Effects of venture capitalists' participation in listed companies

Clement K. Wang [a,*], Kangmao Wang [b], Qing Lu [a]

[a] *Department of Business Policy, Faculty of Business Administration, National University of Singapore, 1 Business Link, BIZ 1 Building, Singapore 117592, Singapore*
[b] *Center for Financial Markets and Accounting, Zhejiang University, Hangzhou 310027, China*

Abstract

We empirically examine the effects of venture capital (VC) firms on VC-backed listed companies in Singapore. While previous studies have shown the VC value-added in lower underpricing and better post-IPO operational performance of VC-backed IPOs, we find the effects of venture capitalists' participation are very complicated. Most significantly, the post-IPO operating performance of VC-backed companies is inferior though they are less underpriced. The finding supports both the certification model and the adverse selection model. Furthermore, we find that IPOs backed by older VC firms perform better, supporting the grandstanding model that younger VC firms bring their portfolios to the market prematurely.
© 2003 Elsevier B.V. All rights reserved.

1. Introduction

Venture capital (VC) is an intermediate external source of financing for small and medium-sized enterprises (SMEs). Extant VC studies generally agree that VC firms not only contribute funding but also provide value-added services to their portfolio companies. However, adverse selection and conflict of interests may bring negative effects to VC investments. In this study, we focus on the effects of venture capitalists'

---

* Corresponding author. Tel.: +65-6874-3154; fax: +65-6779-5059.
E-mail address: cwang@nus.edu.sg (C.K. Wang).

participation in IPO companies in an emerging market and provide a more realistic view through an empirical testing of models (certification/monitoring and adverse selection/grandstanding) on VC effects. Although previous VC research exists in developed countries (e.g., US and Europe), our study is one of the few empirical VC studies in the emerging markets.

Literature on VC-backed companies generally supports the VC certification/monitoring model. That is, VC firms add value to companies in which they invest by certifying them as the most promising ones, and monitoring through the whole process of company growth. For example, Lam (1991) uses a conceptual model to demonstrate the sources of value added by venture capitalists to their portfolios. At the same time, based on data of the US market, Megginson and Weiss (1991) report the certification role of VC firms in the IPO process. In addition, Lin (1996) finds a negative correlation between the shareholding of leading VC firms and their initial returns while Lerner (1994) reports the better timing of VC firms in the IPO of their portfolio companies. Furthermore, Jain and Kini (1995) observe that VC-backed companies exhibit superior post-IPO operating performance compared to non-VC-backed IPO companies, and Brav and Gompers (1997) discover higher long-term returns for VC-backed companies. These studies indicate that VC firms add value to the IPO process and post-IPO operating performance of issuing companies, as well as their long-term market performance.

On the other hand, Amit et al. (1990) theoretically propose the adverse selection problem when venture capitalists search for start-ups to invest in. Associated with asymmetric information, adverse selection means less capable entrepreneurs will choose to involve venture capitalists to share the risk while more capable entrepreneurs will manage their ventures without seeking for external participation. The conflict of interests between venture capitalists and entrepreneurs will also have post hoc effects. Gompers (1996) hypothesizes the "grandstanding" of young VC firms, as they are more likely to conduct IPOs prematurely to falsely signal their reputation and performance. Hamao et al. (2000) report a similar conflict of interests in a study on VC-backed IPOs in the Japanese market. They find deep underpricing of securities-affiliated VC-backed IPOs when the leading venture capitalist is also the leading underwriter.

In this study, we choose Singapore as the research setting, an emerging market with nearly twenty years of VC history to test these two models. The local VC market in Singapore began in 1983 and grew to a cumulative pool of US$13.7b by 2001. Furthermore, we choose the Singapore VC market as the sample in this study because of its relatively large size and industry breadth among emerging markets. In terms of size, Singapore's VC pool is the third largest in Asia, next only to Hong Kong and Japan (AVCJ, 1999). In terms of industry breadth, the industry distribution of VC-backed companies in Singapore is broader with a higher concentration in high-technology sectors (e.g., IT, electronics) compared with that in Hong Kong (AVCJ, 1999). Investigation in this emerging market can add insights to the understanding of VC mechanism, especially in environments outside of the United States.

As listed companies are obligated to disclose their background and operating data to the public, we focus on the VC's influence on listed companies, as reflected by dif-

ferences in IPO cost, pricing, and after-market performance vis-à-vis non-VC-backed firms. In this paper, we empirically study the role of VC firms in the IPO process and after the IPO in Singapore. We focus on the value-added by venture capitalists in VC-backed IPOs, reflected in operational and market performance both at and after the IPO, to test the two models empirically.

The rest of the paper is organized as follows. In Section 2, we present two major models of the role of VC firms in the IPO process, certification/monitoring and adverse selection/grandstanding, as well as the method of empirical testing. Next, Section 3 describes the data sample, followed by Section 4, which compares differences between VC-backed and non-VC-backed firms. Section 5 then provides further testing of adverse selection and the grandstanding model and finally, Section 6 concludes the paper.

2. Two theoretical models on the role of VC firms

2.1. Certification/monitoring model

There are two main models concerning the role of VC firms presented in the literature. The first and well-accepted model is the certification/monitoring model (Barry et al., 1990; Sahlman, 1990; Jain and Kini, 1995). In the IPO process, this model suggests that VC firms could certify the IPO issuing.

It is documented that the IPO process is characterized by information asymmetry, i.e., insiders of an issuing firm possess superior information relative to outside investors. To avoid market breakdown resulting from the information asymmetry (Akerlof, 1970), third-party certification is introduced to ensure the success of an IPO. Underwriters and auditors as well as stock exchanges contribute to IPO certification process as third parties. According to the certification/monitoring model, the certification role can be better performed by venture capitalists because of two reasons. First, venture capitalists are much more knowledgeable on the issuing firm due to their equity holdings, often holding board seats, and enjoying longer and closer working relationship with the management team compared with other financial intermediaries. Second, the reputation factor can control possible false certification by venture capitalists (Sahlman, 1990). Most VC firms raise funds in limited partnerships with finite lifetimes. Hence, the past performance and reputation of VC firms are of utmost importance if they are to successfully raise new funds in the future for survival.

Besides the certification role in the IPO process, this model also accounts for the monitoring role of venture capitalists in the companies they invest in. From the agency approach, VC firms should use various means to monitor their portfolio companies to control the opportunistic behaviors of the entrepreneurs. This could often take the form of stage financing (Gompers, 1995), board membership (Lerner, 1995), and detailed legal contracts (Gompers and Lerner, 1996). Besides the controlling effect, VC firms can also add value to their portfolios. Venture capitalists are experienced in steering start-ups along the development path. Even after the IPO, since

most venture capitalists may continue to hold significant equity stakes and board seats for one to two years, they could still actively advise their portfolio companies and help their further growth.

This model is empirically supported by several studies in the US. For instance, Barry et al. (1990) find that the presence of experienced venture capitalists on the board lowers IPO underpricing. Megginson and Weiss (1991) report that VC-backed companies enjoy lower initial returns, higher net proceeds and higher institutional holding. VC-backed IPOs are also associated with higher quality underwriters and auditors. Jain and Kini (1995) report worse operating performance of VC-backed companies in the IPO year compared with non-VC ones since the VC certification reduces the need for excellent operating performance to impress public investors. Furthermore, they confirm the monitoring role of VC firms after the IPO to post-IPO operating performance. They find that VC-backed companies perform better in the post-IPO period although the difference declines gradually with firm aging. Brav and Gompers (1997) also report better long-term market performance of VC-backed IPOs.

2.2. Adverse selection/grandstanding model

The negative effect of VC starts from adverse selection. Noticing the information asymmetry between the entrepreneur and the venture capitalist in private equity market, Amit et al. (1990) reason theoretically that best ventures will be self-funded, but "average" ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Thus the quality of VC-backed firms is not the best due to the ante hoc effect of the venture capitalists' participation.

The grandstanding model is also a model about the negative influence of VC firms but on the post hoc basis. First proposed by Gompers (1996), the model predicts that new venture capitalists have incentives to signal their ability to potential investors by bringing investees to the public sooner than veteran venture capitalists. As the lifetime of VC funds is typically ten years, venture capitalists must therefore periodically raise follow-on funds to remain active in the VC market. For new VC firms without much reputation, the performance of their first funds becomes essential to the success of their subsequent fundraising. They need good track records such as IPOs to improve their public image in the capital market and to increase the likelihood of new fundraising success. Thus, their portfolio companies may go public prematurely and end up performing poorly. The inexperience of young VC firms, and thus less value-added support, may further contribute to the poor performance of their IPO portfolios.

Though the grandstanding model has been tested by comparison between young VC-backed IPOS and veteran ones (Gompers, 1996), the adverse selection model has not been empirically tested in the VC context. Here we propose to test the adverse selection/grandstanding model by comparing between VC and non-VC-backed IPOs.

If self-funded best ventures in the adverse selection model can also go public later, we can divide non-VC-backed IPOs into two groups: the good quality ventures not

seeking VC funding, and the relatively inferior ones rejected by VCs. If IPOs in the second group are the majority, we can expect better performance of VC-backed IPOs, which supports the certification/monitoring model. If IPOs in the first group are the majority, then we can expect the reverse, which supports the adverse selection model. The grandstanding effect may further magnify the effect of adverse selection as the premature IPO would expose the listed company to higher business risk and result in poor performance.

The two models give different empirical predictions in both IPO and post-IPO performance. In the IPO process, the certification/monitoring model predicts lower underpricing and lower IPO cost for VC-backed IPOs while the adverse selection/ grandstanding model predicts higher IPO cost and higher underpricing due to the high risk associated with VC-backed IPOs. Furthermore, the certification model predicts worse operating performance of VC-backed companies in the IPO year while the grandstanding model predicts same or even better performance to ensure the IPO's success. In the post-IPO operational and market performance, the VC certification/monitoring model predicts that differences between VC and non-VC-backed companies are positive (VC-backed better) and decrease gradually as firms age and VC firms withdraw. On the other hand, the adverse selection/grandstanding model predicts that differences in performance are negative (VC-backed worse) and increase as firms age and potential risks turn out to be real.

Furthermore, we can distinguish the effect of adverse selection from that of grandstanding by the VC investment stage. As the information asymmetry is more severe for early stage ventures when the investee's products or services have not been proven in the market, we would expect the effect of adverse selection to be more severe in firms supported by VCs from the early stage. On the other hand, it is more possible for grandstanding to take place in late stage ventures when the prospect of the IPO is clearer. Thus IPOs with short histories of VC support are more likely to be affected by grandstanding. Moreover, the adverse selection is not related to the IPO timing, and thus the poor performance would be significant in performance measured in absolute value but not the relative change compared with the IPO year. On the other hand, since grandstanding is related to the pre-mature IPO, the window-dressing at the IPO year would be more prominent, and thus the relative change of post-IPO performance compared with the IPO year would be significantly worse.

Empirically, the adverse selection model predicts poor post-IPO operational performance of firms with early VC support but not the relative performance change compared with the IPO year after controlling for similar non-VC ones. The grandstanding model predicts that firms with later stage VC participation will experience worse performance changes compared with the IPO year after controlling for non-VC ones.

2.3. Implications of both models in the Singapore context

It is possible that both models are valid in an emerging market such as Singapore. On the one hand, the mass media tend to focus on the success stories of entrepreneurs with the support of VC funds as role models for potential entrepreneurs to

follow. As most VC firms in Singapore have international or governmental linkages, their presence in the IPO process should have a certification effect on public investors.

On the other hand, the adverse selection will be more severe in emerging markets due to market immaturity. Founding entrepreneurs are reluctant to invite outsiders into the management nor are they willing to give up their equities (Tan, 1998). Thus VC-backed ventures may not be the most promising ones.

Grandstanding may also be severe in emerging markets as many VC firms are young and do not have a long track record. Although the parental backgrounds of these companies may be strong, they need visible performance indicators to prove themselves and to ensure the future success of new fundraising for their own survival. Furthermore, they are inexperienced in identifying investment opportunities in these new regions as well as understanding the local market.

Despite these negative effects, many entrepreneurs still seek young VCs' investment due to two reasons. First, entrepreneurs are often not knowledgeable about finance. Many of them are not informed on the adverse effect of young VCs' participation, and thus seek VC support with little concern of VC quality. Second, their expectations on the value adding of VCs are not high, which mainly are financial capital and the relationship in the financial community and can be provided by young VCs as well.

3. Data sample and descriptive results

In this study, we test the certification/monitoring and adverse selection/grandstanding models in the Singapore context. A data set consisting of companies listed on the stock exchange of Singapore (SES) from 1987 (the year in which the first VC-backed company, Amtek, was listed) to November 2001 (the most recent data available) is collected for the study. We identify venture capitalists mainly through IPO prospectuses, where major pre-IPO shareholders of companies are disclosed. We also use annual reports and other public documents to verify shareholder information in IPO prospectuses. After going through these sources in the public domain, we identify 92 companies as VC-backed companies.

Table 1 presents the descriptive summary for the 92 companies. Here, we define VC age as the time span between the year of the leading VC's incorporation and

Table 1
Descriptive results of Singapore VC-backed companies (1987–November 2001)[a]

	Mean	Median	Standard deviation	Total no
VC age (year)	9.28	8.00	7.0	87
VC equity holding before IPO	17.6%	15.3%	11.9%	92
VC equity holding after IPO	12.5%	11.0%	8.2%	92
Investment duration (year)	2.09	2.00	1.8	87

[a] Data source is IPO prospectuses and first year annual reports after the IPO.

the company's IPO, VC equity holding before IPO as the total VC equity holding percentage just before the IPO and VC equity holding after IPO as the total VC equity holding percentage just after the IPO. The investment duration is defined as the time span between the VC's first investment and the IPO.

Table 1 demonstrates that the mean VC equity stake holding, 17.6% before the IPO and 12.5% after the IPO, is fairly high as an institutional holding. The equity holding after IPO is lower mainly due to a dilution by shares issued to the public. Such large stakes are expected to give VC firms the incentive to actively participate in the governance of their investees subsequent to the IPO. Table 1 shows that the average VC investment duration is 2.09 years, which is shorter than the US counterpart. Barry et al. (1990) report that the mean duration of leading VCs' board seating is 2.92 years, and the investment duration may be longer. This points to the possible existence of the grandstanding behavior. The short duration shows that local VC firms overwhelmingly concentrate on pre-IPO investments.

To compare VC-backed companies with non-VC-backed ones, we apply a method similar to that of Megginson and Weiss (1991). That is, each VC-backed company is matched with a counterpart, an IPO company in the same industry and with a similar size but without VC support. In addition, listing years and trading currency (Singapore dollar or US dollar trading [1]) are also used in determining the match. Employing this approach, we try to match each of the 92 Singapore VC-backed companies with a non-VC-backed IPO company in the same industry (defined by same sub-sectors according to SES industry classification) and with a similar offering size. As a result, a total of 82 VC-backed companies and 82 non-VC ones are found and will be used for further analysis. We exclude ten VC-backed companies because no matching counterparts can be found. Most of them are in the IT service sectors (e.g., dot-coms), often money-losing and not comparable with other companies.

4. Comparison between VC and non-VC-backed firms

We study the differences between VC-backed and non-VC-backed firms in three aspects, namely, the IPO performance, the post-IPO operational performance, and the market performance after the IPO. We test the certification role of VC firms by studying IPO size, underpricing, cost and quality of underwriters and auditors. We test the grandstanding model by examining company age, operating and financial performance as at the IPO year. By studying the influence of VCs on the post-IPO operating performance as well as the long-term market performance, we can ascertain whether the monitoring role or the adverse selection/grandstanding effect of VC firms is more influential on VC-backed companies.

---

[1] Foreign companies are not allowed to trade in Singapore dollars till November 1999, and thus they are traded in US dollars on SES.

4.1. IPO performance

This section focuses on the differences between VC-backed and non-VC-backed firms in the IPO pricing, offering size, underpricing, quality of underwriter and auditor, and ratio of net proceeds as well as the operating performance. We define the ratio of net proceeds as the ratio of net proceeds (excluding all flotation costs in the IPO process) received by the issuing company to total IPO proceeds. It is a measure of total IPO floating cost.

Here, IPO pricing is measured by price/earning ratio (P/E ratio) and book/market ratio. We define P/E ratio as the ratio of the offering price to earnings per share before the IPO. We define book/market ratio as the ratio of net tangible asset per share to the offering price. These two ratios measure the valuation of an IPO share at its offering price. We measure the IPO size by offering proceeds, the amount of the total IPO offering to the public.

We also define underpricing as the first trading day close price minus the offering price divided by the offering price. Since the IPO underpricing is very high in some "hot issue" periods (Ritter, 1984) and increases the standard deviation, excluding IPOs in these periods will reduce the data deviation and tease out the VC effects more clearly. In this study, we choose December 1992–April 1994 and April 1999–September 1999 as the hot issue periods due to the huge international capital inflow in the first period and the rapid recovery from the Asian financial crisis in the latter. Here we report the underpricing both including and excluding the hot issue period.

On auditor quality, we follow the approach of Feltham et al. (1991). The Big Six (Arthur Andersen, Coopers and Lybrand, Deloitte and Touche, Ernst and Young, KPMG, and Price Waterhouse [2]) are differentiated from small local auditors. The Big Six are coded 1 and local ones 0.

For the quality of the underwriter, following Megginson and Weiss (1991), we use the relative market share of underwriters to measure the underwriter quality since it is continuous and relatively easier to construct. We define the quality of an underwriter as the proportion of the IPO amount underwritten by the underwriter on SES from 1987 to 1996 relative to the whole IPO amount underwritten during the same period.

We define company age as the time span between the incorporation year of the company itself or its predecessor company (some companies are restructured and incorporated just before going public, so we base their year of incorporation on their predecessors) and the IPO. Ownership percentage is defined as the equity stake held by original owners after the IPO. Shareholdings of venture capitalists and other strategic partners are included.

During the fifteen years covered by the sample (1987–2001), there emerged one significant regulatory environment change, i.e., the relaxing of SES listing requirements from September 1999 onwards. Therefore, for some variables with inclusive

---

[2] Coopers and Lybrand and Price Waterhouse merged in late 90s, and the Big Six have become the Big Five.

differences (statistically significant in mean difference but not in median difference, or the reverse), we conduct further comparison for IPOs before the change (i.e., for companies listed before September 1999).

To measure the operational and financial performance of a company, we use several ratios similar to the study by Jain and Kini (1995). Debt ratio is measured by the percentage of total debt to total asset at the end of the last fiscal year before the IPO, i.e., Year -1. Earning growth ratio is described as the ratio of the net profit (excluding extraordinary items) of Year -1 to the net profit of Year -2. Four IPOs with less than -50% earning growth ratio are excluded in the analysis since such significance decreases are extraordinary and are compensated by significant expected profit increases in the following year as promised in the IPO prospectuses. Measures of operating performance used are returns on assets (ROA) and returns on sales (ROS). We measure returns by operating income, defined as total sales less cost of goods sold, general and administrative expenses, and net interest expense before depreciation and amortization. Net cash flows on assets and net profit on equity (ROE) are also tested, with similar results. Thus only results of the first two ratios are presented. All these performance ratios are calculated based on Year -1.

Table 2 compares the IPO pricing, size, underpricing, cost, underwriter and auditor quality, company age, financial and operating performance at the IPO year between the two groups (VC-backed IPOs versus non-VC-backed IPOs). To measure the significance level of the two-group difference, we apply a two-tailed t-test and non-parametric Mann–Whitney U test.

Table 2 shows that most measures on the IPO performance are similar between VC and non-VC groups. The similar P/E ratio and book/market ratio between VC and non-VC-backed IPOs show no difference in IPO pricing between the two groups. We also find no significant differences in offering size.

A significant difference in underpricing is found in the sample when the hot issue periods (December 1992–April 1994 and April 1999–September 1999) are excluded from the analysis. As shown in Table 2, VC-backed companies are less underpriced, and thus the certification role of venture capitalists in the IPO is recognized by public investors. If we include IPOs in this period, the underpricing difference will still exist (23.4% versus 31.6%); however, it is not statistically significant due to the higher deviation.

We find no difference between the two groups on auditor quality but significant difference in underwriter quality, particularly before the regulatory change. We find that VC-backed IPOs have higher quality underwriters, which is consistent with the findings of Megginson and Weiss (1991) based on US data. This shows that the certification of VCs through their presence can attract high quality underwriters to certify the IPOs.

However, the VC certification does not lower the IPO cost as reported by Megginson and Weiss (1991) on VC-backed IPOs in the US. Table 2 shows that IPO cost for VC-backed companies, measured by ratio of net proceeds (more exactly, one minus the ratio of net proceeds), is slightly higher than that for non-VC companies, though the difference is not significant. Since the large part of IPO cost is the certification cost of underwriters and auditors, we may conclude that the certification role

Table 2
IPO performance differences between VC and non-VC-backed IPOs for a sample of matched pairs of IPOs listed between 1987 and November 2001 on SES

	VC-backed IPOs mean (median)	Non-VC-backed IPOs mean (median)	t-statistics (Z non-parametric)	Sample size (VC/non-VC)
P/E ratio	16.9 (11.3)	14.6 (12.3)	0.73 (-1.14)	81/81
Book/market ratio	0.49 (0.46)	0.46 (0.47)	1.15 (-0.29)	82/81
Offering proceeds (S$ million)	24.0 (15.4)	22.7 (17.7)	0.36 (-0.29)	82/82
Underpricing	23.4% (12.3%)	31.6% (18.7%)	-1.47 (-1.16)	82/82
Underpricing excluding hot issue periods	13.3% (8.5%)	27.6% (13.4%)	-2.86^{*} (-1.99^{**})	66/72
Ratio of net proceeds	91.4% (92.1%)	92.1% (92.7%)	-1.29 (-1.05)	81/81
Underwriter quality	25.0% (18.8%)	19.0% (7.0%)	2.10^{**} (-1.56)	82/82
Underwriter quality before regulatory change	25.0% (43.0%)	18.2% (7.0%)	2.12^{**} (-1.61^{***})	64/65
Auditor quality	0.90 (1)	0.85 (1)	0.95 (-0.95)	82/82
Company age (year)	15.5 (14.0)	18.3 (16.0)	-1.60 (-1.98^{**})	82/82
Company age before regulatory change (year)	15.7 (14.0)	18.8 (17.0)	-2.08^{**} (-2.41^{**})	64/65
Ownership percentage	71.0% (73.5%)	70.5% (71.9%)	0.41 (-0.51)	82/82
Debt ratio	59.3% (59.5%)	57.5% (62.4%)	0.74 (-0.27)	82/82
Earning growth ratio	124.1% (59.7%)	75.8% (39.0%)	2.17^{**} (-1.71^{***})	79/80
ROA (Year -1)	17.8% (16.9%)	19.0% (17.3%)	-0.89 (-0.48)	82/81
ROS (Year -1)	15.2% (13.2%)	17.3% (15.8%)	-1.37 (-1.36)	82/81

[*] Significant at the 0.01 level.
[**] Significant at the 0.05 level.
[***] Significant at the 0.10 level.

of venture capitalists to financial intermediaries is empirically only partly supported in Singapore. Hence, we may surmise that VC firms can attract high quality underwriters to certify the issuing, but that these underwriters do not accept the certification of VCs by lowering the IPO cost. The possible existence of adverse selection/grandstanding may moderate the certification effect of VCs on intermediaries. Knowing VC-backed IPOs may not be the best IPO candidates due to the adverse selection or grandstanding effects, underwriters and auditors spend similar efforts and ask for similar risk premiums for VC-backed IPOs compared with non-VC ones.

Besides the IPO underpricing and underwriter quality, Table 2 shows two significant differences between VC and non-VC-backed companies: company age, particularly before the regulatory change (younger for VC ones) and earning growth (higher for VC ones). Higher earning growth before the IPO year may indicate VCs' role in pushing their portfolios to grow faster or alternatively the ability of VC firms in finding high-growth companies, while the younger VC-backed companies indicate their tendency to reach the IPO stage earlier. The lower age of VC-backed IPOs is reported in the US but not the higher earning growth (Megginson and Weiss, 1991). Contrary to the finding by Megginson and Weiss (1991), no significant difference is found in the debt ratio. The more significant effect before the regulatory change may be related to the greater difficulties of IPO before the change, and hence, the certification effect of VCs became more important. Thus VC firms need high quality underwriters to certify the IPO, while young companies without VC support find it difficult to go public.

We also observe no differences between the two groups in ROA and ROS. This result is different from that in Jain and Kini (1995) who find that the ROA of VC-backed companies is significantly lower than that of non-VC ones. Our finding supports neither the certification/monitoring model nor the grandstanding model. Perhaps both effects exist, but are hidden in aggregation. To explore this issue, we conduct further analysis in Section 5.1.

4.2. Operational performance after the IPO

In this section, we discuss the operational performance of the two groups after the IPO, looking at both group differences in the same year after the IPO and differences in performance changes from Year − 1 (the last fiscal year before the IPO). The results are presented in Table 3. Here, Year 0 is the fiscal year when the IPO takes place, Year 1 is one year after the IPO, and Year 2 is the second year after the IPO. Because the data collection ends in November 2001, the operating performance data for some of the new IPOs are not available, thus reducing our sample size. Net profit change, which is the ratio of the net profit after the IPO to the net profit in Year − 1, measures the earning growth after the IPO. Similarly we employ ROA change and ROS change to measure the operating performance change. ROA (operating return on assets) is the ratio of operating income to total assets. ROS (operating return on sales) is the ratio of operating income to total sales. As ROS and ROA are similar, only the yearly change of ROA is presented in Table 3. Change of ROA in Year 0 is ROA in Year 0 minus ROA in Year − 1. Change of ROA in Year 1 and Year 2 are similarly defined.

Table 3 shows that net profits of VC-backed companies are in decline. In Year 2 when non-VC-backed companies experience profit increase compared with Year − 1 in average, VC-backed companies suffered profit decline. The median net profit change of the VC group in Year 2 is just 49.5%. This means that in Year 2, half of VC-backed companies earned less than 50% of the profit they earned before the IPO.

On the relative measures of operating performance, differences between VC and non-VC-backed companies are also obvious. When both groups experience decline

Table 3
Differences between VC and non-VC-backed IPOs on operational performance after the IPO[a]

	VC-backed IPOs mean (median) (%)	Non-VC-backed IPOs mean (median) (%)	t-statistics (Z non-parametric)	Sample size (VC/non-VC)
Net profit change in Year 2	54.2 (49.5)	102.2 (106.9)	−1.47 (−1.73*)	58/63
ROA (Year 0)	14.1 (13.5)	15.5 (15.3)	−0.89 (−1.15)	80/79
ROA (Year 1)	9.8 (10.2)	12.2 (11.2)	−1.59 (−1.70*)	71/69
ROA (Year 2)	7.1 (7.5)	10.0 (9.5)	−1.88* (−1.46)	58/62
ROS (Year 0)	14.7 (14.4)	18.0 (15.8)	−1.37 (−1.69*)	80/79
ROS (Year 1)	10.0 (9.4)	14.5 (13.8)	−2.03** (−2.29**)	71/69
ROS (Year 2)	8.2 (7.9)	13.5 (11.9)	−2.52*** (−2.21**)	58/62
Change of ROA in Year 0	−3.9 (−2.5)	−3.2 (−2.2)	−0.59 (−0.61)	80/79
Change of ROA in Year 1	−7.7 (−6.3)	−5.5 (−4.7)	−1.44 (−1.30)	71/69
Change of ROA in Year 2	−10.5 (−8.6)	−7.2 (−6.2)	−2.06** (−1.67*)	58/62

* Significant at the 0.10 level.
** Significant at the 0.05 level.
*** Significant at the 0.01 level.
[a] ROA yearly comparison is based on ROA change from Year − 1.

of ROA and ROS, the decline of the VC-backed group is faster. As a result, the difference in ROS between the two groups becomes significant from Year 1 onwards. Measured in yearly change, ROA change of VC-backed group is significantly lower than that of the non-VC-backed group in Year 2. Therefore, our findings contradict the results of Jain and Kini (1995).

While our findings are consistent with the prediction of adverse selection/grandstanding model, they contradict the expected results of the certification/monitoring model. It seems a lot of "lemons" turn "sour" two or three years after the IPO. We will further visit the post-IPO performance in Section 5.1 to distinguish the adverse selection and the grandstanding effect.

4.3. Market performance after the IPO

In this section, we discuss both the short-term and the long-term market performance of the two groups after the IPO. We examine short-term three- and six-month, and long-term one-, two-, and three-year buy-and-hold market returns, with November 2001 as the latest trading month due to data availability. We define the buy-and-hold market return for a given period as the monthly closing price (adjusted for dividend and bonus) after this period from the IPO minus the first-day closing

price divided by the first-day closing price. For example, for a company listed in August 1994, monthly closing prices for three months, six months, one year, two years and three years are the closing prices in November 1994, February 1995, August 1995, August 1996, and August 1997, respectively. Because of general market movement, raw market returns are adjusted to reflect companies' excess returns over the general market using a market index. Two market indexes, the UOB-SESDAQ index and the SES-foreign index, provide measures for local and foreign shares in Singapore, respectively. Though the UOB-SESDAQ index is an index for shares listed on SESDAQ, the second board of the Singapore stock market, the UOB-SESDAQ index is a good measure for small-capital shares on both SESDAQ and the SES Main Board. Because most VC and non-VC-backed shares are small capital shares, we calculate their market returns and adjust the market returns using the UOB-SESDAQ index return for the same period. For foreign shares, we use the SES-foreign index to derive excess returns.

Table 4 compares the three- and six-month, and one-, two-, and three-year excess returns between VC and non-VC-backed IPO companies.

Table 4 shows no significant short-term and long-term return differences among IPO companies except the six-month return, indicating that VC-backed IPOs perform better than their non-VC counterparts six months after the IPO but not so in other time windows. This result is different from the finding of Brav and Gompers (1997), which reports better long-term market performance of VC-backed IPOs. In fact, Table 4 demonstrates better performance of VC-backed IPOs in short-term periods such as three months and one year though the finding is not statistically significant. However, performance is worse for the VC group in long-term two- and three-year median returns. The positive effect of VC certification/monitoring to market performance is offset in the long-term by adverse selection/grandstanding effects.

Table 4
Differences between VC and non-VC-backed IPOs on market performance after the IPO[a]

	VC-backed IPOs mean (median) (%)	Non-VC-backed IPOs mean (median) (%)	t-statistics (Z non-parametric)	Sample size (VC/non-VC)
Three-month excess return	4.1	0.6	0.68	82/82
	(−2.4)	(−5.1)	(−1.06)	
Six-month excess return	10.5	0.04	1.70[*]	82/82
	(1.3%)	(−6.8)	(−2.16[**])	
One-year excess return	13.2	4.5	1.07	77/80
	(3.1)	(1.8)	(−0.29)	
Two-year excess return	9.3	5.0	0.33	70/69
	(−17.5)	(−1.0)	(−1.07)	
Three-year excess return	29.8	−0.9	1.21	57/61
	(−25.1)	(−23.0)	(−0.37)	

[*] Significant at the 0.10 level.
[**] Significant at the 0.05 level.
[a] Data sources are public database *Estimates Direct* on share price and *SES Fact Books* in various years on market indexes. The excess return is the buy-and-hold return adjusted by the market index, the UOB-SESDAQ index for local shares, and the SES-foreign index for foreign shares.

The significant difference in the six-month return perhaps is related to the end of the lock-up period for VC firms as large shareholders (many of them sign a memorandum with SES at the IPO, with the promise of not selling their shares until six months later). Thus, the study on market performance further supports both the positive certification/monitoring effects and the negative adverse selection/grandstanding effects. As firms age, the positive effects diminish while the negative ones start to become more prominent.

5. Further testing on adverse selection/grandstanding effect

5.1. Performance differences by VC duration

We conduct a test to further understand the reasons behind these empirical results and attempt to answer why VCs do not add value. VC-backed IPOs are classified according to VC duration in two groups: long VC-backed IPOs and short VC-backed IPOs. Companies with at least two years of VC support before the IPO are categorized as long VC-backed IPOs and the rest as short VC-backed IPOs. As two years is the median of VC duration, this division can generate two similar size subsets for comparison. Both long and short VC-backed IPOs are compared with their matched non-VC-backed counterparts in both the operational performances at the IPO year and after the IPO.

The VC duration is expected to have two opposing effects on the company performance. The longer the VC participation, the greater the VC ability to monitor and influence action taken by the company (Jain and Kini, 1995). Therefore, the certification and monitoring effect of VCs would be stronger for long VC-backed IPOs. On the other hand, early stage VC investments face greater information asymmetry and thus are influenced by the adverse selection more severely. On the contrary, short VC duration means less certification/monitoring and greater danger of grandstanding. As we mentioned in Section 2.2, the adverse selection and grandstanding can be distinguished by the post-IPO operational performance differences. The adverse selection would bring worse performance measured in absolute value but not the relative change compared with the IPO year, while grandstanding should yield the reverse.

Table 5 compares long and short VC-backed IPOs with their counterparts separately. Through this analysis, we can understand the various effects of VC participation more clearly, especially in differentiating the adverse selection and grandstanding effects.

Table 5 shows the various effects of VCs on their portfolio companies. In the IPO process, long VC-backed IPOs show significant VC certification effect via lower underpricing and higher underwriter quality, but the certification effect is not significant for short VC-backed IPOs. Thus the VC certification effect in Singapore exists mainly among VCs with longer investment duration. Furthermore, issues raised with respect to the operational performance at the IPO year in Section 4.1 can be answered more clearly here. The higher earning growth for VC-backed IPOs

Table 5
Differences between long and short VC-backed IPOs with their non-VC-backed counterparts[a]

	VC-backed IPOs mean (median) (%)	Non-VC-backed IPOs mean (median) (%)	t-statistics (Z non-parametric)	Sample size (VC/non-VC)
Panel A: Comparison between long VC-backed IPOs and their counterparts				
Underpricing excluding hot issue period	10.3 (8.0)	27.3 (13.8)	−2.27[*] (−1.66[**])	33/37
Underwriter quality	28.4 (43.0)	19.2 (12.0)	2.31[*] (−1.91[**])	41/41
Earning growth ratio in Year − 1	107.7 (59.7)	62.5 (35.0)	1.67[**] (−1.56)	39/40
ROA (Year − 1)	15.2 (14.0)	19.1 (17.4)	−2.22[*] (−2.21[*])	41/40
ROA (Year 1)	7.3 (8.4)	12.4 (12.2)	−2.48[*] (−2.49[*])	35/36
ROA (Year 2)	5.0 (5.0)	10.8 (11.6)	−2.46[*] (−2.55[***])	29/31
Change of ROA in Year 1	−6.6 (−3.9)	−5.2 (−4.9)	−0.70 (−0.22)	35/36
Change of ROA in Year 2	−8.6 (−5.8)	−6.7 (−5.5)	−0.82 (−0.48)	29/31
Panel B: Comparison between short VC-backed IPOs and their counterparts				
Underpricing excluding hot issue period	16.3 (10.5)	27.8 (13.0)	−1.67[**] (−1.15)	33/35
Underwriter quality	21.6 (12.0)	18.9 (7.0)	0.66 (−0.39)	41/41
Earning growth ratio in Year − 1	140.1 (62.6)	89.1 (58.4)	1.45 (−0.97)	40/40
ROA (Year − 1)	20.4 (20.4)	18.8 (17.2)	0.83 (−1.40)	41/41
ROA (Year 1)	12.2 (11.8)	11.9 (10.8)	0.16 (−0.10)	36/33
ROA (Year 2)	9.1 (9.3)	9.2 (8.0)	−0.02 (−0.58)	29/31
Change of ROA in Year 1	−8.8 (−8.2)	−5.8 (−4.7)	−1.27 (−1.36)	36/33
Change of ROA in Year 2	−12.3 (−11.3)	−7.7 (−9.1)	−2.19[*] (−1.99[*])	29/31

[*] Significant at the 0.05 level.
[**] Significant at the 0.10 level.
[***] Significant at the 0.01 level.
[a] Long VC-backed IPOs are IPOs with at least two-year VC support before the IPO. Short VC-backed IPOs are IPOs with less than two-year VC support. The comparison is between these IPOs with their matched non-VC-backed IPOs.

is the same for long and short VC-backed IPOs. However, the ROA of short VC-backed IPOs is higher than non-VC ones though not statistically significantly, while the ROA of long VC-backed IPOs is significantly lower than non-VC ones. The latter result is consistent with the finding of Jain and Kini (1995). Thus, we can

conclude that VCs in Singapore with long investment duration are similar to VCs in the West. On the contrary, IPOs with short periods of VC support are the opposite, i.e., the higher ROA is possibly related to their higher levels of window-dressing. The higher ROA can contribute to the grandstanding effect of VCs for earlier IPOs. Alternatively, the high growth of these companies may attract less experienced later stage VCs to invest in them.

Results on operational performance after the IPO in Table 5 demonstrate more clearly the differences between long and short VC-backed IPOs. The ROA of long VC-backed IPOs in Year 1 and Year 2 is significantly lower than that of the non-VC group, but there is no statistical difference of ROA change in Year 1 or Year 2 compared to Year − 1. On the contrary, the ROA of short VC-backed IPOs is similar to the non-VC ones but the decrease of the ROA in Year 2 compared to that in Year − 1 is significantly faster for VC-backed IPOs. It supports the adverse selection model since the effects are more visible for companies with long periods of VC support, as well as the grandstanding model, with more prominent effects on companies with short periods of VC support.

Our findings here reveal reasons behind the poor post-IPO operational performance of VC-backed IPOs reported in Section 4.2, i.e., adverse selection and grandstanding. The VC value added through its monitoring is not high enough to erase the adverse selection effect. Furthermore, though the adverse selection is less prominent for later stage investments, the grandstanding effect is more visible in this stage because of the conflict of interests and the inexperience of VC firms. VCs, which focus on later stage investment, may merely pick firms in high growth industries one or two years before the IPO without much monitoring. After the IPO, they may take an attitude of "wait and see" to divest in the stock market without much interest in the company performance. All these contribute to the inferior post-IPO operational performance of VC-backed IPOs.

5.2. Performance differences by VC age

In this sub-section, we study performance differences between IPO companies backed by older VC firms and those by younger ones to determine whether these differences are related to the age of VC firms as expected by the grandstanding model. This test can distinguish the effect of adverse selection from the VC grandstanding directly.

Similar to Gompers (1996), we classify VC-backed companies into two groups, older VC-backed and younger VC-backed. The median VC age is eight years in our sample. Thus we take the median as the boundary. A VC firm is defined as "old" if its age is older than eight years in the IPO year and "young" if it is eight years old or less in the IPO year. This is close to the boundary of six years used by Gompers (1996). Sensitivity analysis shows similar results if the boundary moves to seven or nine years. We analyze IPO offering proceeds, underpricing, underwriter reputation, company age, VC equity holding, VC investment duration, company earning growth, ROA, ROS, net profit change and ROA change to test the grand-

Table 6
Differences between old and young VC-backed IPOs[a]

	Old VC-backed IPOs mean (median)	Young VC-backed IPOs mean (median)	t-statistics (Z non-parametric)	Sample size (old VC/ young VC)
Offering proceeds (S$ million)	30.8 (21.6)	17.8 (11.3)	0.13 (-2.41^{*})	39/43
Underpricing	17.3% (5.8%)	28.9% (20.2%)	-1.65^{**} (-2.41^{*})	39/43
Underwriter quality	27.9% (43.0%)	22.3% (12.0%)	2.31^{*} (-1.47)	39/43
Company age (year)	16.2 (14.0)	15.0 (12.0)	1.28 (-1.70^{**})	39/43
VC equity holding after the IPO	12.1% (9.7%)	13.5% (13.6%)	-0.76 (-1.82^{**})	39/43
VC investment duration (year)	2.6 (2.0)	1.8 (1.5)	1.81^{**} (-1.28)	36/41
Earning growth ratio	82.3% (44.8%)	162.9% (95.7%)	-2.21^{*} (-2.39^{*})	38/41
ROA (Year 2)	9.0% (9.3%)	6.0% (6.7%)	2.46^{*} (-1.37)	21/37
ROA (Year 2)	10.8% (8.6%)	6.7% (6.1%)	2.77^{***} (-1.64^{**})	21/37
Net profit change (Year 1 to Year − 1)	115.0% (106.1%)	74.1% (80.8%)	1.50 (-0.88)	32/39
Net profit change (Year 2 to Year − 1)	103.2% (90.4%)	26.4% (44.1%)	1.74^{**} (-1.46)	21/37
Change of ROA in Year 1	−6.5% (−4.7%)	−8.7% (−6.8%)	0.70 (-0.96)	32/39
Change of ROA in Year 2	−8.7% (−6.5%)	−11.5% (−9.4%)	0.82 (-0.88)	21/37

[*] Significant at the 0.05 level.
[**] Significant at the 0.10 level.
[***] Significant at the 0.01 level.
[a] Sample consists of VC-backed IPOs listed on SES between August 1987 and November 2001.

standing model. We present the differences between companies supported by older VC firms and those by younger ones in Table 6.

Table 6 shows significant differences in IPO underpricing (lower for old VC-backed companies), earning growth ratio (lower for old VCs), and ROS in Year 2 (higher for old VCs). These results confirm the findings of Gompers' (1996) study.

On the IPO performance, companies backed by older VC firms experience significantly lower underpricing and lower earning growth ratio. As the certification role of venture capitalists to the public has already been accepted in Section 4.1, we conclude that the certification effect of older VC firms on the public is stronger. As older VC firms are not so eager to push their portfolios to the public, their portfolios can wait for a better timing to get a better price in the market. Besides the lower underpricing, IPOs backed by older VCs are more likely to be associated with high reputation underwriters (significant in mean difference but not the median). Older VC

firms also take a longer time to bring their portfolio companies to the public (weakly significant in median difference but not the mean), and their investment duration is longer (weakly significant in mean difference but not the median). These findings support the grandstanding model. Meanwhile, there are no differences found in equity stake and company performance in the IPO year between older and younger VC firms except for the lower earning growth of companies supported by older VC firms.

However, the difference in the operating performance is significant after the IPO. In Year 2, the ROS of the older VC group is significantly higher than that of the younger one. The ROA of older VC group is also higher though statistically it is not so strong (significant in mean difference but not the median). Other differences such as net profit changes and change of ROA are also observable though they are not statistically significant. These results are similar to the VC and non-VC differences discussed earlier. When we compare IPOs backed by older VC firms and non-VC-backed IPOs, the difference of operational performance is not significant.

In summary, IPOs backed by older VC firms can largely avoid the adverse effect of VC participation on their operational performance. This can be explained by the grandstanding model, since the incentive for grandstanding is less strong for older VCs as well as they are more experienced in investment selection and monitoring. Hence, they are able to invest in early stage ventures and add more value to them. Their portfolios take more time to reach the IPO stage, with lower underpricing, and better operational performance than companies backed by younger VC firms. Thus, we confirm the grandstanding model in the Singapore market. Further research is required to distinguish the grandstanding effect and the inexperience of young VC firms in emerging markets.

6. Conclusions

We find a number of interesting results in this study. Through the comparison between VC and non-VC-backed IPOs in Singapore, we find that VC-backed companies are younger and have lower underpricing and higher quality underwriters. Contrary to the evidence found in the US, we do not find that VC-backed firms have higher proceeds, lower issuing cost or higher quality auditors. Furthermore, the lower underpricing and high quality underwriters are more prominent for IPOs with at least two years of VC support. We also find that the operational performance of these IPOs with longer VC support is worse than that of non-VC ones in the IPO year.

On post-IPO performance, we report that the post-IPO operational performance of VC-backed companies is inferior to that of non-VC-backed companies and this gap widens with time, with their operating return on assets and return on sales being significantly lower. Moreover, IPOs with longer VC support perform significantly worse measured in absolute value, while IPOs with shorter VC support perform worse in relative change compared with the IPO year. On short-term and long-term market performances, there are no significant differences between VC and non-VC-backed IPOs though VC-backed IPOs perform relatively better in short-term

periods. These findings are different from the traditional VC literature which focus on developed markets. Hence, our research sheds new light on the study of VCs and their effects in emerging markets.

Our study shows the complicated role of VC firms with respect to their portfolio companies. It does not support the monitoring role of VC firms after the IPO (Jain and Kini, 1995) and only partly supports the VCs' certification role (Megginson and Weiss, 1991). However, it provides support to both the adverse selection (Amit et al., 1990) and the grandstanding model (Gompers, 1996). The lower underpricing of VC-backed IPOs supports the VC certification to the public, but the certification to financial intermediaries is only partly supported by the high quality of underwriters without lower IPO cost. The poor post-IPO operational performance supports both the adverse selection, being more visible for IPOs with long period of VC support, and grandstanding, being more prominent for IPOs with short period of VC supports. The similar market performance may indicate that the positive VC certification is largely offset by the negative adverse selection/grandstanding effects. A comparison between older and younger VC-backed IPOs shows that older VC-backed ones perform better and can reach the level of non-VC-backed IPOs. In this way, IPOs backed by older VC firms can largely avoid the adverse effect of VC participation on their operational performance.

Acknowledgements

References

Akerlof, G.A., 1970. The market for "lemons": Quality uncertainty and the market mechanism. Quarterly Journal of Economics 84, 488–500.

Amit, R., Glosten, L., Muller, E., 1990. Entrepreneurial ability, venture investments and risk sharing. Management Science 36, 1232–1245.

AVCJ, 1999. The guide to venture capital in Asia (1999 edition). Asia Venture Capital Journal (AVCJ) Corporation. Hong Kong.

Barry, C.B., Muscarella, C.J., Peavy III, J.W., Vetsuypens, M.R., 1990. The role of venture capital in the creation of public companies. Journal of Financial Economics 27, 447–471.

Brav, A., Gompers, P.A., 1997. Myth or reality? The long-run under-performance of initial public offerings: Evidence from venture and nonventure capital-backed companies. Journal of Finance 52, 1791–1821.

Feltham, G.A., Hughes, J.S., Simunic, D.A., 1991. Empirical assessment of the impact of auditor quality on the valuation of new issues. Journal of Accounting and Economics 14, 375–399.

Gompers, P.A., 1995. Optimal investment, monitoring, and the staging of venture capital. Journal of Finance 50, 1461–1489.

Gompers, P.A., 1996. Grandstanding in the venture capital industry. Journal of Financial Economics 42, 133–156.

Gompers, P.A., Lerner, J., 1996. The use of covenants: An empirical analysis of venture partnership agreements. Journal of Law and Economics 39, 463–498.

Hamao, Y., Packer, F., Ritter, J., 2000. Institutional affiliation and the role of venture capital: Evidence from initial public offerings in Japan. Pacific-Basin Finance Journal 8, 529–558.

Jain, B., Kini, O., 1995. Venture capitalist participation and the post-issue operating performance of IPO firms. Managerial and Decision Economics 16, 593–606.

Lam, S.S., 1991. Venture capital financing: A conceptual framework. Journal of Business Finance and Accounting 18, 137–149.

Lerner, J., 1994. Venture capitalists and the decision to go public. Journal of Financial Economics 35, 293–316.

Lerner, J., 1995. Venture capitalists and the oversight of private firms. Journal of Finance 50, 301–318.

Lin, T.H., 1996. The certification role of large block shareholders in initial public offerings: The case of venture capitalists. Quarterly Journal of Business and Economics 35, 55–65.

Megginson, W., Weiss, K., 1991. Venture capitalist certification in initial public offerings. Journal of Finance 46, 879–903.

Ritter, J., 1984. The 'hot issue' market of 1980. Journal of Business 57, 215–241.

Sahlman, W.A., 1990. The structure and governance of venture-capital organizations. Journal of Financial Economics 27, 473–521.

Tan, W.T., 1998. Venture capital in Asia Pacific: An overview. Asia Business Law Review 20 (April), 40–47.