
Government-Backed Venture Capital as a Science, Technology and Innovation (STI) Policy Instrument: A Chinese Perspective

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Abstract

This paper discusses government-backed venture capital as a science, technology and innovation (STI) policy instrument from the Chinese perspective. China aspires to overhaul its growth model by vigorously promoting technological innovation and entrepreneurship. Like many other countries, however, funding gaps constrain new technology ventures in the early stages of venture development. To plug this gap, China attempts to use government-backed venture capital as a policy instrument. Super-size central government-backed VCs were set up and dozens of similar schemes are in operation at local levels. This paper provides a case study of such government-backed venture capital schemes in China. It documents the background conditions explaining the country's need for public venture capital, describes the distinct features of program design in such schemes, and assesses the impact of government-backed venture capital.

Keywords

government-backed venture capital, private venture capital, China, venture capital guiding funds

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1. INTRODUCTION

Science, technology and innovation (STI) policy is now central to national competitiveness. One of the primary goals of STI policy is to create conditions conducive to innovation and entrepreneurship in the private sector. While entrepreneurs focus heavily upon their talent to identify and exploit opportunities, they are very often held back by the lack of access to financing, particularly at the startup stages. The underlying cause is that the financing infrastructure comprised of seed angels and new and established venture capital investors fail to allocate significant financial resources for growth. The equity gap in the provision of financing to growing or growth-potential innovative new businesses gives rise to a need for a range of government financial instruments to support companies that do not manage to obtain the financing they need for business creation and expansion. Government-backed venture capital (GVC) is one such instrument supporting young firms for accessing financing related to market failures. GVCs are referred to as programs that make equity or equity-like investments in young firms, or encourage other private funds to make such investments (Lerner, 2009).

GVCs appear in many countries. Specifically, the success of the Yozma scheme, set up by the Israeli government in 1992, inspired governments in many countries to follow suit. The Yozma scheme is thought to have delivered super performance in terms of high returns to funds, a good number of spin-offs of local Yozma funds partners, the increased capitalization of the ten original Yozma groups, and a higher ratio of venture investment to GDP (Lerner, 2009; Senor & Singer, 2011). Overall, however, evidence on the effectiveness of such schemes in other countries remains elusive (Rigby & Ramlogan, 2013).

Lerner (2009) argues that the challenge results from little understanding of how such programs should be structured to ensure their effectiveness and to avoid political distortions. Harrison and Mason (2000) suggest the potential drawbacks of GVCs, e.g., replicating and reinforcing existing spatial biases in the VC industry, creating market distortions that over the longer term could drive out or displace private sector venture capital funds, and lowering fund portfolio returns if there are geographical constraints on the deal flow for investment. Lerner (2009) contends that GVCs could fail as a result of design imperfections and implementation failure. For the former, such initiatives may suffer from a short-term orientation or requirements of profitability or self-sufficiency that run counter to the nature of the entrepreneurial process and the mission of the program, fund sizes too insignificant to have an impact or so large they swamp already existing funds, and encouraging funding in industries or geographic regions where private interest does not exist. For the latter, such initiatives may fail to build incentives or design appropriate evaluative mechanisms, and tend to ignore the international nature of the entrepreneurial process.

With the proliferation of GVCs and the persistent suspicion of the effectiveness of such initiatives, this policy instrument deserves closer scrutiny. China makes an intriguing case for the study of GVC as a STI policy instrument. While China's economic growth over the last three decades is widely viewed as a "miracle" (Li & Wang, 2014), growth will have to be driven by entrepreneur-

ship and innovation, simply because the long-standing low-tech, manufacturing-based, exported-oriented growth model is “unstable, unbalanced, uncoordinated, and unsustainable” as described by Wen Jiabao, the former Premier, in his speech at the 18th National Congress on November 12th, 2012. In response, China released the Outlines of the Medium and Long-term National Plan for Science and Technology Development (2006-2020; MLNP) in 2006 and proclaimed the building of an innovative economy as the new national strategy. At the core of this strategy is the endeavor to drive home-grown innovations that embrace original innovation, integrated innovation, and re-innovation based on assimilation and absorption of imported technologies. With such initiatives came a series of policies aimed at boosting technological entrepreneurship and mitigating the funding gap facing entrepreneurial firms in the early stages of venture development. A significant development, above all, was the launch of the GVC scheme dubbed “venture capital guiding funds” (VCGFs), in 2008. Like similar efforts elsewhere, underlying the VCGF initiative in China was the appreciation that there is a close relation between VC and technological entrepreneurship and that China was under-provided in support of this kind. Where the private sector is unable to provide sufficient capital to new firms, the government aims at using VCGFs as a lever to direct more risk capital into entrepreneurial firms that will ultimately yield high social returns. By 2015, Chinese governments had injected 200 billion into 228 VCGFs.¹

This paper reviews the evidence of the effects of GVCs on access to VC financing and performance, charts the development of government-backed venture capital (GVC) as a STI policy instrument in China, describes the GVC schemes’ objectives, principles and forms of support, and assesses the impact of the Chinese initiative. The paper is organized as follows. After the introduction, a review is presented of the empirical evidence of major public venture capital schemes in a number of countries, and the key factors influencing the performance of those schemes are identified. This is followed by a section profiling the developments of the public venture capital initiative in China. The fourth section provides an assessment of the impact of public venture capital funds in China.

2. OVERVIEW OF GVCs

2.1. Impact of GVCs

Government intervention in the VC market generally takes two forms: (1) as government-managed VC funds and (2) as government-sponsored VC funds. For the former, the government starts VC funds and directly manages them as a general partner (GP) in government-managed VC funds. For the latter, the government invests public capital in private VC funds (PVCs) and becomes a limited partner (LP) of PVCs. Government intervention in the VC market in both forms is often justified from two perspectives. The first justification is associated with the existence of the “equity gap” in capital markets arising from information asymmetries. Many early-stage investments in young

¹ Data are from www.pedata.cn. Unless stated otherwise, denominations are in Chinese currency.

innovative firms require significant pre-project investigation and project preparation but such efforts are limited by information asymmetries between the founders and venture capitalists, hence a gap resulting in equity financing that is not readily filled by private venture capital (Commission of the European Communities, 2009). GVCs are primarily designed to mitigate supply-side market failures by filling the young firms' equity capital gap (Colombo, Cumming, & Vismara, 2016; Lerner, 1999). The second justification is related to the externalities of GVCs. The activity of GVCs is normally guided by broader policy objectives, not exclusively by financial goals. As such, GVCs consider investments that might be less financially viable in terms of return for risk if the investment could generate significantly positive externalities such as job creation or the exploitation of investment opportunities in peripheral and economically lagging regions.

Consequently, GVCs share two common policy objectives. First, they aim to fill the equity gap in the provision of financing to young and high-growth businesses (Harrison & Mason, 2000). The increase in availability of venture capital allows businesses of this kind to exploit significant growth opportunities they would otherwise avoid because they are unable to fund this growth from internally generated sources of financing and debt financing, and are too small to access public equity markets (Harrison & Mason, 2000). Secondly, GVCs aim to redress spatial variations in venture capital investment activity that may lead to uneven spatial economic development within a country (Hood, 2000). This results from a concern that there is an extreme geographical concentration of venture capital firms and their investments. The creation of public venture capital hence is aimed at stimulating and directing the supply of venture capital to achieve socially equitable economic development goals.

While government intervention in the VC market may be justifiable, there are three main concerns that it might be counterproductive (Colombo et al., 2016). First, GVCs may displace or crowd out private investment. Second, GVC fund managers may be unable to pick winners due to a lack of screening capabilities or due to possible distortions of the investment strategies as a result of political intervention. Third, GVCs may not be effective in supporting GVC-backed companies because GVCs have fewer industrial resources such as business networks and marketing intelligence. Therefore, empirical research regarding both GVC funds and GVC-backed firms produce mixed results as far as the impact of GVCs is concerned (Table 1).

2.1.1. Impact on Access to Equity Capital

A growing number of studies investigate the impact of GVCs on young firms' access to equity capital. The empirical question is this: does the activity of GVCs tend to displace or crowd out private investment? Research findings are mixed. Lerner (1999) analyzes the long-term impact of the Small Business Investment Research program (SBIR) in the US by matching SBIR-backed companies to ones that did not receive SBIR financing. He finds evidence that suggests the program's positive impact on access to VC. More specifically, while the SBIR-backed firms do not differ significantly from matching firms in the likelihood of receiving VC in the years prior to the awards, they are significantly more likely to receive such financing in subsequent years. Lerner (1999) concludes that the SBIR program plays an important catalytic role by both reducing the information gap faced by

investors and helping certified firms obtain venture funding. These findings are echoed in a study conducted by the UK's National Audit Office (NAO) (2009) examining the impact of three GVC funds. In that study, 84% of the businesses surveyed report that the initial funding made it easier for them to obtain additional financing from other sources, and 32% report they would have been unable to obtain any financing without the support from the funds.

Brander, Du and Hellmann (2015) examine firms funded by GVCs in 2000–2008 using a dataset of 20,446 enterprises in twenty-five countries. They find that companies funded by both GVCs and PVCs obtain more investment than those funded purely by PVCs, and much more than those funded purely by GVCs. Also, markets with more GVC funding have more VC funding per company and more VC-funded companies. The results suggest that GVC financing largely augments rather than displaces PVC financing. Equally interestingly, they find that when GVCs co-finance with PVCs, total investment is higher, suggesting complementarity between GVC financing and PVC financing. Similarly, using a sample of European high-tech entrepreneurial companies, Guerini and Quas (2016) find that GVC funding increases the likelihood that companies will receive private venture capital. Moreover, GVC-funded companies that received a first round of PVC funding are at least as likely as other PVC-backed companies to receive a second round of PVC funding.

By contrast, in an analysis of the Canadian labor funding initiative, Cumming and MacIntosh (2006) find no evidence to suggest that the initiative boosted total venture spending in each province. Baygan (2003; cited in Clayrsse, Knocjaert, & Wright, 2009) in his analysis of the Small Business Investment Companies (SBICs) scheme in the US finds that SBIC investments did not address gaps such as industrial segments or firms neglected by financiers in the private funding process, and that GVCs may contribute to over-funding of particular sectors, crowding out purely private funds. Da Rin, Nicodano and Sembenelli (2006) examine the level of venture capital funding across fourteen European countries between 1988 and 2001 and find that for every dollar being handed out by a government-sponsored program or fund, private investors put a dollar less into the sector. Brander, Egan, and Hellmann (2010) find similar evidence in the case of Canadian public venture capital, finding that GVC funds partially crowd out PVC funds for financing of high-technology enterprises. Lim and Kim (2015) analyze 463 South Korean VC funds raised in the 1995–2005 period and find a mixed picture for GVCs. Overall, GVC financing in South Korea does not considerably contribute to filling the equity gap in new technology-based firms (NTBFs). Nonetheless, a partial positive effect of public capital on the equity gap in NTBFs is observed when GVC investments are broken down by market stage. GVCs seem to be more effective in inducing PVCs to invest more in younger firms in the growth stages of the VC market but less effective in the restructuring stages of the VC market.

2.1.2. Impact on Performance

How GVCs perform has also been subjected to close scrutiny. Research has measured GVC performance in two ways. First, performance is measured by the impact of GVC investments on the investees' performance in terms of job creation, sales growth, successful exit and etc. Second, performance is measured by return on investments of GVC funds. In his analysis of the SBIR program,

Lerner (1999) found that SBIR-backed firms enjoyed substantially greater employment and sales growth. However, the superior performance was confined to SBIR-backed firms in areas that already had private venture activity, suggesting that the program failed to redress the spatial unevenness in venture capital supply to achieve economic and development goals.

The UK's review of the impact of investment from six government-backed venture capital schemes on 782 funded firms over the period 1995–2008 finds that the schemes overall produced a positive, yet modest impact on firm performance in terms of high quality job creation, when compared to a matched control sample (NESTA & BVCA, 2009). It also finds that there was a U-shaped relationship in gross profit margins over time since investment—i.e. GVC-backed firms' gross profit margins collapsed substantially and immediately in the three years after receiving the initial investment—leveled out by the fourth year and increased dramatically by year six. In addition, GVC-backed firms were found to have higher-than-average labor productivity. While the review acknowledges the schemes' positive effect on intended firm behavior and on productivity in the economy resulting from the allocation of financial and managerial resources to help firms to grow, it nonetheless concludes that the schemes are a relatively expensive means of short-term job creation.

Unlike reviews conducted by Lerner (1999) and NESTA and BVCA (2009), a number of studies find no evidence of any impact on performance. For example, in the US, a review of the fund performance of SBICs over the period of 1994–2000 find that the composite internal return rates (IRRs) were -12.3% for the scheme as opposed to 20.4% for the private investors and that the estimated total value to capital was 0.78 compared to 1.3 for the private partners, indicating underperformance of the scheme (SBA, 2004; cited in Clayrse et al, 2009). Brander et al. (2010) examine the Canadian GVCs on a range of outcomes related to value creation, competitive effects, and innovation. They find that GVC-backed firms perform worse in terms of the frequency of successful exits, exit values, and survivorship than PVC-backed firms. In Europe, Alperovych, Hübner and Lobet (2015) investigate the implications of GVC and PVC investments on the operating efficiency of a sample of 515 Belgian portfolio firms up to three years after the investment. They find that the PVC-backed firms display significant reductions in productivity. Grilli and Murtinu (2014a) investigate the effect of GVC and PVC funds on the sales growth of 6,513 European NTBFs over the period of 1992–2009. Their results show that GVC-backed NTBFs underperformed as compared with PVC-backed ones and that GVC-backed NTBFs did not grow more than non-VC-backed companies.

What is interesting in Grilli and Murtinu's (2014a) research is that they identify a positive impact by GVCs on firm performance when GVC funds are co-financed with PVC funds and both target young firms. Their finding of the positive impact of GVC and PVC co-financing is supported by other studies. Using a new European Union-sponsored firm-level longitudinal dataset, Grilli and Murtinu (2014b) assess the impact of GVC and PVC funds on the sales and employment growth of European high-tech entrepreneurial firms. They find a positive and statistically significant impact of syndicated investments (co-financing) by both types of investors on firm sales growth, but only

when led by PVC investors. Similarly, Brander, Du and Hellmann (2015) find that when GVC and PVC co-finance in the same company (mixed funding), the company is more likely to have a successful exit than when only PVC financing or only GVC financing is present. Employing a novel database that includes 665 European biotechnology start-ups and young companies, 125 of which are VC-backed, Bertoni and Tykvová (2015) explore the effect of GVCs on these firms' patent stock development. They find that GVCs boost the impact of PVC funds on both invention (measured by patent stock) and innovation (measured by passive citations of patents).

TABLE 1. Reviews of Venture Capital Support Measures

VC scheme			Impact	
Country	Study	Year/period	Access	Performance
Unit of analysis: GVC schemes				
USA	Small Business Investment Research program (SBIR) (Lerner, 1999)		<ul style="list-style-type: none"> No significant difference between GVC-backed firms and matching firms in the likelihood of receiving VC in the years prior to the awards GVC-backed firms were significantly more likely to receive VC in subsequent years 	<ul style="list-style-type: none"> GVC-backed firms enjoyed substantially greater employment and sales growth. The superior performance was confined to GVC-backed firms in areas that already had private venture activity
USA	Small Business Investment Companies (SBICs) (SBA, 2004; cited in Clayrsse et al, 2009)	1994–2000		<ul style="list-style-type: none"> The composite IRRs were -12.3% for the scheme as opposed to 20.4% for the private investors The estimated total value to capital was 0.78, compared to 1.3 for the private partners
UK	Six government-backed venture capital schemes (NESTA & BVCA, 2009)	1995–2008		<ul style="list-style-type: none"> An overall positive, but relatively small, effect on employment. A “U-shaped” relationship in GVC-backed firms' gross profit margins over time since investment GVC-backed firms have higher than average labor productivity. These schemes are a relatively expensive means of short-term job creation
UK	Three public-backed venture capital funds (NAO, 2009)		<ul style="list-style-type: none"> The initial funding had made it easier for GVC-backed firms to obtain additional financing from other sources GVC-backed would have been unable to obtain any financing without support from the funds 	
Canada	The labor fund initiative (Cumming & MacIntosh, 2006)		<ul style="list-style-type: none"> No boost to the aggregate amount of venture spending in each province 	
Korea	Lim & Kim (2015)	1995–2005	<ul style="list-style-type: none"> No impact on filling the equity gap in NTBFs. In the growth stage of the VC market, GVCs significantly induce PVCs to invest more in younger firms. In the restructuring stage of the VC market, GVCs invested more than did PVCs 	

Unit of analysis: GVC-backed firms				
Europe	Da Rin, Nicodano and Sembenelli (2006)		<ul style="list-style-type: none"> For every dollar being handed out by a GVC, private investors put a dollar less into the sector 	
Canada	Brander et al. (2010)	1996–2004	<ul style="list-style-type: none"> GVC funds partially crowd out PVC funds for financing of high technology enterprises. 	<ul style="list-style-type: none"> GVC-backed firms exhibit weaker performance (i.e. the frequency of successful exits, exit values, and survivorship) than PVC-backed firms
Europe	Grilli and Murtinu (2014a)	1992–2009		<ul style="list-style-type: none"> Underperformance of GVC-backed NTBFs as compared to PVC-backed ones. No impact of GVC on targeted young NTBFs. Positive and significant impact for GVCs when GVCs co-finance with PVCs and both target young firms.
Europe	Grilli and Murtinu (2014b)	1994–2004		<ul style="list-style-type: none"> A positive and significant impact of GVCs that co-finance with PVCs on firm sales growth, but only when led by PVCs.
Belgium	Alperovych, et al. (2015)	1998–2007		<ul style="list-style-type: none"> Significant reductions of GVC-backed firms in productivity
Global	Brander et al. (2015)	2000–2008	<ul style="list-style-type: none"> GVCs largely augment rather than displace PVCs. When GVCs co-finance with PVCs, total investment is higher 	<ul style="list-style-type: none"> An apparent complementarity between GVC financing and PVC financing. When GVCs co-finance with PVCs, exit outcomes are better than with PVCs alone or with GVCs alone
Europe	Bertoni and Týkřová (2015)	1994–2004		<ul style="list-style-type: none"> No impact of GVCs alone on invention and innovation. GVCs boost the impact of PVCs on both invention and innovation.
Europe	Guerini & Quas (2016)	1993–2010	<ul style="list-style-type: none"> GVCs increase the likelihood of companies to receive PVC. GVC-funded firms that have received a first round of PVC are at least as likely as other PVC-backed firms to receive a second round of PVC or to be listed or acquired 	

Source: compiled by the author

2.2. Policy Challenges

Harrison and Mason (2000) sum up the potential drawbacks of the public sector provision of venture capital. First, the effect of these programs may simply be to replicate and reinforce existing spatial biases in the venture capital industry. Second, an increase in the supply of venture capital as a result of direct or indirect government programs may create market distortions that over the longer term could drive out or displace private sector venture capital funds. Third, the supply of capital is not the only or the most important constraint on economic development, so simply making venture capital available will not automatically generate the conditions under which entrepreneurship can flourish. Fourth, in the case of direct public sector provision of venture capital funds, the long-

term financial viability and sustainability of these funds are doubtful. Fifth, if there are geographical constraints on the investments of the fund (reflecting the territorial interests of the government department or agency involved) deal flow may be constrained, investments may be made in non-competitive businesses, and lower fund portfolio returns may be generated, making the attraction of additional venture capital into the region from either public or private sources more difficult.

Lerner (2009) suggests that public venture capital initiatives could fail as a result of design imperfections and implementation failure. Design imperfections manifest in two respects. First, such initiatives may ignore the realities of the entrepreneurial process: a) the program may have a short-term orientation, not understanding that initiatives take many years to bear fruit; b) the program may have requirements that run counter to the nature of the entrepreneurial process and the mission of the program (e.g. profitability or self-sufficiency); and c) reasonable programs may have been too tiny to have an impact, or so large that they swamp the already-existing funds. Second, such initiatives may ignore the market's dictates, namely pressure to "spread the wealth." Government officials sometimes encourage funding in industries or geographic regions where private interest does not exist. Implementation failures manifest themselves in failure to build in incentives, failure to design appropriate evaluative mechanisms, and ignorance of the international nature of the entrepreneurial process.

Hood (2000) draws a few lessons from the Scottish experience. These include: a) clear and consistent objectives of the public venture capital organization and a measure of accountability in respect to the objectives and performance of public venture funds, b) operating and taking a mid-to-long-term view of outcomes, c) the necessity to attract, reward and hold together experienced and committed venture capital executives to manage public funds, and d) interaction between public and private-sector venture capitalists.

HCCPA (2010) raises a number of concerns including the disproportionate distribution of funding from national funds to London and the South East, the underperformance of government-backed funds, and the substantial and high costs of managing the funds. They conclude that the funds were structured in a way that meant the taxpayer bore a disproportionate share of the risk and hence greater losses, and that there is a risk that the ongoing pattern of investment, concentrated in London and the South East, reinforces inequalities between regional economies.

3. CHINA'S GVC INITIATIVE

The capital markets were significantly underdeveloped when China started economic reform in the late 1970s. Yet, from early on during these reforms, the Chinese government realized the importance of venture capital, particularly regarding high-tech development ("Torch Program"). In retrospect, the development of GVCs over the last three decades can be divided into three phases.

The first phase (1985–2006) is the experimental period, characterized by a range of *ad hoc* experi-

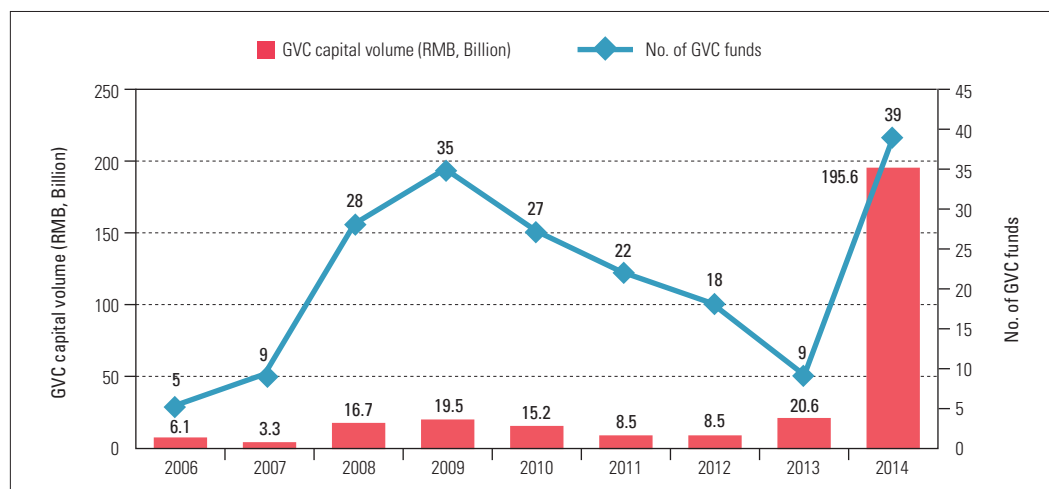
ments in government-managed VCs at both the central and local government levels. The first-ever attempt to exploit GVCs were the central government's investments in the government-sponsored VC fund China New Technology Venture Capital Corporation (CNTVC) in 1985, in which the Ministry of Finance (MOF) and the Ministry of Science and Technology (MOST) were the main capital providers. Experiments later spilled over to local governments. Particularly in the national high-tech development zones (HTDZs), local governments were encouraged to use government-managed VC funds as a new policy instrument for financing HTDZ-based high-tech firms. The highlight of their efforts over this period was the launch of the central government-managed Innovation Fund for Small Technology-based Firms (InnoFund) in 1999. InnoFund was and still is used as a "priming-pump" for leveraging local governments, large firms, and financial institutions to invest more in technology-based SMEs. Its funding mechanisms ranged from grants to loan-interest subsidy. Equity investment was an option but was rarely used. The *ad hoc* experiments in this period gradually built momentum and finally led to a consensus that GVC could be a desirable vehicle to leverage capital of wide sources to invest in the priority areas of national strategic importance. This was manifest in the State Council's release of the "Provisions of Management of VC Firms" in November 2005 that for the first time identified GVCs—dubbed "venture capital guiding funds" (VCGFs)—as a desirable form of government intervention in the VC markets. To bring a wide range of *ad hoc* local experiments under the umbrella of VCGF signaled a change in fundamentals, mainly a shift from government-managed VCs to government-sponsored VCs.

The second phase (2007–2013) was a period of widespread adoption of GVC. The start of this period was marked by three developments. First, MOF and MOST co-issued a policy titled the "Provisions of Management of the Venture Capital Guiding Fund for High-tech SMEs" in July, which served as the blueprint in preparation for the launch of a super-size GVC fund. Second, MOF and State Administration of Taxation jointly issued the "Notice on Taxation Policy in Support of VC Firms" that clarified the tax relief and tax liabilities of PVC firms. Third, MOF joined force with MOST to launch a state-level GVC fund named Venture Capital Guiding Fund for Technology-based SMEs. These developments generated a ripple effect on local governments, giving rise to a wave of activity of GVCs across the country. Twenty-eight GVC funds were launched in 2008, raising a total of 16.7 billion (Figure 1). This was a three-fold increase in the number of new GVC funds and a four-fold increase in aggregate capital raised against the previous year.

This hectic pace of development led to heterogeneity, confusion, and inconsistency. Consequently, the State Council in October 2008 issued "Directives on Formation and Management of VCGFs" as a means of formalization. The document was influential in the sense that it streamlined practices of many local initiatives and set out important principles for consolidation of ongoing initiatives and the development of new schemes. As promulgated in the Directives, the objective of the guiding funds was two-fold: 1) to leverage government pump-priming funds to increase the supply of venture capital so as to overcome market failures, and 2) to leverage PVC funds to invest in firms in the seed or startup stage. The Directives also sets out some key principles for the formation and operation of VCGFs. First, governments may not assume the role of general partners (GP) in the fund-of-funds they contribute to or be the lead investor in companies they co-invest in with PVCs. Second,

VC fund managers should be given full responsibility for decisions on investments while VCGFs as a limited partner (LP) participate in investor governance decisions on the same terms as private investors and with the same voting rights. From 2008 to 2012, new GVC funds maintained a two-digit growth in numbers, adding an average of 13.7 billion to the pool of aggregate capital each year (Figure 1). However, there was a noticeable leveling off in momentum as time went on during this period.

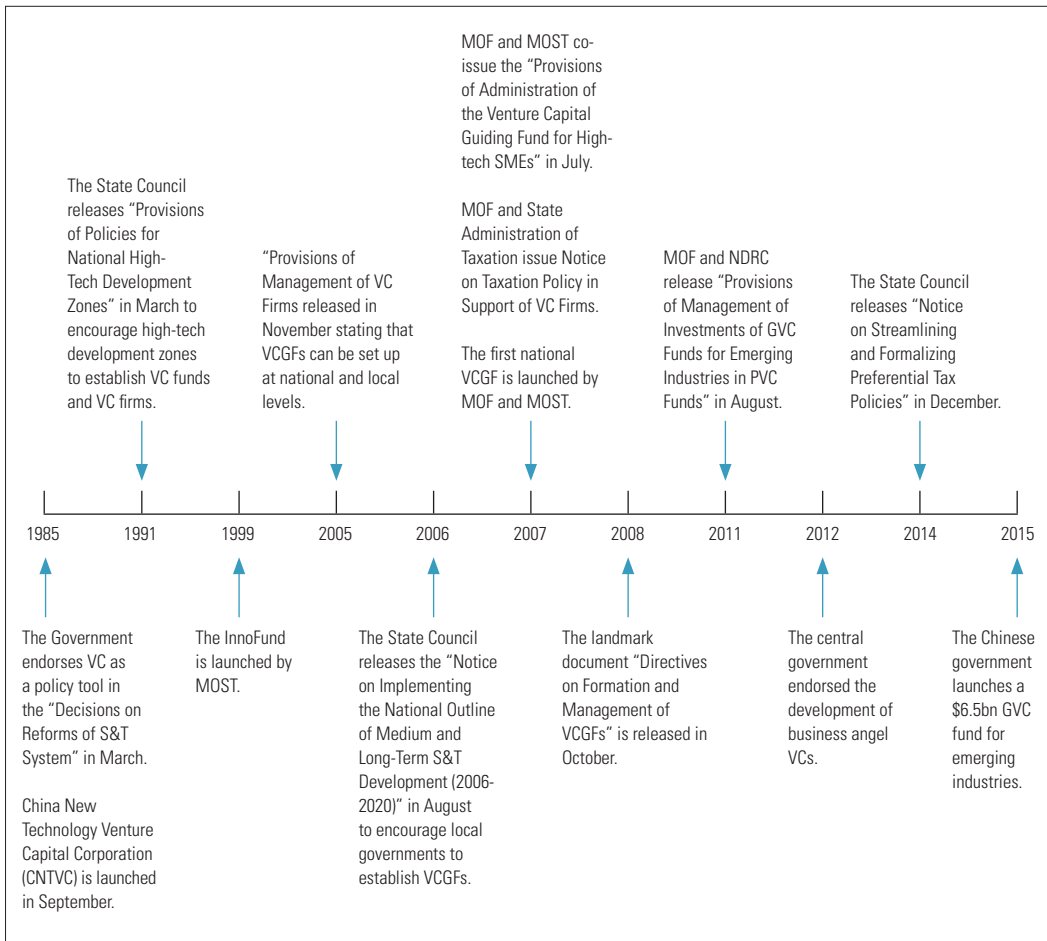
FIGURE 1. Changes in GVC Funds in China, 2006–2014



Source: www.pedata.cn

The third phase (2014 onwards) marks the resurgence of GVC activity. In 2013, a new government was formed with Li Keqiang becoming the new Chinese Premier. Although China emerged from the 2009 global financial crisis largely unhurt, it faced the dual challenges of a global economy still recovering from economic recession and a domestic economy shifting to slower rates of economic growth. The new government conceptualized the changing domestic growth pattern as the “new normal” and vowed to find solutions while giving the markets a greater role. Subsequently, the government started an overhaul of legislation to ease red tape for businesses and to lessen market intervention. A wide-reaching change occurred in 2014 when the State Council released its “Notice on Streamlining and Formalizing Preferential Tax Policies” removing the power of local governments to use localized tax incentives for luring inward investment. This change of policy triggered a new wave of GVC activity since 2014 in which local governments used GVCs as an alternative way of fundraising and investment. At the central government level, building on what was perceived as a promising start, the Government announced in January 2015 the launch of a new super-size GVC fund of 4 billion (\$6.5bn) with a specific focus on start-ups in emerging industries. Nationwide, thirty-nine new GVC funds were launched and 195.6 billion in capital was raised. Figure 2 describes the evolution of public venture capital schemes in China.

FIGURE 2. Evolution of GVC Schemes in China



The activity of VCGFs in China is the kind of intervention where governments directly channel public financial resources into the VC industry. Five types of allocation of governmental funds can be identified: fund-of-funds, co-investment, VC investment subsidy, VC investment guarantee, and VC loan guarantee.

Fund-of-Funds

When government support takes the form of fund-of-funds, they invest in PVC funds rather than investing directly in companies. This has increasingly become a preferable mode of support. In one aspect, it allows the VCGF to use its equity capital contribution as a lever to encourage the establishment of more PVC funds and thus maximizes the impact of public venture capital on the supply of VC to new and high-tech firms. In another aspect, it offers the VCGF an opportunity to invest in a portfolio of PVC funds so as to diversify investments. Essentially, this type of support ensures

that the government can distance itself from risk and liability for investments made. It also ensures the PVC fund's independence in decisions about appointment of venture capital fund managers and in individual investment decisions. In this model, investments are structured as equity and can be bought out by investors. Government investment in the funds is on the same terms as those of private investors, except that each fund is provided with an option exercisable up to the end of the fifth year of the fund to buy out the government investment on the basis of capital plus interest only. A VCGF contributes initial capital to a new VC fund in conjunction with other private founders and sells off its shares in due time under the pre-agreed terms. The central government lays out certain principles for VCGFs to invest in the fund-of-funds:

- A VCGF should never contribute more than 25% of the subscribed sum of capital to the new PVC fund, nor should it be the largest shareholder of the fund.
- A VCGF should not hold its shares in a fund for more than five years.
- A VCGF should consider the exit option whenever a buy-out proposal is tabled from other shareholders or external investors. In the meantime, under no circumstances should any other VC shareholder make their exit from the fund before the VCGF does. Should the shareholders or external investors decide to buy out the VCGF's shares in the fund's first three years of operation, they would only pay for the VCGF's initial capital contribution. After the fund's three years of operation, they would pay for the VCGF's initial contribution and interest calculated at the benchmark one-year lending rate of the Central Bank.

Co-Investment

This is a modified form of direct public investments through government-managed VC funds. It means that the VCGF and the PVC firm co-invest in early stage SMEs. The main purpose of this approach is to bring existing, decent-size PVC firms on board to invest in high-tech start-ups and to share investment risk with PVC investors. The support through co-investment is exercised as follows:

- PVC firms can apply to a VCGF for co-investment within one year of identifying prospective investment targets or completing investment in the target project. The VCGF can invest together with the PVC firm in projects that meet the VCGF's due diligence exercises, but its investment in a single project shall not exceed half of the PVC firm's investment or 3 million in a single investment.
- The VCGF entrusts the PVC firm with managing its investment and shall use up to 50% of its capital gains to pay management fees and bonuses to the PVC firm.
- A VCGF shall not hold its shares in the VC-backed project for more than five years. Under no circumstances should the PVC firm withdraw from the co-invested project ahead of the VCGF.

VC Investment Subsidy

This form of support is very similar to co-investment except that the VCGF subsidizes the PVC firm's investment costs through a non-repayable grant and holds no share in the venture-backed

company. The support is to help the PVC firm withstand risks arising from its investments in early stage ventures. Subsidy is open to all PVC firms who invest in early stage firms. The grant value is up to 5% of the PVC firm’s actual investment or a maximum of 5 million.

Investment Guarantee

This approach is to encourage PVC firms to screen investment opportunities and nurture early stage high-tech firms. After a PVC firm identifies a good early stage high-tech firm and starts offering support to it, the PVC is eligible to apply for a VCGF grant on behalf of the firm under its supervision. The VCGF can provide a grant of up to 1 million to a firm of this kind to subsidize its R&D expenses. As a binding condition, the PVC firm is expected to firstly provide free mentoring services to the candidate company for a maximum of two years and then to invest in the company when the supervisory period ends. In parallel with the PVC firm’s investment, the VCGF would follow up with the offer of a second grant of up to 2 million to the venture-backed company to subsidize the costs of mass production of the new product.

VC Loan Guarantee

This is to support VC firms to borrow from the money market. The loan guarantee will help reduce creditors’ risk and encourage small investors and banks to invest in high-growth ventures through the platform of PVC funds. VC funds can also improve their financial performance as debt creditors will only receive relatively low fixed-rate interest. Using information from credit rating agencies, VCGFs can provide loan guarantees to those VC funds with excellent credit records and support them to consolidate their funding resources.

GVC schemes in China started with the more conventional approaches such as investment subsidies, but over time fund-of-funds gradually became the main funding model (Table 2). As of 2010, 93% of VCGFs used this method to leverage private VC investments. Capital contribution-wide, this funding model has a much higher percentage of VCGF involvement. Clearly, this is a very positive sign of development in public-backed venture capital in China.

TABLE 2. Forms of Financing by VCGFs

	Use of fund	Percent	Capital allocation, billion	Percent
Fund-of-funds	54	93	44.95	99
Co-investment	34	58.62	31.26	69
Financing guarantee	5	8.62	1.6	4
Investment subsidy	7	12.07	4.46	10

Source: Ding and Li (2015)

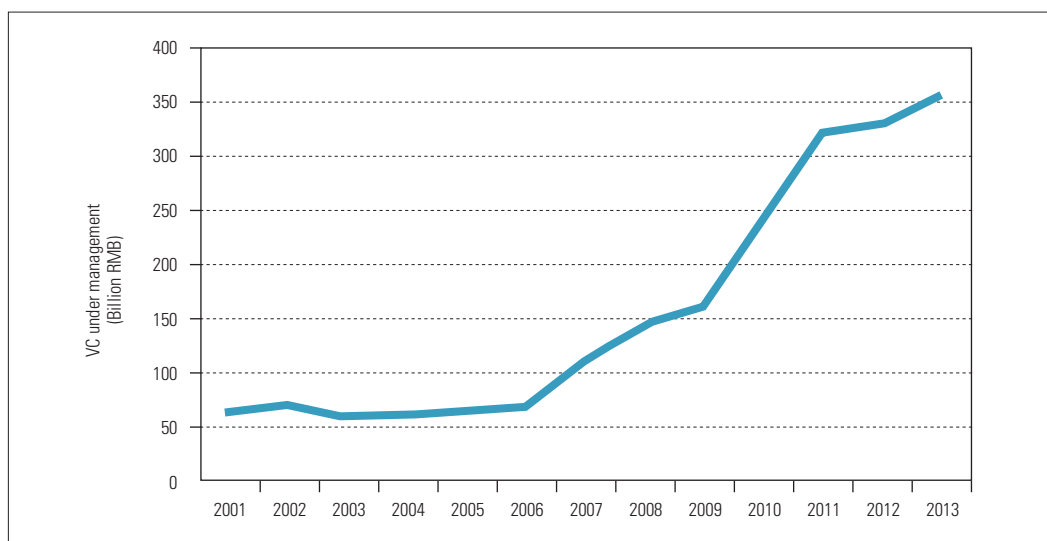
Impact of Public Venture Capital Schemes

In 2008, the Chinese government set out two policy objectives for the public venture capital scheme

in their “Directives on Formation and Management of VCGFs”: 1) to increase the supply of venture capital through the catalytic role of public funds, and 2) to encourage venture capital to invest in seed or startup businesses. Evidence so far suggests VCGFs performed well in terms of increasing the supply of venture capital. For example, as of 2009, state-level VCGF invested 309 million in fourteen PVC funds in the form of fund-of-funds. These PVC funds went on to raise capital of 2.382 billion. As such, the VCGF maximized its investment impact by a factor of 7 (Ding & Li, 2015). At the local level, the impact factor of VCGFs was 3 on average. The highest impact factor of 12.26 was reported by the Administrative Office of Shenzhen Government-managed VC funds (“VC hub Shenzhen: How to spend 80 billion GVCs,” 2015). In 2008, the Shenzhen Municipal Government launched six city-level VC funds. The funds later invested 875 million in seventeen PVC funds that further raised 10.7 billion.

For the VC sector as a whole, the phenomenal growth in VC after 2006 also offers further evidence suggesting the VCGFs’ positive impact on the development of the VC market. Figure 3 illustrates that by 2013, the total amount of VC under management increased by five-fold to 357.4 billion from 66.4 billion in 2006.

FIGURE 3. Total of VC Under Management, 2001–2013



Source: MOST online database

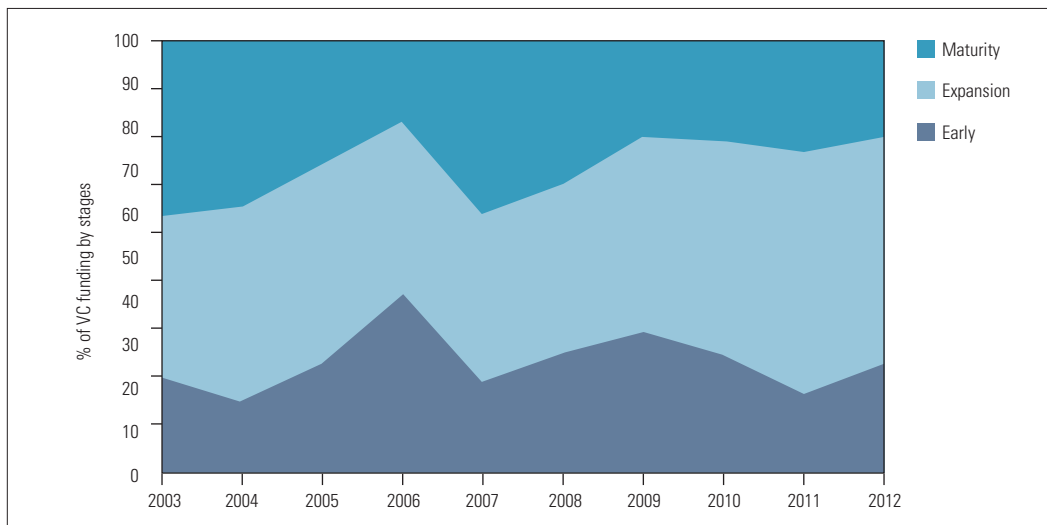
A major question concerning the impact of GVC funds is the important issue of “crowding out.” According to Brander et al. (2015), crowding out might occur on two possible levels. At the enterprise level, GVC financing might be associated with less funding per enterprise; at the market level, GVC investment might reduce the total amount of funding obtained by enterprises in the market. All evidence available to date seems to suggest positive effects of GVC funding at the market level

in China, meaning more VC investments in total to more enterprises. Unfortunately, we cannot assess the impact of GVCs at the enterprise level mainly due to unavailability of data.

The second objective of China’s public venture capital scheme is to leverage VC into new firms in the seed and startup stages. As stated in the “Provisions of Management of the Venture Capital Guiding Fund for High-tech SMEs” in 2007, a PVC fund should invest in early stage high-tech SMEs no less than twice as much as the VCGF’s contribution to the fund-of-funds. The “Provisions on Management of Investment of GVC funds for Emerging Industries” in 2011 stated even more clearly that investment of the GVC-sponsored fund in early stage firms should be no less than 60% of the subscribed capital of the fund. Has the activity of GVC funds achieved this objective? Evidence is mixed. On the positive front, a survey of 312 GVC-backed firms conducted in 2012 found that 40% of GVC investees were early-stage firms (those with an operational history of less than five years) before 2008 and 61% after 2008 (“Performance evaluation of GVC funds,” 2015). The percentage was even higher in Shenzhen, where early-stage firms made up 90% of GVC-backed firms. In contrast, Qinghai Province’s only two province-level GVC funds were exclusively focused on firms in growth stage (Qinghai Productivity Improvement Centre, 2014). Similarly, Chongqing municipality’s GVC fund of 2.5 billion invested mostly in later stage firms (China Venture, 2015).

In general, as can be seen in Figure 4, the percentage of VC investment in the seed and startup stages since 2008 does not show a significant increase for the VC sector as a whole. From 2003 to 2012, VC investment in the seed and startup stage averaged 10.8%, but in seven years over that period the share of seed and startup stage investment was below average. This may suggest that GVC schemes were not as effective as they should be in plugging the equity gap confronting early stage firms. The main beneficiaries were in fact firms in the expansion stage.

FIGURE 4. Percentage of VC Investment by Stage of Venture Development



Source: MOST online database

One possible explanation for GVC's preference of investment in later-stage firms is that GVC funds in China are more risk-averse than PVC funds. And this has something to do with the sources of GVC funds and compensation schemes for GVC fund managers. In China, fiscal funds from the government's budget are the main source of capital in VCGFs. In the 2012 survey, this source of funding was used in the establishment of fifty-one VCGFs and contributed almost two-thirds of capital in all VCGFs. Banks contributed another 15.73% to VCGFs (Table 3). These mainly refer to China Development Bank's (CDB) contribution to three VCGFs and Eximbank's contribution to the Chengdu VCGF.

TABLE 3. Source of Capital in VCGFs

	VCGF		Capital	
	Number	Percent	Billion	Percent
Fiscal special fund	51	79.69	34.30	63.49
Listed/non-listed companies	6	9.38	0.33	0.60
Solely state-owned investment companies	2	3.13	5.9	10.92
Banks	4	6.25	8.5	15.73
Other	1	1.56	5	9.26

Source: Ding and Li (2015)

A recent survey conducted by ChinaVenture in 2014 found that local governments prioritized capital investment safety over all else (ChinaVenture, 2015). This may suggest that while GVC funds displayed an overall positive impact at the market level, they actually had less impact on VC financing at the seed and startup VC market level.

As far as performance is concerned, in a sample of fifty-six VC funds, Qian and Zhang's (2007) research find that the average return on investment was 13.25% for state-owned VC funds and 33.01% for PVC funds. The performance of VCGFs can be impacted by their design. Recent academic research identifies a number of factors which tend to improve the chances of a successful venture capital fund, including: a flow of good quality deals; the timing of investments; broad geographic coverage; larger fund sizes; and the ability to make follow-on investments and to exit individual investments on a timely basis (Lerner, 2009). However, VCGFs in China commonly have multiple aims that are never defined as clear, measurable objectives. In particular, none of the GVC funds lay out an explicit financial performance objective. Admittedly, this does not appear to be a unique problem with China's VCGF initiatives; similar concerns were raised about schemes in other countries such as the UK (NAO, 2009). Numerous evidence shows that local governments' rush to embrace GVCs displayed bandwagon behavior (Ding & Li, 2015). Many local governments started their own VCGFs to promote high-tech industries in the hope of creating a cluster of activity. Realistically, however, only a handful of these regions have the necessary scientific resources and infrastructure to support a successful cluster, rendering the bulk of these funds ineffective. Concerns were already expressed about whether it was desirable for a city at the county level to set up a

VCGF (Zheng, 2009). Entrepreneurship is commonly drawn towards areas where entrepreneurial talent, locally-embedded social capital, and supporting infrastructure prevail; there are powerful forces that lead firms to cluster in particular places (Li & Geng, 2012). Thus, much of the impact is diluted as funds that could be very helpful in a core area end up where they are not helpful.

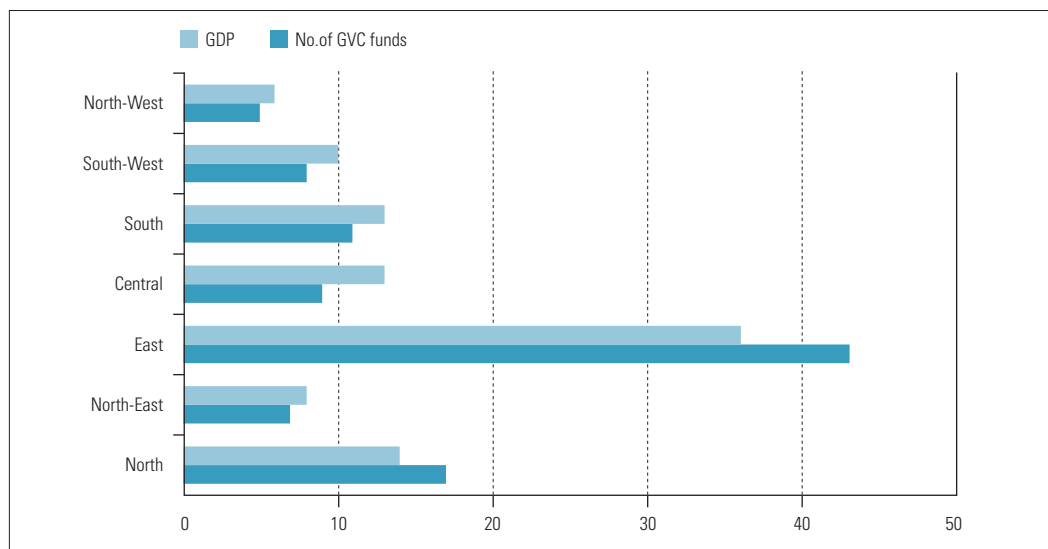
Local governments' enthusiastic replication of the national model of VCGFs at the local level came with caveats. In many local initiatives, VCGFs are conditional on funds investing in specific regions through local registration and satisfying the threshold of registered capital for a new fund-of-fund. For example, the 2010 MOST survey finds that 87% of local VCGFs demand their partner VC funds to invest a certain percentage of subscribed capital locally, while 68% of VCGFs request the new fund to be registered locally, and 61% satisfies the minimum size of new funds. The survey also finds that 49% of VCGFs include all three restrictive clauses in their initiatives, 25% include two restrictive clauses, 24% have one restrictive clause, and only 3% have no restrictions. There is a tendency that the further down the local levels the more restrictions are placed on VCGF's partners in obtaining local government contribution. A separate survey in 2011 conducted by Zero2IPO finds that a condition on a fund-of-fund to invest 60–70% of its subscribed capital locally is a common practice (Wang, 2012). This local protection tendency counters against one of the principles of VCGFs, namely that of market-based operation. The extent to which a local VCGF influences the local economy should be considered from a demand-side perspective. It is reasonable to suggest that not every region has a large group of high potential firms that are capable of earning the exceptionally high returns sought after by venture capital investors. By restricting VC funds into regions lacking attractive, high-potential firms, these VCGFs are in danger of creating a mismatch between demand and supply in a specific region and compromising fund performance.

Finally, it appears that the public venture capital scheme in China has not had an impact on reversing uneven spatial concentration of venture capital investment activity, although this is not a stated objective of the scheme. 43% of GVC funds were concentrated in the East region that made up of 36% of the country's GDP (Figure 5). Comparatively, the less developed North–West region had only a 5% share of the GVC funds against its 6% share of the national GDP. Investments from national-level VCGFs also suggest a similar pattern. For example, a nationwide survey conducted by MOST in 2012 found that among 299 national-level VCGFs investment projects, only nine projects were in the western region and that for 530 million in project investment, only 5 million went to the west region (Ding & Li, 2015). In the review of GVC funds in 2013, the Qinghai Government reported difficulty in meeting its pledge of 90 million in contribution to the VCGF funds due to a gap of 30 million in the budget (Qinghai Productivity Improvement Centre, 2014).

4. CONCLUSION

China aspires to overhaul its growth model by vigorously promoting technological innovation and entrepreneurship. Like many other countries, there is a funding gap facing new technology ventures in the early stages of development. To address this gap, China uses government-backed venture

FIGURE 5. Spatial Distribution of GDP and Number of VCGFs (2014)



Source: MOST online database

capital as a policy instrument. Super-size central government-backed VCGFs are set up, and many similar schemes exist on local levels. While five forms of GVC support are used, fund-of-funds and co-investment were the dominant models for leveraging private VC investments. This can be seen as a positive development as evidence of such schemes in other countries suggests that co-financing delivers greater value for money. In the two objectives the government set out for the scheme, evidence suggests that such schemes overall augmented PVC financing at the market level, but their effect on drawing VC investments to early-stage firms remained weak. Firms in the expansion stage appeared to be the main beneficiaries of GVC schemes. It was also found that there was a tendency for local protection, that the further down the local levels the more restrictions were placed on VCGF's partners in where and how to invest. This may lead to the spatial mismatch between the supply and demand of VC and to the possible underperformance of funds. Despite the mushrooming of GVCs everywhere, the GVC scheme surprisingly has not changed the entrenched imbalance of VC distribution geographically. This suggests that deep down, money follows where opportunities lie.

This paper has made a tentative attempt to assess the impact of the GVC initiative in China. Due to a lack of data, however, many important issues concerning Chinese VC and GVCs' behavioral aspect are yet to be addressed. For example, does Chinese GVC enhance VC syndicates? Does GVC-backed funds show different exit behavior? What is the level of exit and survivorship of Chinese GVCs? To what extent do GVCs enhance technological innovation or entrepreneurship? Answers to these questions will undoubtedly improve our understanding of GVCs in the Chinese context, and they should determine future directions for research.

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