effects on startup

performance and valuation. First, the analysis in the paper shows that Japanese startups backed by CVCs are significantly more likely to get acquired compared to their TVC-backed counterparts. On the other hand, having a CVC does not significantly affect the likelihood of the startup going public. These findings shed new light on the issue of the role of CVCs in the successful exit strategies of their portfolio companies. It is well documented that CVC-backed IPOs in the US have a higher likelihood of going public compared to their TVC-backed counterparts (e.g., see Gompers and Lerner (2000) and Santhanakrishnan (2002)). The fact that in Japan it is the acquisition exit venue that is more likely under CVC backing suggests that perhaps for Japanese startups backed by CVCs being acquired may be a more desirable outcome than doing an IPO.

Second, I document that CVC-backed startups that eventually make it to an IPO, enjoy higher valuations compared to similar TVC-backed IPOs. CVC-backed Japanese startups tend to have higher Market-to-Book (MTB) rations relative to their TVC-backed peers. In this respect, the effect of CVC on Japanese startups is similar to that of its U.S. counterpart (see, e.g., Ivanov and Xie (2010)). The results are robust to various empirical specifications. When controlling for the potential endogeneity of receiving CVC, I find that the results remain significant and with the same sign.

The paper contributes to the literature on the effects of CVC on startups. Prior studies find that CVC backing is associated with a higher probability of a successful exit (IPO or acquisition) (Gompers and Lerner (2000), Ivanov and Xie (2010), and Santhanakrishnan (2002)). This study finds evidence that the presence of CVCs leads to significantly higher likelihood of being acquired but finds no evidence of effect on the likelihood of going public. Prior studies also find that CVC backing is associated with higher valuations at IPO (Maula and Murray (2002) and Ivanov and Xie (2010)) and at acquisition (Ivanov and Xie (2010)). I document a similar effect for Japanese startups.

II. CORPORATE VENTURE CAPITAL AND STARTUPS – LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

CVCs differ from TVCs in several important aspects (Gompers and Lerner (2000)). First, CVCs are usually organized as separate units within corporations with a certain degree of autonomy from corporate headquarters. Sometimes, they can also be structured as informal groups within units, e.g., as part of a corporation's research and development (R&D) department. TVCs, on the other hand, are mostly structured as limited partnerships (LPs). Second, CVCs usually lack the high-powered incentive schemes typical for TVCs. While substantial profit sharing ("carried interest") is common among TVCs, most corporate venture capitalists are compensated with salary and bonuses. For example, MacMillan, Roberts, Livada, and Wang (2008) survey 48 CVC programs and report that only 21% of senior personnel receive carried interest and 13% receive bonus similar to carried interest. Third, unlike TVCs, CVCs do not invest in entrepreneurial companies for financial returns only. Instead, they often pursue investments to provide their corporate parents with strategic benefits such as access to new technology and markets and opportunities to develop strategic alliances or joint ventures.[2] In fact, most corporations establish CVCs programs with strategic motives in mind (Yost and Devlin (1993) and Earnst&Young (2002)).

Several theoretical models provide rationale for the development of strategic corporate investment. Hellmann (2002) models an entrepreneur's choice between a TVC and CVC, who compete on valuation and the value-added services they provide to startups. Unlike TVCs, CVCs can derive strategic benefits from investing in in startups. Hellmann shows that if the startup develops complementary technology to that of the CVC parent, then it is better off choosing the CVC over TVC as an investor, because the CVC would have stronger incentives to provide supportive effort. When the technology developed by the startup is a substitute that decreases the value of the core assets of the CVC parent, the startup faces a trade-off between choosing a TVC

[2] Other strategic benefits include establishing a toehold for future acquisitions, developing potential customers or suppliers, supporting the growth of complementary products and services, utilizing excess capacity, and exposing middle management to entrepreneurship (Silver (1993)).

or a CVC. The CVC might offer higher valuation, but the TVC always provides more value-added services. If the technology is mildly harmful to the CVC parent, the startup chooses the TVC, but if it is very harmful, the TVC and the CVC will syndicate the deal.

Fulghieri and Sevilir (2009) model how product market competition affects the choice of developing innovation internally versus acquiring it externally through CVC investing. The internal development allows for the appropriation of a higher share of the innovation profits, whereas external development provides stronger incentives to the entrepreneur. Fulghieri and Sevilir (2009) show that when the R&D race is more intense and development speed is critical, CVC investment if preferable.

II.A DO CVCS ADD VALUE TO THEIR PORTFOLIO FIRMS?

Academics and practitioners alike have long suggested that CVCs add value to their portfolio companies, but the empirical evidence on this is rather limited. Previous studies such as Gompers and Lerner (2000) and Santhanakrishnan (2002) find that CVC backing increases entrepreneurial firms' likelihood of going public or being acquired. However, it remains unclear how CVC-backed startups fare once they arrive at these stages. It would be premature to conclude that CVCs add value if their portfolio companies consistently go public or get acquired at valuation levels below those attained by non-CVC-backed companies. Since CVCs almost always co-invest with TVCs, whether CVC backing adds value to startup companies depends on whether CVCs can make contributions incremental to those from TVCs. Some of the institutional differences between the two types of venture organizations suggest that CVCs can, while other differences suggest otherwise. These differences will jointly determine how valuable CVC services and support are to entrepreneurial companies.

II.A.1 Potential advantages of CVCs

The defining feature of CVCs is their close affiliation with large established corporations. As a direct result of this affiliation, they can leverage the assets and capabilities of their parents to facilitate the growth and development of portfolio companies (Block and MacMillan (1993)). For

example, they can provide startups with technological and R&D support, product development assistance, manufacturing capacities, and access to marketing and distribution channels (Chesbrough (2000)). Sometimes, certain technologies require the development of complementary technologies in order to generate value, and corporations might be better positioned than TVCs to provide and coordinate such complementarities (Chesbrough (2000)). CVCs can also connect entrepreneurial firms with various business units of their parent corporations and help establish cooperative relationships between them. The CVC parent might be a potential customer or supplier which could significantly increase the startup's odds of success.

Ivanov and Xie (2010) examine the forms of collaboration that exist between a CVC parent and its portfolio firms. Their study of CVC-backed IPOs yields evidence consistent with a value-adding role of CVCs. They find that CVCs provide a variety of valuable services and support to their portfolio companies. Specifically, between startup companies and their CVC investors, there often exist customer or supplier relations, marketing/sales/distribution agreements, and joint research or product development agreements. These relations exhibit interesting variations across different industries. For example, joint research agreements are more common for pharmaceutical and biotech firms, while firms from industries such as internet/business services, electronics, and machinery and computer equipment have more product development and marketing/sales/distribution relations with their corporate venture investors.

Being part of large industrial corporations also gives CVCs access to the intra-firm information network. Their contacts with other divisions of the parent corporations could generate some inside knowledge about the industries and product markets in which those divisions operate. CVCs can use this information to help entrepreneurial companies devise better business strategies and compete more effectively in the product market. Also, since CVCs are a part of large corporations, they can tap the financial resources of their parent corporations (deep pockets) and hence might be able to finance startups even during periods in which the VC industry is in recess (Chesbrough (2000)).

Another way in which CVC backing benefits startups is by bringing credibility to these young, unproven enterprises (McNally (1997)). Most CVC parent corporations are well-known leaders in their respective industries. Their presence as investors could send a positive signal about a startup's prospect and mitigate the information asymmetry surrounding the startup. The reduced uncertainty should facilitate the startup's interactions with potential alliance partners, suppliers and customers, and help the startup obtain a higher valuation in the capital market. Consistent with this argument, Stuart, Hoang, and Hybels (1999) find that biotech startups with prominent strategic alliance partners arrive at the IPO stage faster and receive higher valuations than comparable firms without such connections. In addition, the credibility provided by CVC parent corporations can help with the rapid internalization of their portfolio firms (Maula and Murray (2002)).

II.A.2 Potential disadvantages of CVCs

The unique organizational structure of CVCs also puts them at certain disadvantages compared to TVCs. Most of the traditional venture funds are set up as limited partnerships in which the venture capitalists are the general partners, and they invest the money contributed by limited partners. The pre-specified finite life of the limited partnerships (usually 10 years) and the covenants in the contractual agreements between limited partners and general partners ensure that venture capitalists put their best efforts into selecting and managing portfolio companies (Gompers and Lerner (1996)). However, both features are largely missing from corporate venture programs. Therefore, it is questionable whether corporate venture capitalists have enough incentives to exert best efforts in the selection and development of startup companies.

The problem is exacerbated by the fact that CVCs do not have the high-powered compensation schemes that TVCs usually adopt, probably due to their less autonomous status as part of a larger industrial company.[3] Therefore, CVCs frequently experience difficulties in recruiting and retaining talented employees (Gompers and Lerner (2000)), which further

[3] For example, jealousy from other divisions and bureaucracy in a large corporation both could deter the use of high-powered compensation schemes.

undermines their ability to provide value-added services to entrepreneurial companies. In addition, CVCs could become victims of intra-organizational politics as various business units compete over scarce resources (Sykes (1986)).

CVCs' incentives may also be called into question when conflicts of interest arise between their corporate parents and their portfolio companies due to similar or competing products and technology. As active equity investors, CVCs have access to the business strategy and trade secrets of the entrepreneurial firms and should try to prevent any leakage of such sensitive information. However, in cases of a conflict, CVCs most likely will side with their parent corporations, which they are a part of, and engage in activities such as information sharing and technology transfer that may jeopardize the survival and growth of startups (Hamel (1991)). Hellmann (2002) shows that when a CVC parent and a startup are potential competitors, the startup is better off receiving financing from a TVC. In addition, sometimes CVC investments in startups are prelude to acquisitions later on (McNally (1997), Siegel, Siegel, and MacMillan (1998), Sykes (1990), and Winters (1998)). Sykes (1990) reports that entrepreneurs are often wary of such intentions. Having a corporate venture investor could also constrain startups from developing inter-organizational relationships. For example, CVCs may prevent their portfolio companies from forming alliances with their parent corporations' competitors, even though such alliances can bring significant strategic benefits to the startups.

II.B EMPIRICAL EVIDENCE ON CVC VALUE ADDED

So far, the empirical work on the value added by CVCs has focused on primarily two questions. First, does CVC backing improve the startup's likelihood of a successful exit? Second, does CVC backing lead to higher valuations and better performance? In answering both questions, one of the main issues has been to distinguish strategic from purely financial CVC investing. As mentioned above, investing for strategic reasons might have very different implication for the motivation and ability of CVCs to nurture their startups. Another key issue is to disentangle selection from value added. Specifically, do CVCs simply select better startups to finance, or do

they add value beyond that added by other investors in the startup? The answer to this question would undoubtedly provide us with a much clearer understanding of what role CVCs play in the financing of entrepreneurial ventures.

Gompers and Lerner (2000) are the first to show that CVC backing is associated with a higher probability of a successful exit. They examine the performance of startups backed by TVCs and CVCs during the period of 1983-1994. As a unit of analysis, they use an investment in a startup by CVCs or TVCs. They find that CVC-backed startups are more likely to go public or be acquired than TVC-backed startups. In addition, they find that it is not CVC backing per se that is associated with better exit outcomes, but the presence of a strategic fit between the startup and the CVC parent. Gompers and Lerner define strategic fit based on the degree of proximity between the lines of business of the CVC parent and the startup. Their study, however, does not deal with the selection versus value added issue.

One potential explanation for the positive relationship between successful exits and strategic fit with the CVC parent is provided by Hellmann (2002). In his theoretical model, the CVC has an incentive to offer support to a startup when the two have complementary products. Santhanakrishnan (2003) tests Hellmann's prediction using a unique measure of complementarity between startups and CVC parent corporations and finds that in the presence of complementarities CVCs are more likely to provide product market support to their portfolio firms which, in turn, increases their probability of successful exit. Santhanakrishnan (2003) also controls for the endogeneity between product market support and startup exit strategies and finds that his results remain unchanged.

Most of the current empirical evidence on CVC value added is based on CVC-backed startups that go public because a lot more information is available for those firms than for CVC-backed startups that are acquired or remain private. Using UK data, Maula and Murray (2002) examine the effect of CVC backing on the market value of IPO firms for a sample of 325 information technology firms going public during the period 1998-1999. Market value is measured

as shares outstanding multiplied by the price at the close of the offer day. Controlling for several factors that might affect the firm value at IPO, they find that CVC-backed IPOs tend to have higher market value than other IPOs. The valuations are higher when the startup is backed by more than one CVC. However, their empirical analysis does not address whether the documented CVC effect reflects CVC value added, or it is simply due to superior project selection abilities, as CVCs may be able to leverage their industry knowledge and expertise to choose better entrepreneurial companies to back without adding any value. Also, Maula and Murray (2002) do not distinguish between CVCs making strategic investments and those making purely financial investments.

Ivanov and Xie (2010) provide further insights into whether CVCs add value to startups by analyzing a large sample of 1,510 VC-backed IPOs during the period 1981-2000, of which 219 are backed by CVCs. They examine whether CVC backing affects the valuations that startups obtain when they go public and how persistent the effect is. Unlike other studies, they also study a sample of acquisitions of VC-backed targets to investigate whether CVC backing has any effect on the takeover premiums that CVC-backed startups receive when acquired.

Their analyses show that the valuable services and support from CVCs translate into higher IPO valuations for the startup companies. Using a method of propensity score matching to control for the endogeneity of CVC backing, they find that IPOs with CVC backing obtain significantly higher valuations than those with TVC backing only, suggesting that CVCs add value to their portfolio companies and the value added is incremental to that provided by TVCs. Moreover, they find that the higher valuations mostly accrue to startups that have a strategic fit with the parent corporations of their CVCs, where strategic fit is defined as the existence of a strategic alliance or close business relation. This is consistent with the argument that the benefits of CVC backing primarily come from asset or operation complementarities between startups and corporate venture investors. The results hold for a number of widely used price multiples and are robust to controlling for a host of IPO pricing determinants. The valuations of CVC-backed IPOs with the presence of strategic fit remain higher than those of other IPOs for at least six months after the offering and in

the three years after the IPO the return performance of CVC-backed IPOs is similar to that of their TVC-backed peers. To investigate whether the higher valuation of CVC-backed IPOs is simply driven by the superior project selection ability of CVCs, they estimate a system of simultaneous equations in which both CVC backing and IPO valuation are endogenous. Their results suggest that CVCs do exhibit some project selection ability, but they also add value to their portfolio firms.

To shed more light on the incremental value added by CVCs, Ivanov and Xie (2010) also compare the offer-day valuations between strategic CVC-backed IPOs and TVC-backed IPOs that have strategic alliances with other corporations. They find that strategic CVC-backed IPOs continue to have significantly higher valuations, suggesting that IPO companies benefit more from strategic CVC backing than from general corporate alliances. One possible reason for that is that strategic CVCs hold substantially larger ownership in portfolio companies than do other corporate alliance partners. As a result, CVCs have stronger incentives to develop and nurture entrepreneurial firms. The higher equity stakes may also help resolve potential hold-up problems between partners in strategic relationships (Klein, Crawford, and Alchian (1978), Grossman and Hart (1986), and Hart (1988, 2001)).

Ivanov and Xie (2010) also supplement their IPO analysis with an examination of acquisitions of VC-backed targets, since acquisitions and IPOs are the two most successful exit outcomes for startups. They find that targets with CVC backing tend to receive higher takeover premiums than their counterparts with only TVC backing, and the higher premiums again concentrate in targets with strategic overlap with their CVCs' corporate parents. This result echoes the evidence based on IPO valuation and lends further credence to the CVC value added claim.

Chemmanur, Loutskina, and Tian (2014) investigate the ability of CVCs to nurture innovation at their portfolio firms by comparing the innovation productivity of CVC-backed firms relative to those backed by TVCs. Using NBER patent data and a sample of VC-backed firms that eventually go public, they find that CVC-backed IPOs tend to generate more patents and have higher number of patent citations than TVC-backed firms. For example, compared to TVC-backed

firms, CVC-backed IPOs generate 28.6% more patents within the three years before the IPO and 47% more patents within the first four years following the IPO. The results are robust when controlling for the potentially endogenous nature of CVC backing. Chemmanur, Loutskina, and Tian (2014) also explore the mechanisms through which CVCs are better at nurturing innovation than TVCs. They find that CVCs' superior nurturing ability is a result from the higher tolerance to failure that CVCs have and the strategic fit between the portfolio companies and the CVC parent.

Park and Steensma (2012) argue that another benefit for startups of CVC financing is the ability of the latter to provide complementary assets that enhance the commercialization of new technologies. Examples of these assets include expertise and infrastructure for product development, manufacturing, legal, sales, distribution, and customer service activities Startups are unable to develop such assets because of significant costs and time constraints. Park and Steensma (2012) find that CVCs benefit startups with a need for specialized complementary assets and startups operating in uncertain environments. Such startups are more likely to go public and less likely to fail compared to startups that need specialized complementary assets but do not receive CVC funding.

II.B TESTABLE HYPOTHESES

The unique attributes that distinguish corporate venture capitalists from their independent counterparts make the investigation of CVC value-adding an interesting empirical question. Some of the differences suggest that corporate venture capitalists could benefit entrepreneurial firms in ways that traditional venture capitalists may not be able to emulate. Specifically, corporate venture capitalists are usually closely affiliated with large, established industrial companies, and this vantage point enables them to draw upon their corporate parents' resources to aid in the growth and maturation of their portfolio companies. At the same time, however, there are also reasons to suspect that CVCs may not be able to add much value to entrepreneurial firms. In addition, many general partners of TVCs have substantial prior business experiences, through which they acquired significant industry expertise and developed a wide network of connections within their specialized industries. These two factors may enable TVCs to match CVCs in providing resource-based

services and support to startup companies. Therefore, it is an empirical question whether CVCs can add value to their portfolio companies in addition to the contributions by TVCs.[4]

Given the purported benefits from CVC backing, and the supporting empirical findings based on U.S. and UK data, I expect to observe similar effects of CVC financing on Japanese startups. I assume the pros and cons of CVC investing for startups to be similar in the Japanese VC industry. I believe this is a reasonable assumption given that the VC industry is competitive and international in nature. Like in the above-mentioned empirical studies that rely on U.S. or UK data, the control group in the analysis top follow is the universe of Japanese startups that are financed by TVCs (Japanese or foreign).

The first hypothesis concerns the effect of CVC on the probability of a successful exit of Japanese startups. If the net effect of CVC backing on Japanese startups is positive, CVC financing should enhance the likelihood of going public for these startups. It is possible, however, that in Japan an acquisition is the preferred exit by startups and their investors relative to an IPO. That's why. I also study the likelihood of being acquired as another successful exit option. Assuming that going public or being acquired are the preferred outcomes for entrepreneurs and investors in Japanese startups, I test the following hypothesis:

H1: Ceteris paribus, Japanese startups funded by CVC investors will be more likely to go public or be acquire compared to Japanese startups backed only by TVCs.

The null hypothesis will be that Japanese CVC does not have a significant effect on the probability of a successful exit of Japanese startups. There could be several potential explanations for why the null hypothesis should hold. For example, it is possible that CVCs in Japan are

[4] There is evidence that VCs can help startups develop more strategic alliances (Hsu (2006) and Lindsey (2008)), contribute to their professionalization (Hellmann and Puri (2002), and accelerate their speed to bring products to the market (Hellmann and Puri (2000)). However, these studies are silent on whether there is any differential effect between CVCs and TVCs on the provision of these services. Bottazzi, Da Rin, and Hellmann (2008) touches upon this issue and they find that CVCs in general are less involved in the recruiting of directors and mangers at entrepreneurial companies than TVCs. However, they make no distinction between strategic CVCs and financial CVCs, which play quite different roles at entrepreneurial companies as indicated by the former's significantly greater board control and equity ownership (Ivanov and Xie (2010)).

structured differently than those in other developed countries, which may limit the number of value-added services they provide. Alternatively, Japanese CVCs may have different objectives compared to their U.S. or U.K. counterparts. For example, they may be more focused on obtaining pure financial returns from their investments rather than gaining strategic benefits, Lastly, it is possible that the net effect of Japanese CVC is only marginally positive, and hence its effect on the likelihood of a positive exit for a startup is rather marginal. It is worth noting that all these explanations need not be mutually exclusive.

The second testable hypothesis I test concerns the valuations of CVC-backed startups. As mentioned before, prior studies based on U.S. and UK data find a significant and positive effect of CVC financing on the valuation of CVC-backed startups at the time these go public or get acquired. Given the strong evidence of a positive impact of CVC on post-IPO valuations, I expect that to be the case in Japan as well. Thus, I put forth the following hypothesis:

H2: Ceteris paribus, if the net effect of CVC backing is positive, entrepreneurial companies with CVC backing will obtain higher valuations than those without CVC backing in the IPO market or the market for corporate control and vice versa.

Again, the null hypothesis will be that Japanese CVC does not have a significant effect on the post-IPO valuation of Japanese startups. The potential explanations for why the null hypothesis should hold are similar to the ones above. It is possible that CVCs in Japan are structured differently than those in other developed countries, or have different incentives, which may limit the number of value-added services they provide and hence limit their effect on the valuations of the startups they finance.

III. SAMPLE SELECTION AND SUMMARY STATISTICS

I construct a sample of Japanese VC-backed startups from 1990-2023 using data from the VentureXpert database and hand-collected data from Crunchbase. For each startup, I require that

there is non-missing information on the startup name and the names of its VC investors (e.g., the investor name should not be recorded as "Unknown investor"). I use the VentureXpert classification of VC investors to identify CVC-backed startups. A startup is CVC-backed if it has at least one investor designated as "Corporate/PE/Venture". My final sample has 1,706 VC-backed startups, of which 479 are CVC-backed. It is possible for a startup to have more than one CVCs, as well as more than one TVCs. There are 593 unique VC firms, of which 128 unique CVCs.

[Table 1 around here]

Table 1 presents some summary statistics for the sample of VCs in the sample. Panel A shows the types of VC investors that invest in the Japanese startups in my sample. As expected, most VCs are TVCs – private equity funds who raise capital from their limited partners and invest in a portfolio of startups. They account for almost 50% of the sample investments, measured by the number of investments. CVCs are the second largest type of VC investor, accounting for almost 17% of the investments in the sample. There is also a fair number of financial institution-affiliated VCs, as well as incubator programs. Panel B of Table 1 lists the 15 largest CVCs based on the number of investments they made during the sample period. As can be seen, there is a wide variety of industries represented in this group, from manufacturing to telecommunications and software. Additionally, some of those are the venture arms of U.S. corporations, such as Intel Corp. and Salresforce. Intel Corp is also a large CVC investor in U.S. startups.

Panel C of Table 1 lists the nations of the sample VCs. Unsurprisingly, most of them are from Japan (approximately 64%). US VCs are the second largest group, followed by VCs from Hong Kong, South Korea, and Singapore. Panel D of Table 1 lists the nations of the CVCs in the sample. A similar picture emerges – most of them (approximately 73%) are from Japan, and approximately 22% are from the US. There are very few CVCs from other countries in the sample.

For each startup, I collect data on company-specific characteristics and information on its VC investors. Company-specific characteristics include the startup's age when it received its first VC investment, the total VC funding received by the end of 2023, and its industry affiliation. For

industry affiliation, I rely on VentureXpert's industry classification. Following previous papers in the VC literature, in the analysis I use an indicator variable for industry affiliation. I classify startups as Hi-tech or not based on their VentureXpert's industry classification. I also use information on the startups' exit strategies from VentureXpert. To test H2, I also am interested in successful exits such as IPOs or acquisitions. I use the data from VentureXpert to identify startups that during the sample period went public or were acquired.

[Table 2 around here]

Panel A of Table 2 presents summary statistics (mean and median) on the company-specific variables. I split the sample into two – CVC-backed and TVC-backed startups. CVC-backed startups are significantly younger than their TVC-backed counterparts – the Mann-Whitny test for differences in medians is significant at the 1% level. The CVC-backed startups also tend to operate in more high-tech industries and receive significantly more VC funding than their TVC-backed counterparts. These differences suggest that the CVC-backed startups may be very different than TVC-backed startups, and that the CVC-backing may not be random. Thus, it may be these differences that account for the differences in the variables of interest, not CVC financing per se. I will deal with this potential endogeneity problem in the next section.

Panel B of Table 2 shows summary statistics for the characteristics of the VC firms investing in the sample startups. We also see some significant differences between CVC-backed startups and their TVC-backed counterparts. The former have a significantly larger number of VC investors than the latter. Additionally, for each startup I identify the lead venture capitalists, irrespective of whether it is a CVC or some other type of VC. Based on existing VC studies, the lead VC is identified in three ways. First, I designate as a lead VC the venture firm with the largest funds under management. Second, I use the VC firm with the largest number of funds as a lead VC. Lastly, I identify as a lead VC the oldest VC firm.

Panels C and D of Table 2 list the fifteen most frequently observed industries in the sample for both CVC-backed and TVC-backed startups. As can be seen from Panel C, CVC-backed

startups are mostly from hi-tech industries such as biotechnology, software, internet applications, semiconductors, etc. While some of these industries are present in the TVC-backed sample, TVC-backed startups do appear to have a significantly different industry makeup compared to their CVC-backed peers. For example, as can be seen in Panel D of Table 2, many TVC-backed startups are from the manufacturing, chemicals, transportation, food and beverage, and entertainment industries, which are older and with low growth prospects.

IV. EFFECTS OF CVC ON STARTUPS' PROBABILITY OF SUCCESSFUL EXITS

In this section I test H1. As discussed above, the choice of getting CVC may not be random. That's why, I first run a choice model analysis, and then I try to control for the potential endogeneity of the CVC decision by using propensity score matching.

IV.A Probit model analysis

To test H1, I estimate a probit model where the dependent variable is either an indicator variable equal to one if the startup eventually goes public, or an indicator variable equal to one if the startup eventually gets acquired during the sample period. The econometric specification of the probit model is given in Equation (1) below. The main independent variable of interest is *CVCbacked*, an indicator variable equal to one if the startup is funded by a CVC, and zero otherwise. As control variables I include the company-specific and VC firm-specific variables listed in Table 2. Regarding company-specific characteristics, I include the log of the company age, the Hi-tech indicator variable, and the log of total VC funding received. The VC controls include the number of VCs invested in the startup and the VC reputation measure based on funds under management.

$$\text{Probit}(Successful\ exit = 1)_i = a * CVCbacked_i + b * Startup\ controls_i + VC\ controls_i + e_i \quad (1)$$

[Table 3 around here]

Table 3 lists the coefficient estimates from the probit model. In Models 1 through 3, the dependent variable is the going public indicator. The three specifications include variations of the

control variables used, with Model 3 incorporating all control variables. As can be seen, the coefficient on the CVC indicator variable is negative and significant, suggesting that CVC financing is associated with a lower likelihood of going public. This is in sharp contrast to the findings in studies based on U.S. and UK data. It should be noted, however, that the endogeneity concerns mentioned in the previous section may play a role here. I try to control for endogeneity in the next subsection. In addition, the evidence suggests that older startups as well as startups backed by more reputable VC (as measured by funds under management) are more likely to go public. The results are similar if any of the other two lead VC measured are used in the analysis.

Models 4 through 6 of Table 3 present the probit model coefficients with the dependent variable being the indicator of a startup being acquired. The specification is the same as that in the first three models. For the acquisition exit, we do not find any significant CVC effect – the coefficient on the CVC variable is statistically insignificant in all specifications. Like with the going public exit, startups backed by more reputable VC are more likely to go public. Unlike the going public analysis, older firms are significantly less likely to be acquired. This may be due to the desire of the acquirer to acquire a promising target early on before other potential bidders show up. Also, acquirers may be wary of the higher acquisition costs usually associated with larger firms. Similarly, startups financed by a larger number of VCs are less likely to be acquired. Lastly, the evidence in Table 3 suggests that hi-tech companies are less likely to be acquired.

IV.B Propensity Score Matching Approach

In selecting matching firms for CVC-backed IPOs, we recognize that obtaining CVC financing is a choice that an entrepreneurial firm faces at some point in its life cycle and this choice may not be random. Some firm-specific characteristics could affect a startup's decision to resort to CVC financing. Alternatively, CVCs may choose to invest only in certain types of startups. Therefore, CVC-backed IPOs can be significantly different from other IPOs. These differences, not CVC backing, may be responsible for any differences in valuation.

To address this endogeneity concern, I apply a matching procedure based on propensity scores developed by Deheja and Wahba (1999, 2002). The same approach has been used by other studies such as Drucker and Puri (2006) and Villalonga (2004) to deal with the self-selection issue. Its major appeal to econometricians is its ability to control for a large set of observable characteristics, but like almost all matching techniques, it does not take into account unobservables. In our context, a propensity score is the probability that a startup will receive CVC financing conditional on a set of independent variables. The matching algorithm consists of three steps. First, I estimate a probit model where the dependent variable is equal to one if a startup has CVC participation and zero otherwise. Second, I compute the estimated probability (propensity score) of each startup receiving CVC financing based on the coefficient estimates from the probit model. I then pair each CVC-backed startup with the TVC-backed startup with the closest propensity score in the so-called "nearest neighborhood" matching. Finally, I test whether the difference between exit indicator variables is significantly greater than zero. I perform all matching with replacement (i.e., the same matching firm can be used more than once as a match) because Abadie and Imbens (2006) argue that this reduces bias.

In the probit model, I control for the following variables that may explain whether an entrepreneurial company receives CVC backing. Based on prior studies (see Ivanov and Xie (2010)), I use variables that proxy for a startup's size, age, and industry. In essence, I use the company-specific control variables used in the probit model specification in Table 3, plus the measure the lead VC's reputation

Table 4 presents the results for the average treatment effects for both the going public and getting acquired variables. I find that after controlling for the potential endogeneity of CVC financing, CVC-backed startups are significantly more likely to get acquired than their TVC-backed peers. In a reversal from the simple probit analysis in Table 3, there is no more significant difference in the likelihood of going public between CVC-backed and TVC-backed startups. I

should note that the results should be interpreted with care given the relatively small sample size of the subsample of CVC-backed startups with a successful exit.

[Insert Table 4 about here]

Overall, the empirical analysis in this section provides partial support for H1. After controlling for the potentially endogenous nature of CVC financing, CVC-backed Japanese startups appear to be more likely to get acquired than their TVC-backed peers. There is no significant difference in the likelihood of going public.

V. CVC AND STARTUP VALUATION AT THE TIME OF GOING PUBLIC

In this section, I test H2 to see whether CVC financing affects startups' valuation. Because of availability of valuation data, I limit the analysis to startups that eventually go public. I match the sample of VC-backed IPOs that went public according to the VentureXpert database with SDC's New Issues database. From SDC I use the data on post-IPO valuation. To test whether CVC-backed IPOs have higher valuations than their TVC-backed counterparts, I construct the MTB ratio after the company does an IPO. The market value is based on the on the price and shares outstanding of the company at the closing of the IPO offer-day. The book value is the most recent book value of company's equity available immediately prior to the IPO. I am able to match 96 startups with data on price, shares outstanding, and book value of equity from SDC. As with the successful exit analysis, the potential endogeneity of CVC backing is a valid concern here. That's why I perform an OLS regression analysis and propensity score matching.

[Insert Table 5 about here]

▶ $\text{MTB}_i = a * CVCbacked_i + b * Startup\ controls_i + VC\ controls_i + e_i$ (2)

Panel A of Table 5 presents the OLS regression results. The econometric specification is given in Equation (2). Again, the main independent variable of interest is *CVCbacked*. I use the

same control variables I used in the probit analysis in Table 3. As can be seen, CVC backed-startups appear to have significantly higher valuations than TVC-backed startups at the time of their IPO. From the other variables, the results suggest that hi-tech companies tend to receive higher valuations when going public.

Panel B of Table 5 presents the results of the propensity score matching. It is done in the same way as the analysis in Table 4. The results suggest that, even after controlling for the potential endogeneity of CVC backing, CVC-backed startups tend to enjoy significantly higher valuations than their TVC-backed peers when going public. Again, the results in this section should be interpreted with care given the relatively small sample size of the subsample of CVC-backed startups that go public.

Overall, the results in Table 5 provide consistent evidence that Japanese CVCs are associated with higher portfolio company valuations at the time of an IPO. This evidence is also in sync with the empirical evidence from prior studies based on U.S. and UK. Thus, this study confirms the potentially positive net value-added effect that CVCs have on their portfolio companies. Combined with the results in Section IV, I believe the paper provides interesting and important findings regarding the valuable role that CVCs play for their portfolio companies.

VI. CONCLUSION

Prior research on corporate venture capital has documented some important benefits to both portfolio firms and parent companies from CVC investing. However, all of these studies are based on U.S. and UK data. It remains to be seen if the purported CVC benefits can be found in other capital markets. This study evaluates the effect of CVCs on Japanese startups using detailed VC data from Japan. I test two hypotheses. The first relates to the role of CVCs in the probability of startups to achieve profitable exit strategies such as doing an IPO or getting acquired. The second hypothesis posits that CVC backing would have positive impact on startups' valuations.

Using data on Japanese CVC-backed and TVC backed startups, and after controlling for the potential endogenous nature of CVC backing, I find that CVC does play an important role for Japanese entrepreneurs. The empirical evidence from my analysis suggests that CVC backing is associated with a significantly higher probability of getting acquired. Additionally, for VC-backed startups that eventually go public, those backed by CVCs tend to receive significantly higher valuations as measured by their post-IPO MTB ratios compared to their TVC-backed counterparts. The overall results from this study add important insights to the CVC literature about the value-added that CVCs provide to their portfolio companies.

There are other potentially important issues that could be explored in the Japanese venture capital market in future research. For example, another interesting issue to consider is the types of valuations that Japanese startups receive when getting acquired. Also, prior studies have documented important differences between CVCs that have a strategic focus and those that invest purely for financial gains. It is strategic CVCs that tend to add more value to their portfolio companies. It would be interesting to explore whether CVCs investing in Japanese startups also have a strategic focus and how this affects their portfolio companies. Additionally, a future study on the benefits of CVC for Japanese CVC parent companies will broaden the literature's understanding of what benefits CVCs generate for their parent companies.

REFERENCES

Bottazzi, L., M Da Rin, and T Hellmann. 2008. "Who are the active investors? Evidence from venture capital." *Journal of Financial Economics* 89, 488-512.

Chemmanur, T., E. Loutskina, and X. Tian. 2014. "Corporate venture capital, value creation, and innovation." *Review of Financial Studies* 27, 2434-2473.

Chesbrough, H. 2000. "Designing corporate ventures in the shadow of private venture capital." *California Management Review* 42(3), 31-49.

Chesbrough, H. 2002. "Making sense of corporate venture capital." *Harvard Business Review* 80, 90-99.

Drucker, S. and M. Puri, 2005, "On the Benefits of Concurrent Lending and Underwriting," *Journal of Finance* 60, 2,763-2,799.

Earnst&Young. 2002. Corporate Venture Capital Report.

Fulghieri, P., and M. Sevilir. 2009. "Organization and financing of innovation, and the choice between corporate and independent venture capital." *Journal of Financial and Quantitative Analysis* 44, 1291-1321.

Gompers, P., and J. Lerner. 1999. *The Venture Capital Cycle*, MIT Press, Cambridge, Massachusetts.

Gompers, P., and J. Lerner. 2000. "The determinants of corporate venture capital success." in R. Morck (editor), *Concentrated Corporate Ownership*, University of Chicago Press, pp. 17-50.

Gompers, P., and J. Lerner. 2001a. "The venture capital revolution." *Journal of Economic Perspective* 15, 145-168.

Hart, O. 1988. "Incomplete contracts and the theory of the firm." *Journal of Law, Economics, and Organization 4*, 119-139.

Hart, O. 2001. "Financial contracting." *Journal of Economic Literature* 39, 1079-1100.

Hellmann, T. 2002. "A theory of strategic venture investing." *Journal of Financial Economics* 64, 285-314.

Hellmann, T., and M. Puri. 2002. "Venture capital and the professionalization of start-up firms: Empirical evidence." *Journal of Finance* 57, 169-197.

Hellmann, T., L. Lindsey, and M. Puri. 2008. "Building relationships early: Banks in venture capital." *Review of Financial Studies* 21, 513-541.

Hsu, D. 2006. "Venture capitalists and cooperative start-up commercialization strategy." *Management Science* 52, 204-219.

Ivanov, V., and F. Xie. 2010. “Do corporate venture capitalists add value to startup firms? Evidence from venture-backed IPOs and acquisitions.” *Financial Management*, 120-152.

Keil, T., M. Maula, and C. Wilson. 2010. “Unique resources of corporate venture capitalists as a key to entry into rigid venture capital syndication networks.” *Entrepreneurship Theory and Practice* 34, 83-103.

Klein, B., R. Crawford, and A. Alchian. 1978. “Vertical integration, appropriable rents, and the competitive contracting process.” *Journal of Law and Economics* 21, 297-326.

Kleinknecht A, and J. van Reijnen. 1992. “Why do firms cooperate in R&D? An empirical study.” *Research Policy* 21, 347–360.

Lindsey, L. 2008. “Blurring firm boundaries: The role of venture capital in strategic alliances.” *Journal of Finance* 63, 1137-1168.

Maula, M., and G. Murray. 2002. “Corporate venture capital and the creation of U.S. public companies: The impact of sources of venture capital on the performance of portfolio companies.” in M.A. Hitt, R. Amit, C. Lucier, R.D. Nixon, eds. *Creating value: Winners in the new business environment*. Blackwell Publishers, Oxford.

Maula, M., T. Keil, and S. Zahra. 2003. “Corporate venture capital and recognition of technological discontinuities.” Working paper.

McNally, K. 1997. *Corporate Venture Capital: Bridging the Equity Gap in the Small Business sector*, London: Routledge.

Park, H., and K. Steensma. 2012. “When does corporate venture capital add value for new ventures?” *Strategic Management Journal* 33, 1-22.

Santhanakrishnan, M. 2003. “The impact of complementarity on the performance of entrepreneurial companies.” Working paper.

Siegel, R., E. Siegel, and I. MacMillan. 1988. “Corporate venture capitalists: autonomy, obstacles and performance.” *Journal of Business Venturing* 3, 233-247.

Stuart, T. E., H. Hoang, and R. Hybels. 1999. “Interorganizational endorsements and the performance of entrepreneurial ventures.” *Administrative Science Quarterly* 44, 315-349.

Sykes, H. B. 1990. “Corporate venture capital: Strategies for success.” *Journal of Business Venturing* 5, 37-47.

Villalonga, B., 2004, "Does Diversification Cause the 'Diversification Discount'?", *Financial Management*, 33, 5-27.

Winters, T. B. 1988. “Venture capital investing for corporate development objectives.” *Journal of Business Venturing* 3, 207-223.

Yost, M., and K. Devlin. 1993. “The state of corporate venturing.” *Venture Capital Journal* 37-40.

Appendix

Variables' definitions

Startup-specific variables	
Startup age	The age of the startup at time of first VC investment (in years).
Total funding received	The total VC funding received by the startup during its VC ($ mil.).
Hi-tech industry	Indicator variable equal to 1 if the startup is from one of the following industries: Biotech Equipment, Biotech Research, Biotech-Animal, Biotech-Industrial, Business Services, Computer Software, Data Communications, Digital Imaging and Computer Graphics, E-Commerce Technology, Internet Communications, Internet Content, Internet Ecommerce, Internet Programming, Internet Software, Wireless Communications
Had an IPO	Indicator variable equal to 1 if the startup went public.
Hed a merger	Indicator variable equal to 1 if the startup was acquired.
MTB ratio	Ratio of market value of equity to book value of equity at the time of IPO.

Startup-specific variables	
Number of invested VCs	The number of VC invested in a startup
Lead VC funds under management ($ mil.)	The funds under management (in $ mil) of a VC firm invested in the startup. The one with the largest funds under management is designated as the lead VC.
Lead VC firm number of funds ($ mil.)	The number of VC funds a VC firm invested in the startup has. The one with the largest number of funds is designated as the lead VC.
Lead VC firm age (years)	The age (in years) of a VC firm invested in the startup. The oldest one is designated as the lead VC.

Table 1. Summary statistics on sample VCs

Panel A. Types of VC investors in Japanese startups

VC Investor Type	Number of investments	Percent of total number of investments
Private Equity Firm	1,420	49.93
Corporate Venture Capitalist	479	16.84
Bank Affiliated	290	10.20
Incubator/Development Program	214	7.52
Investment Management Firm	164	5.77
Insurance Firm Affiliate	84	2.95
University Program	78	2.74
Government Affiliated Program	56	1.97
SBIC	41	1.44
Angel Group	7	0.25
Other	5	0.18
Service Provider	5	0.18
Endowment, Foundation or Pension Fund	1	0.04
Total investments	2,844	100%

Panel B. The top 15 CVC firms in the sample

CVC Firm Name	Number of startups	Percent of total CVC investments
CyberAgent Inc	41	8.56
Strive Inc	30	6.26
Itochu Corp	28	5.84
Intel Corp	24	5.01
LY Corp	23	4.81
GMO Internet Group	17	3.55
Monex Group	16	3.34
Salesforce Ventures LLC	16	3.34
Dentsu Group	12	2.51
Nippon Telegraph and Telephone Corp	12	2.51
Carta Inc	11	2.3
Mitsui & Co	11	2.29
Klab Inc	10	2,1
Sony Group Corporation	10	2.1

Fuji Media Holdings	9	1.88

Table 1, continued

Panel C. VC firms' nations

Nation of VC firms	**Number of VC firms**	**Percent of total number of VCs**
Japan	377	63.58
United States	128	21.59
Hong Kong	15	2.53
South Korea	14	2.36
Singapore	11	1.85
France	8	1.35
China	7	1.18
United Kingdom	7	1.18
Germany	6	1.01
Taiwan	5	0.84
Belgium	2	0.34
Sweden	2	0.34
Australia	1	0.17
Brazil	1	0.17
Canada	1	0.17
Cyprus	1	0.17
Israel	1	0.17
Luxembourg	1	0.17
Malaysia	1	0.17
Saudi Arabia	1	0.17
Spain	1	0.17
Switzerland	1	0.17
Thailand	1	0.17
Total	593	1.00

Table 1, continued

Panel D. Nations of CVC firms

Nation of CVC firms	**Number of CVC firms**	**Percent of total number of CVCs**
Japan	93	72.66
United States	28	21.88
China	1	0.78
France	1	0.78
Germany	1	0.78
Hong Kong	1	0.78
Saudi Arabia	1	0.78
South Korea	1	0.78
Thailand	1	0.78
Total	128	1.00

Table 2. Sample of VC-backed startups – summary statistics

Panels A and B present the mean and median of certain startup characteristics and characteristics of the VCs invested in these startups. The variable definitions are listed in the Appendix. Lead VC is defined in three different ways: 1) as the VC with the largest funds under management, 2) as the VC with the largest number of funds, or 3) as the oldest VC invested in the startup. The symbols ***, **, * represent statistically significant differences between the sample of CVC-backed startups and the sample of TVC-backed startups, at the 1 percent, 5 percent, and 10 percent based on nonparametric Mann-Whitney test for equality of medians.

Variable	CVC-backed startups		TVC-backed startups	
	Mean	Median	Mean	Median
Panel A. Startup characteristics				
Startup age at time of first VC investment (years)	3.38	2.54	13.71	4.10***
Total funding received ($ mil.)	21.80	4.7***	7.29	0.43
Hi-tech industry	0.72	1.0***	0.45	0
Had an IPO	0.06	0	0.09	0
Hed a merger	0.04	0	0.04	0
Panel B. VC firm characteristics				
Number of invested VCs	4.3	4.0***	1.6	1.0
Lead VC funds under management ($ mil.)	2,785	622***	1,372	102
Lead VC firm number of funds ($ mil.)	26	17***	18	8
Lead VC firm age (years)	35.2	32.0	37.8	36.0

Panel C. Top 15 industry distribution of CVC-backed startups

Startup industry	**Number of startups**	**Percent of total CVC-startups**
Computer Software	157	32.78
Internet Ecommerce	64	13.36
Internet Content	50	10.44
Internet Software	27	5.64
Internet Services	17	3.55
Turnkey Integrated Systems and Solutions	15	3.13
Biotech-Human	11	2.3
Semiconductors/Other Electronics	10	2.09
Computer Programming	9	1.88
Internet Programming	9	1.88
Industrial Automation	8	1.67
Business Services	7	1.46
Consumer Services	6	1.25
Entertainment and Leisure	6	1.25
Internet Communications	6	1.25

Table 2, continued

Panel D. Top 15 industry distribution of TVC-backed startups

Startup industry	**Number of startups**	**Percent of total TVC-startups**
Computer Software	224	18.26
Internet Ecommerce	82	6.68
Internet Content	62	5.05
Industrial Equipment	54	4.4
Business Services	52	4.24
Chemicals and Materials	48	3.91
Manufacturing	42	3.42
Food and Beverage	38	3.1
Entertainment and Leisure	35	2.85
Biotech-Human	34	2.77
Transportation	31	2.53
Turnkey Integrated Systems and Solutions	31	2.53
Construction	28	2.28
Internet Software	27	2.2
Consumer Products	26	2.12

Table 3. CVC backing and the probability of a successful exit for startups

The table presents the results of a pooled cross-sectional time series regression of the fraction of independent directors on the company's board on a number of explanatory variables for a sample of 542 CVC-backed and TVC-backed IPOs during the period 1992-1999. Strategic CVC is an indicator that equals one if there is a strategic CVC investor. Financial CVC is an indicator that equals one if there is a financial CVC investor. Outside SA is an indicator that equals one if there is an outside strategic partner (but not a strategic CVC investor). SA Ownership is an indicator variable equal to one if the strategic partner has an equity stake in the TVC–backed IPO. Outside SA * SA Ownership is an interaction term indicating an outside strategic partner with an equity stake. CEO-chairman and CEO-founder are respectively indicators that equal one if the CEO is also a chairman of the board and if the CEO is a firm founder. Standard errors are robust to heteroscedasticity and firm clustering. All variables are defined in the Appendix. In parentheses the two-sided p-values based on heteroskedasticity-consistent standard errors. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

	Successful exit:					
Variables	Going public			Being acquired		
	(1)	(2)	(3)	(4)	(5)	(6)
CVC	-0.225**	-0.335***	-0.335***	-0.030	0.029	0.029
	[0.04]	[0.01]	[0.01]	[0.81]	[0.84]	[0.84]
Log (Age)	0.075*	0.093**	0.093**	-0.167***	-0.148	-0.147***
	[0.10]	[0.04]	[0.04]	[0.01]	[0.02]	[0.01]
Hi-tech	0.115	0.088	0.088	-0.205*	-0.218*	-0.219*
	[0.24]	[0.37]	[0.38]	[0.09]	[0.08]	[0.08]
Log (VC size)		0.079***	0.080***		0.136***	0.134***
		[0.01]	[0.01]		[0.01]	[0.01]
Num of VCs		0.010	0.010		-0.064**	-0.066*
		[0.66]	[0.69]		[0.05]	[0.07]
Log (Amt invested)			-0.001			0.008
			[0.98]			[0.88]
Intercept	-1.552***	-1.986***	0.001***	-1.352***	-2.041***	0.001***
	[0.01]	[0.01]	[0.97]	[0.01]	[0.01]	[0.97]
Num. Obs.	1,703	1,703	1,703	1,703	1,703	1,703
Pseudo-R^2	0.01	0.02	0.02	0.01	0.05	0.05
Prob>χ^2	0.02	0.01	0.01	0.04	0.01	0.01

Table 4. CVC backing and the probability of a successful exit for startups – propensity score matching

This table presents the average treatment effects (ATEs) between the successful exit strategies of CVC-backed startups and those of a control sample of TVC-backed startups selected based on propensity score matching. The matching variables are the ones used in Models 3 and 6 in Table 3. Robust *t*-statistics in parenthesis. All variables are defined in the Appendix. The symbols ***, **, * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Variable of interest	*Num. obs.*	*Difference (Std Err)*	*p-value (difference=0)*
Average treatment effect – Going public $IPO_{CVC\text{-}backed\ startups} - IPO_{TVC\text{-}backed\ startups}$	28	0.004 (0.027)	0.90
Average treatment effect – Being acquired $Acquired_{CVC\text{-}backed\ startups} - Acquired_{TVC\text{-}backed\ startups}$	20	0.031 (0.011)	0.01

Table 5. CVC backing and the valuations of going public VC-backed startups

The sample used in this panel consists of 187 TVC-backed targets, 22 CVC-backed targets with strategic CVC investments, and 30 CVC-backed targets with financial CVC investments from 1996 to 2000. The dependent variable is the logarithmic transformation of the Purchase Price/Book Value of Assets. *Stock acquisition* is a dummy variable equal to one if the deal is financed entirely with common stock, and zero otherwise. *Relative deal size* is the ratio of deal size to acquirer market value of equity at the end of the month prior to the announcement date. *Target industry MTB* is the median target industry market-to-book ratio during the year of the deal, where industry is defined using 2-digit SICs. *Intra-industry deal* is a dummy variable equal to one if the target and the acquirer share a 2-digit SIC code. In parentheses are two-sided *p*-values based on heteroskedasticity-consistent standard errors.

Panel A. Ordinary least squares regression

Independent variables	Dependent variable: Market-to-book ratio	
	(1)	(2)
Intercept	2.759***	3.233***
	(0.01)	(0.01)
CVC	1.076**	1.281***
	(0.04)	(0.01)
Log (Age)	-0.264	-0.253
	(0.23)	(0.16)
Hi-tech	2.172***	2.188***
	(0.01)	(0.01)
Log (VC size)		-0.098
		(0.13)
Num of VCs		-0.084
		(0.51)
Log (Amt invested)		0.206
		(0.37)
Adjusted R^2	0.29	0.32
Number of observations	96	96

Panel B. Propensity score matching

Variable of interest	*Num. obs.*	*Difference (Std Err)*	*p-value (difference=0)*
Average treatment effect – MTB ratio			
$MTB_{CVC\text{-backed startups}} - MTB_{TVC\text{-backed startups}}$	23	2.052 (0.985)	0.04