

Chinese Venture Capital: A Discussion of the Efficacy of Recent Policies

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I. Venture Capital

I.1 Introduction

Since 1978, exports and low value-added manufacturing have driven China's remarkable economic growth (Ding and Zhang 2009). Recently, greater emphasis has been placed on indigenous innovation to maintain competitiveness and sustain growth rates. This goal has been reflected in economic policy, as the Chinese Government has stated its commitment to shifting towards an innovation-driven economy by 2020 (OECD 2008). In light of this objective, Venture Capital (VC) is an effective solution to encourage innovation and growth through the funding of private enterprises.

VC is defined as "independently managed, dedicated pools of capital that focus on equity or equity-linked investments in privately held, high growth companies" (Ács and Audretsch 2003). Essentially, VC is a long-term active investment in which a Small to Medium sized Enterprise (SME), often in a high-tech industry, receives cash as well as intangible value from the VC firm, in the form of managerial expertise and network connections (Grundling, Steynberg, and Wang 2009). The venture capitalist receives a return in the form of an "exit": a return on investment from an equity sale such as acquisition, liquidation, or initial public offering (Hu 2010).

Small to medium sized enterprises (SME) are often underfinanced due to their lack of tangible assets, unpredictable value of innovation, and informational asymmetries. Additionally, while private VC returns are substantial, positive externalities of innovation associated with investment in SMEs suggest that returns on investment remain below social returns (Lerner 2002). Therefore, the VC supply is likely suboptimal.

Given the economic benefits of an active VC sector, policies should be implemented that encourage VC transactions. A VC industry did not exist in China until 1985, when intrusive policies were implemented (Wong, 2011). Numerous tax incentives, subsidies, and direct investments have been used to increase funding to SMEs (Hu, 2010). These policies have been largely successful, as risk capital investments in China have increased from US \$56 million in 1993 to US \$15,163 million in 2010 (Wong, 2011). There is extensive theoretical and empirical literature discussing whether these types of policies have increased supply of VC (leveraging effect), or increased competition and thus dissuaded entry of private VC firms (crowding-out effect) (Guo & Zhao, 2013).

This paper will examine theoretical constructs of VC, foreign examples, and China's VC history to conclude whether China's recent economic policies for VC are effective in encouraging innovation and economic growth.

I.2 The Economic Benefits of Venture Capital

In order to increase production output, either capital or labour inputs must be increased (extrinsic growth), or total factor productivity must be increased (intrinsic growth). Early research in productivity observed that in the U.S. between 1870 and 1950, inputs only accounted for 15% of economic growth, with the rest of growth attributed to improved productivity through more efficient allocation and technological progress (Abramowitz 1956). New technological innovation is the main driver of productivity growth (Globerman 2012). Furthermore, society benefits from innovation in a variety of ways, such as progress in health care, transportation, and communication.

Capital is a constraint for research and development firms that commercialize technology, particularly small firms (Lerner 2009). SMEs, especially high-technology firms, have a number of risky characteristics that greatly increase the difficulty of obtaining financing from traditional financial institutions, such as banks. Examples of these risky characteristics associated with SMEs are: few tangible assets that can serve as collateral, difficulty in valuating the potential of their innovation, and high incidence of failure (bankruptcy) (Grundling, Steynberg, and Wang 2009).

VC encourages innovation through relief of the capital constraint by financing firms that would otherwise be deemed too high risk for traditional investment institutions (Avnimelech, Bar-El, and Schwartz 2007). Firms that are funded by VC often develop completely new technologies or products, which contribute to technological progress. In the United States of America, VC represented 3 percent of research and development funds in 1998, though VC backed firms generated 15 percent of national industrial innovation (Kortum and Lerner 1998). This evidence shows that risk capital is an extremely efficient source for financing innovation and increasing productivity.

VC delivers far greater value to investees than just the capital provided, resulting in more successful businesses. Bankruptcies in new businesses are primarily caused by: capital constraints, poor management, and lack of market knowledge (Avnimelech, Bar-El, and Schwartz 2007). In addition to providing capital, VC firms provide strategic advice, industry connections, and legitimacy to overcome these faults (Auerswald and Branscombe 2001). Extensive research shows that VC backed firms outperform comparable SMEs in terms of failure rates and profitability (Bertoni, Luukkonena, and Deschryverea 2012). This is due to the mentioned value added and financing, as well as a selection bias; VCs selectively fund firms with higher expected return on investment. This bias is beneficial for economic growth as it allocates resources with greater efficiency.

I.3 Venture Capital Market Failures

A supply gap for VC funding of SMEs exists as a result of a number of market features. For example, technological innovation often leads to profits earned by competitors, not exclusively by the researching firm (Lerner 2009). An example of this is Toyota's development of the Prius in 1997 as the world's first commercial hybrid vehicle

(Lake 2001). Though Toyota developed new technologies, many competing firms quickly invested in similar technologies and profited as a result. Externalities could also be realized by consumers who benefit from less expensive or more enjoyable products, or by the general population due to progress in social sectors such as health care or environmental sustainability. Since return on investment for the venture capitalist is unlikely to capture total social return, investment will fall below the social optimum regardless of which particular positive externality occurs (Lerner 2002). The gap between social and private rates of return on innovation is estimated to be between 50% and 100% of private returns (Griliches 1992).

Another reason for the undersupply of risk capital is asymmetric information (Lerner and Watson 2007). The entrepreneur is more knowledgeable about their future profits since they have a more complete understanding of their technology and the market in which their SME operates. Since entrepreneurs cannot communicate this information with perfect honesty and clarity, venture capitalists have difficulty differentiating strong firms from weaker ones. Thus, the venture capitalist assesses all projects with assumed higher risk, which leads to a lower valuation and an overall undersupply of VC.

Empirical evidence shows a long-run trend of venture capitalists decreasing the frequency of their investment in early stage ventures (Pierrakis 2010). Another observable trend is that VC is heavily focused on specific sectors in many prominent markets. In 2000, 92 percent of U.S. VC funding was invested in information technology and health care sectors (Lerner 2002). These dramatic trends have largely been caused by a “herding” effect: the phenomenon of market agents reacting to other market agents rather than the actual market conditions (Devenow and Welch 1996). Low investment rates in young SMEs and particular neglected sectors represent failures in the VC market.

II. Government Intervention

II.1 The Role of Government Intervention

Successful economic VC policy should address the discussed market failures, and accentuate the benefits of VC. Policy can be used to increase supply of VC and thus move the market into social equilibrium. Common policy tools that encourage VC activity include subsidies, tax benefits, changes in regulations, grants, and public participation in the market (Lerner 2009). Policies aimed at expanding the pool of risk capital usually take the form of investment subsidies or direct investment in the VC industry (OECD 2006). Subsidizing VC investment directly increases rate of return for the venture capitalists, thus incentivizing greater participation by lowering the entry threshold. Direct investment is either structured as public funded and operated VC organizations, or through government investment as a limited partner in VC funds (Guo and Zhao 2013). This achieves a leverage effect by increasing the supply of VC by expanding the number of investors, resulting in greater VC investment.

In the development stages of a VC industry, an important role of government is initiating the investment cycle. Prior to the first successful VC funding and profitable exit by a VC

backed firm, there exists a dilemma: no risk capital exists so SMEs are capital constrained, but there are no returns on VC investment to entice investor participation (Lerner and Watson 2007). Once initiated, the development of a risk capital industry is a long-term process that requires the evolution of market and legal structures, of supporting professional intermediaries such as lawyers and accountants, and of expectations between SMEs and venture capitalists. Government intervention can initiate and accelerate the development of a VC industry by supporting early investments and by establishing these institutions.

A third purpose of government intervention is to increase financing for firms in industries neglected by VC (Wong 2011). Subsidizing or focusing government-funded VC on these sectors would increase investment in underfinanced markets (leverage effect). Obtaining government funded VC funding additionally provides legitimacy, which can ease concerns over asymmetric information and increase the likelihood of receiving financing from banks or follow-up funding from private VCs (Jeon and Kim 2013). Government officials may also be better suited to assess firms in some neglected sectors, such as those where customers are government services, such as national defence or health care (Lerner 2002). Thus, government investment can develop risk capital markets in neglected sectors.

II.2 Drawbacks of Government Policy

The greatest concern regarding government participation in the VC market is the possible manifestation of a crowding-out effect. Increased supply of VC could initially result in lower expected returns due to a shift to long-run equilibrium that clears at greater quantity of investment and lower profit level (Gilson 2002). If government funded VC competes with private VCs, these lower expected returns could slow the development of private VC, possibly causing some investors to leave the market (Cumming and MacIntosh 2006). The theoretical result of a crowding out effect is that projects that would have been financed by private VCs instead receive state funding (Guo and Zhao 2013). Thus, unless government funded VC does not compete with private VC, the risk capital market may become dependent on state funding in the long run. This implies that government funded VC should only be used temporarily to accelerate the development risk capital markets, or as a permanent agent in an undersupplied market.

A drawback of government operated VC firms is the lack of experience in selecting the most promising firms. Predicting success of SMEs is extremely difficult, though private venture capitalists have demonstrated significant effectiveness in financing firms with higher returns (Lerner 2002). There is much doubt regarding the ability of government officials to forecast the profitability of SMEs (Avinimelech and Teubal 2006). Thus, on a firm-by-firm basis, resources would be allocated most efficiently by the private sector. Further, largely due to the intangible value provided by private venture capitalists, high levels of government funded VC funding result in lower financial returns from SMEs compared to private VC (Picker 2011).

A final concern with government intervention is the ability for government officials to implement policies for their own benefit (Ding and Zhang 2009). Though this potential issue arises with many forms of government intervention, decisions of government funded VCs often seem arbitrary, which creates the potential for investment to be directed to unfeasible enterprises if funding regulations are not strict and explicit.

II.3 Types of Government Policies

The most common policy used to address VC market failure is equity enhancement, often referred to as “hybrid schemes” (Cowling, et al. 2012). These hybrid VC firms are structured with the state investing as a passive limited partner in the VC fund, giving full operation responsibility to the general partner. Thus, public investment increases supply of VC, though the market still behaves with the effectiveness of private VC. Governments can select VCs that fund targeted sectors such as early stage SMEs and neglected industries, but firm by firm selection is done by experienced and proven private venture capitalists. This structure complements existing VC institutions, rather than crowding-out the private sector with state controlled investments. British evidence demonstrated that many hybrid VC firms achieved the same standard as private VC firms regarding returns on investment (Cowling, et al. 2012). Also, data from 1984-2008 in European countries indicates that government-funded VC improves growth rates of early stage SMEs, thus enhancing investment returns and innovation (Grilli and Murtinu 2011).

A disadvantage to hybrid schemes is that funding a neglected sector does not change investment conditions in that sector; the unattractive characteristics that initially caused the supply-side market failure are not remedied. Expected return from these sectors has not increased so there is no greater incentive for VC investment (Avinimelech and Teubal 2006). To overcome this persistent failure, governments often act as a limited partner and agree to cap their returns in order to provide greater profits to private limited partners (Gilson and Schizer 2003). This provides greater returns from previously neglected sectors, encouraging greater market participation by private VC firms, thus moving investment quantity towards the social equilibrium. Government funded VC, however, must not represent too large of a proportion of the VC industry. Information from 25 countries showed that low levels of government funded VC lead to better exit performance, while high government involvement began to crowd-out private VC (Jeon and Kim 2013).

II.4 Successful Government Intervention: Israel’s Government Policy

In the early 1990’s, Israel was experiencing widespread failure to commercialize technology despite massive research and development investment. Issues went beyond capital constraints, including lack of business experience and managerial expertise (Gilson and Schizer 2003). In 1993, the Yozma Programme was created to generate a competitive Israeli VC industry to invest in young SMEs, hoping to successfully develop high-technology businesses (Grundling, Steynberg, and Wang 2009). Ten hybrid VC funds were created through Yozma, each with the involvement of a foreign and a domestic financial institution, and at least US\$ 8 million of government investment (Avinimelech,

Bar-El, and Schwartz 2007). From 1993-1998, approximately US\$ 250 million was invested in early-stage SMEs, generating a leverage effect. Hybrid VC firms experienced higher success rates than average (16.5 percent compared to 9 percent) and lower failure rates (28.3 percent compared to 35.6 percent) (Avnimelech, Bar-El, and Schwartz 2007). Use of successful government policy sparked and expanded the pool of risk capital, allowing Israel to become the world's most active VC market, with VC investments exceeding those of any other country, at 1.2 percent of GDP (Haour 2005). Israel's success in generating a thriving VC industry serves as justification for similar policies to be implemented in other developing countries.

III. Venture Capital in China

III.1 Chinese Venture Capital History

Prior to 1985, there was no VC activity in China, but in subsequent years a number of government funded initiatives eventually succeeded in fostering a VC industry. With ambitions of cultivating a more innovative economy, China's State Science and Technology Commission created the China New Technology Venture Capital Investment Corporation (CNTVI) in 1985, the first VC firm to operate in China (Feng 2004). Other government funded VC firms joined the market in the 1980's as well, though there was little investment activity until the early 1990's (Wong 2011).

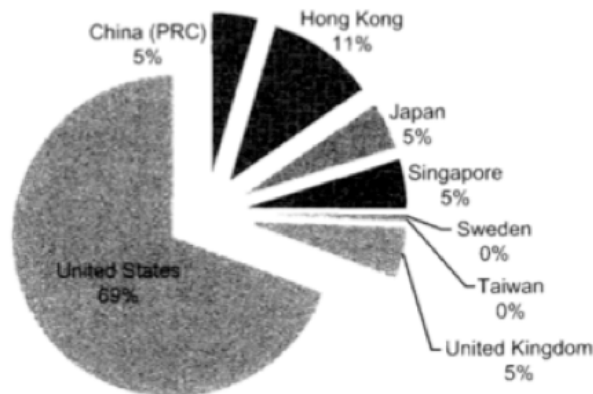
In the early 1990s, tax benefits were implemented to incentivize VC investment in high technology sectors and young SMEs (Hu 2010). Also, many provinces began to participate in VC markets by creating state funded and operated VC firms (Wong 2011). By the early 1990's some exits were occurring, but the VC market was still dominated by government funded VC firms. Prior to 1996, total VC deals in China remained below 10 each year (Wong 2011).

China's VC industry began to accelerate in the mid-1990s, as technology development became a pressing policy concern. The Chinese government created an ad hoc committee to monitor and study the domestic VC industry (Hu 2010). Simultaneously, government funded VC firms began to step back from direct market participation due to their limited success as investors resulting from a lack of experience (Wong 2011). Prior to the late 1990's, private fundraising required the government's permission and was seldom given to domestic firms. The relaxation of this regulation combined with a wave of foreign direct investment across industries in China, caused a shift in VC investment towards foreign firms, who contributed 95 percent of total VC funding in the 1990s (Feng 2004). This investment was heavily skewed towards state owned enterprises (accounting for 90 percent of VC investment) and businesses in the information technology sector (Feng 2004). VC investment in 1999 was more than eight-fold the total in 1993 (Wong 2011).

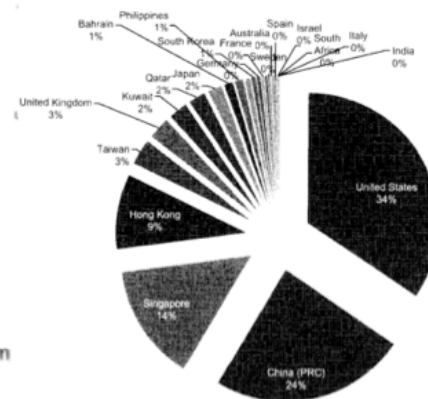
A major shift in VC policy occurred in 1998 when CNTVI was closed due to its inability to commercialize research and development projects (Grundling, Steynberg, and Wang 2009). CNTVI was replaced by the Innovation Fund for Small and Medium Technology-based Enterprises (Innofund), the first of many hybrid VC funds. Though Innofund did

not have a significant impact, it served as a policy experiment that inspired many additional hybrid VC firms in the future.

Amount of VC Investment by Nationality, 1990–1999



Amount of VC Investment by Nationality, 2000–2010



Source: (Hu 2010)

Beginning in the mid-2000's many implemented policies including increased VC market participation, diversifying VC sources, and encouraging foreign investment experienced considerable success (Hu 2010). Beneficial tax policy that was initially only available to specific sectors was applied to all VC firms, further encouraging participation. Chinese VC firms became significantly more active, and were responsible for nearly one quarter of all VC deals from 2000 to 2010. Also, risk capital investment was distributed more evenly among industries compared to the 1990's, providing funds to previously neglected sectors (Wong 2011). Total VC investment in 2010 was thirty-times greater than investment in 1999 (Wong 2011).

Foreign and Domestic VC Investment by Year

Year	Number of VC Investments	Total (US\$ Million)
1993	4	55.6892
1994	8	80.3
1995	8	184.13
1996	16	102.6821
1997	19	180.8657
1998	15	137.364
1999	47	477.5146
2000	103	856.7725
2001	94	2,170.5632
2002	95	513.2531
2003	103	1,786.0116
2004	184	3,661.0366
2005	246	9,621.5954
2006	479	10,831.3774
2007	712	15,026.1007
2008	567	14,985.9974
2009	336	13,474.2851
2010	302	15,163.1126
Grand Total	3,338	89,308.6512

Source: (Hu, 2010)

III.2 Recent Chinese Economic Policy

Since 2007, there have been three major national expenditure programs to develop the VC industry. The creation and progression of these programs will be examined and critiqued in relation to theoretical arguments and foreign experiences.

Industrial Technology Research and Development Budgets Funded Venture Capital Fund

The Industrial Technology Research and Development Budgets Funded VC Funds (ITRDF) was founded in 2007 and funded by the Industrial Technology Research and Development Budget, a portion of fiscal spending earmarked for commercializing technologies. ITRDF hired venture capitalists based on their experience and past record to operate the fund according to its targets. The fund financed early stage SMEs to create technical progress in high-technology industries (Jian 2007). Targeted firms were to have innovation potential that could create a positive public impact and a high level of expected financial returns (Hu 2010). The venture capitalist did not set the strategic agenda, but had responsibilities akin to those of any fund manager, such as proposing firm-by-firm investment decisions, guiding their investees, and seeking exit options.

ITRDF behaved like a state owned and operated VC firm. While managers were hired from the private sector to remedy the lack of experience of government officials, the ITRDF still could not reach the same level of efficiency of a private firm. A private VC firm would target companies solely based on the maximization of expected financial return on investment. The fund manager of ITRDF also had considered the targets of generating positive externalities when making investment decisions. Investment was directed to young SMEs that could generate innovation of public benefit. The goal of government intervention was to move the market to social equilibrium, by addressing the positive externalities present in specific sectors. Additionally, prior to 2007 there was a market movement away from funding young SMEs, so this intervention was complementary to the market, achieving a leverage effect (Wong 2011). However, since these firms only received government backed VC, they were expected to experience lower financial and innovative returns, as discussed above.

ITRDF was structured to provide capital to underfinanced VC sectors, expanding the pool of risk capital. However, this policy selects firms according to specific targets rather than market incentives, distorting the market and failing to finance firms that would maximize financial and innovative returns. Thus, ITRDF did partially fill the equity gap, but did not do so in an efficient way.

Government Directory Venture Capital Fund

The Government Directory Venture Capital Fund (GDVCF) was also initiated in 2007 by Ministry of Science and Technology, and surpassed ITRDF as the most significant government funded program to encourage VC (Guo 2008). Like ITRDF, this

program aimed to encourage innovation and economic development by increasing investment in early stage and high-technology SMEs. The most significant difference between GDVCF and ITRDF is that GDVCF invested in private VC firms rather than individual SMEs. GDVCF was not involved with managing VCs or selecting SMEs, but instead collected private VC and set targets for this fund. GDVCF invested as a limited partner in private VC firms that focused on financing young or technology oriented SMEs. GDVCF value of remaining market oriented resulted in the condition that they could not be the largest shareholder or general partner of a fund. Other investors could purchase shares of GDVCF investment with ease and on favourable terms. Also, a subsidy of up to 5 per cent for VCs that invest in early stage SMEs was created in this program (Hu 2010).

By providing funds to private VC firms rather than competing with them, GDVCF increased the total pool of privately invested VC. This program is a true hybrid VC firm that allowed markets to allocate the increased supply of capital. One can expect the empirical evidence to show that this program generated leverage effects, as many similar foreign programs have (Cowling, et. al. 2012). The ease with which private investors were able to purchase GDVCF equity minimized the crowding out effect. Any crowding-out that may have initially occurred could be quickly be corrected by private share purchases. This hybrid VC firm structure also made use of evidence that suggested SMEs perform better under a combination of private and public investment. Private VC strongly desired GDVCF investment due to the generous terms and the legitimacy derived from the backing of the Chinese government, allowing the program to remain active and effective. Incentive to invest in target sectors was further increased by the subsidy, which efficiently addressed the positive externalities that cause VC market failure. The downside of this program was that it was likely to generate negative financial returns for the government because of investment in lower return industries, giving preferential terms to co-investors, and the cost of the subsidy. Overall, GDVCF created very favourable investment conditions for VC firms, causing increased market supply of risk capital to targeted SMEs.

Industrial Technology Research and Development Budget Participated Venture Capital Fund

The Industrial Technology Research and Development Budget Participated Venture Capital Funds (ITRDPF) was created in late 2009 in response to the financial crisis (Fa 2009). Capital is gathered from national expenditure, local investment, and private investors, and then invested in individual SMEs. Each fund must be at least 250 million RMB, private investment must account for a minimum of 60 percent of total capital, and local government expenditure must be at least as much as national government investment (Hu 2010). Similar to GDVCF, government investment is entirely passive: the government cannot act as a controlling shareholder or general partner of a fund. Investment of each fund is focused on new and high-technology firms as well as strong local industries. A minimum threshold for investment in young SMEs must be met by all funds, encouraging funds to provide seed funding. Investment objectives and targets are specific to each fund, stated in shareholder agreements and

acted upon by fund managers. Like ITRDF, fund managers are chosen from private institutions based on their previous experience with VC. A bonus system for the fund manager incentivizes greater investment in young SMEs.

ITRDPF continues the evolution towards complementary policy rather than competitive. Reducing the percent of investment in each fund decreases intervention, and improves the efficiency of the market. By fundraising investment from local governments and private sources, the pool of risk capital is directly increased. Like ITRDF, operational investment decisions are delegated to experienced fund managers, overcoming likely poor allocation by government officials. Like the programs that preceded ITRDPF, resources remain focused towards sectors that produce the greatest externalities and have the largest equity gap, namely young and high-tech SMEs. Since funds are sometimes devoted to areas with significant market failures, increasing supply moves the market towards the socially optimal equilibrium. Thus, the ITRDPF represents the natural evolution that combines the best policies from each of ITRDF and GDVCF, marking a trend away from distortionary intervention to a more efficient leverage effect.

IV. Conclusion

VC plays a vital role in generating innovation and productivity growth in an economy. Many innovative firms are capital constrained due to characteristics that make debt financing unattainable. VC relieves this constraint and adds intangible value, generating innovation and economic growth. Funding cash constrained firms creates positive externalities, causing VC markets to supply suboptimal quantity of investment. Government policy can address this market failure using policy tools including subsidy, market participation, and deregulation. The success of these policies rests on generating a leverage effect as opposed to a crowding-out effect.

China's recent VC market interventions have been comprehensive, using multiple policies to address the undersupply of VC in many sectors. The Chinese government targeted young SMEs and high-tech firms as ideal candidates for investment because local market failures are greatest in these sectors. These policies quickly evolved, showing inclination towards market-oriented policies to achieve a leverage effect.

Chinese policy-makers should continue this trend of decreasing government intervention in the VC market. Public investment should be passive and target specific sectors where market failure is greatest. This focus should be on industries with high public return such as health care, environmental sustainability, and new technology.

China developed an active and rapidly growing VC sector over the course of less than 30 years due to active government intervention. This impressive period will continue under market-oriented policy that effectively targets and addresses market failures.

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