

PUBLIC POLICY FOR VENTURE CAPITAL: AN INTEGRATED FRAMEWORK

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ABSTRACT

This paper reviews the main theoretical and empirical literature on public policy that supports the development and growth of vibrant venture capital industries worldwide. The paper focuses on the content and results of public policy mechanisms adopted in various countries, their theoretical grounding and main empirical findings, with an eye to distilling the main patterns of success and failure. Five broad areas of public policy intervention that tackle both demand and supply sides of the venture capital industry are reviewed: (1) the development of an entrepreneurship and innovation ecosystem; (2) investment laws and regulations; (3) fiscal policy; (4) secondary stock market; and (5) government venture capital. The paper concludes with a public policy framework distilled from the literature. This work will help academics, practitioners and policy makers, especially those new to the field, to get a comprehensive yet concise map of the academic literature on the topic, which currently is much needed. It also helps readers in identifying the main research questions and empirical results to date.

JEL: K2, O17, O250

KEYWORDS: Venture Capital, Public Policy, Entrepreneurship Policy, Entrepreneurial Finance, Financing Innovation

INTRODUCTION

Meggison (2004) defines modern venture capital as ‘... a professionally managed pool of money raised for the sole purpose of making actively-managed direct equity investments in rapidly-growing private companies, and with a well-defined exit strategy.’ Venture capital is equity capital that commands above market returns and is typically invested in young companies that have high growth potential but are nevertheless highly risky (Gompers 1997; Boocock and Woods 1997; Florida and Kenney 1988; Sophie et al. 2002). A venture capitalist will typically become deeply involved in the invested company beyond the provision of equity capital, giving strategic advice as well as access to a rich network of technical marketing, financial and operations support to grow the company (Botazzi and Da Rin 2002; Schmidt 2003; Klonowski 2010). With these unique characteristics, venture capital is poised to support the growth of highly innovative and promising young companies in new industries, which other forms of financing would find too risky to invest in.

Many countries are seeking to foster vibrant communities of VCs through enhancing both supply of and demand for VC investments through the creation of opportunities and incentives (Baygan and Freudenberg 2000). Key supply side factors include the channeling of capital willing to invest in young, risky ventures; the availability of technical expertise capable of evaluating, funding and assisting these young ventures; and an exit mechanism for VCs. On the demand side, a preponderance of promising ideas, high-potential entrepreneurs and firms suitable for investment are needed. The following sections provide a review of the empirical and theoretical literature dealing with common policy instruments that have been used by governments in various countries to foster a vibrant venture capital industry. Each policy tool is explained along with its potential benefits and drawbacks, in addition to its most important conditions for success. Before reviewing the public policy instruments, the debate on the desirability and effectiveness of

government intervention in stimulating entrepreneurial and VC activity is summarized (Lerner 2009; Cumming 2011). Following the public policy debate, the literature on government support policies for stimulating entrepreneurial demand for VC are reviewed. The following section looks at investment laws and regulations after which fiscal policies to enhance the VC sector are surveyed. Next, we look at exit mechanisms for VC followed by a review of government venture capital. Finally, patterns of success and failure are gleaned from the literature and conclusions are drawn.

LITERATURE REVIEW

In economic theory and practice, direct government intervention in supporting entrepreneurship and VC is warranted in the presence of market failures (Keuschnigg and Nielson 2001). Two major market failures have been documented: a shortage in the supply of capital to new technology-based firms (NTBFs), known in the literature as the ‘funding gap’ and the presence of positive spillovers/externalities, which reduce private incentives for innovation and entrepreneurship. In the absence of a well-developed VC sector, high potential NTBFs would typically fail to receive investment capital from traditional financial institutions. Theoretically, this funding gap is explained by the presence of adverse selection and moral hazard due to information asymmetries. Adverse selection arises in a situation where the entrepreneur knows more about the technology/product than the investor and may inflate its strengths contrary to investor interests. The investor commits capital under this asymmetric information.

Moral hazard results from the inability of the investor to evaluate the extent to which the entrepreneur is putting forth the optimal effort that would make the enterprise successful (Amit, Brander, and Zott 1998). Most young companies do not own the high collateral that bank loans would require and in the case of high technology, a company’s financial statements will typically display several years of negative cash flow due to spending on R&D, product development and marketing. Thus NTBFs are unlikely to be funded through traditional means (Lerner and Watson 2008; Lerner 2009; Mason 2009). Venture capital has its way of mitigating the high risks involved in such investments through a costly due diligence process before pledging capital and by being deeply immersed with the investee in growing the company. Given the high commitment, VCs will typically not find it feasible to invest in seed and start-up, where companies’ financing needs are quite modest (Kanniainen and Keuschnigg 2003). Furthermore, as VCs grow in their expertise, they are able to attract larger investment funds. Experienced VCs will tend to pick larger size projects rather than finance a large number of small projects. This again biases VC investments away from NTBFs (Dubocage and Riveau-Danset 2002; Mason and Pierrakis 2011; Palacio, Zhange, and Sole 2012).

Government intervention is thus warranted to correct imperfections in capital markets where young innovative firms are faced with credit constraints. From a theoretical economic perspective, the risk associated with such companies would require that they pay a premium over the regular interest rate that is charged more mature, high-collateral companies (Mason 2009). This premium is one that young start-ups are unlikely to be capable of servicing. Any public policy instrument that increases the supply of investment funds would help to lower this interest rate. Also, any policy instrument that increases the return on investment would increase the willingness of arms length financiers to invest in high-collateral companies, thus freeing up VC funds for low collateral companies (Da Rin, Nicodano, and Sembenelli 2006). The funding gap for promising startups has also been associated with market inefficiencies that are caused by lack of information, whereby promising start-ups cannot locate VCs and vice versa (Harding 2002).

Besides the funding gap, entrepreneurship is an economic activity that exhibits increasing returns due to the presence of positive spillovers (externalities) (Lerner and Watson 2008). The more entrepreneurial activity, the better the services, expertise and networks that VCs, lawyers and other professionals make available to support entrepreneurs. These positive spillovers are particularly vital in the early development of an entrepreneurial sector and VC industry. When the industry reaches a critical mass, returns on investment in VC pick up and the importance of government intervention declines (Lerner and Watson

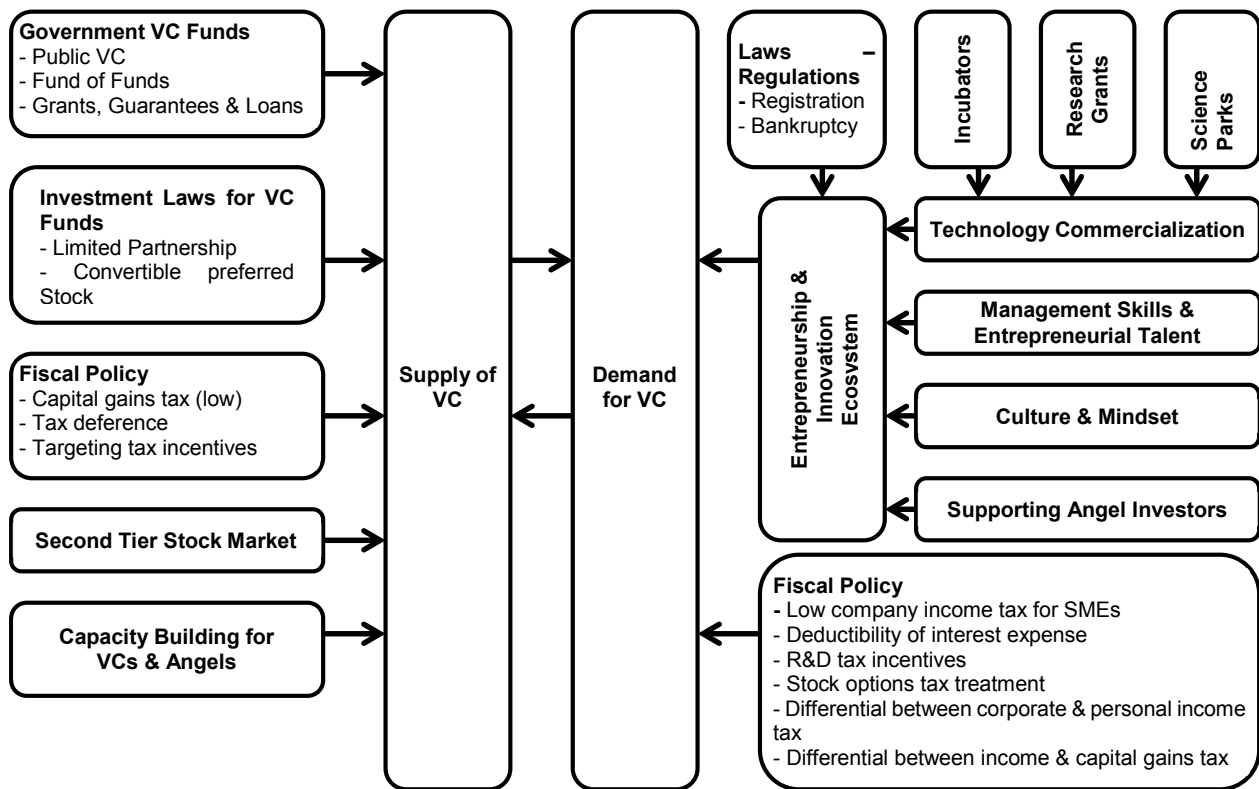
2008; Lerner, 2010). Technological innovation is also an activity that exhibits positive spillovers and in many instances the social rate of return on R&D exceeds the private rate of return to the companies undertaking it. Public finance theory supports government subsidies in case the company undertaking the innovation cannot capture all the economic benefits (Lerner and Watson 2008). Avnimelech and Teubal (2004) use an evolutionary/systems perspective to show that by lowering the private cost of early entrants into the VC industry, the American government policy allowed for individual and collective learning to take place and for a mature VC industry to evolve.

The number one argument against government intervention is incompetence (Lerner and Watson 2008). A government bureaucrat will not spend the funds under his/her control with the same diligence as an entrepreneur or investor spends his/her hard won dollars on a venture that is his future success or demise. Poor choice of unsuccessful investment targets, profiteering by hiring consultants who are relatives or friends of the program administrators, and other misconstrued incentives and moral hazard behaviors are cited (Lerner 2009). Secondly, there are groups of beneficiaries who organize to capture the direct and indirect subsidies provided by public support programs. These groups are not, in many cases, the target beneficiaries that the government programs were initially designed to support (Lerner, 2009). Third, government policy may be ineffective due to bundling multiple policy objectives with contradicting priorities under common programs (McGlue 2002). The rest of the paper presents an integrated framework for public policy interventions geared toward the evolution of a vibrant VC sector. Figure (1) below illustrates the main policy mechanisms that have been employed in various countries and gleaned from the literature. The figure shows how each mechanism stimulates the development of the VC sector either by enhancing the demand for or the supply of venture capital.

Policy Mechanism (1): Entrepreneurship and Innovation Ecosystem

The entrepreneurship and innovation ecosystem caters primarily to the demand side of the VC industry and entails creating an entrepreneurial sector, encouraging research and commercializing innovative ideas to ensure access to cutting edge technology (Romain and van Pottelsberghe 2004; Lerner 2009). Moreover, it involves the cultivation of entrepreneurial skills and capacities that produce a virtuous cycle and a steady stream of attractive investible start-ups (Lerner 2010). Singapore has been able to build a vibrant VC sector by catering to demand side policies first, by stimulating entrepreneurship and building R&D capabilities in the 1980s then shifting its focus to supply side initiatives in the 1990s to provide seed and start-up capital (Lerner, Moore, and Shepherd 2005). The increased internationalization of the VC sector, as portrayed by the rising amounts of cross-border VC investments, points to the possibility of the demand side becoming the more decisive factor in developing a country's VC industry. If local entrepreneurial talent exists, it will attract VC investments from many countries, even if domestic supply is short (Baygan and Freudenberg 2000). Creating an entrepreneurial & innovation ecosystem that attracts VC requires support for R&D, intellectual property and commercialization of technology (Da Rin, Nicodano, and Sembenelli 2006); enhancement of entrepreneurial skills (Karaömerliolu and Jacobsson 2000; Mason and Harrison, 2001; Romain and van Pottelsberghe 2004; Mason 2009); cultivation of an entrepreneurial culture and mindset (Karaömerliolu and Jacobsson 2000; Gilson and Schizer 2003; GEM); and support for angel investors. Technology commercialization, innovation, entrepreneurial culture and mindset are all research fields with rich streams of literature, the review of which is beyond the scope of this paper. We focus here on the aspects of entrepreneurial skill and mindset that are particularly important for VC investment.

Figure 1: An Integrated Framework on VC Public Policy



One of the important elements in an entrepreneurial culture is acceptance of failure and a willingness to take risk (Karaömerliolu and Jacobsson 2000; Knight 1921). Being VC investment ready involves influencing entrepreneurs to change their attitudes about relinquishing equity to investors (Ooghe et. al. 1989), trusting the VC process (Harding 2002), teaching them how to “sell” and “pitch” to investors and finally, making their business investment worthy. The latter involves fundamental issues in the quality of the management team/entrepreneur, the position of the business in the market, the viability of exit and returns on investment (Mason and Harrison 2001). Some of these investibility issues are costly and therefore, some European countries have set up grants to cover costs of market accessibility and analysis, legal due diligence and technology validation (Harding 2002; Mason 2009). Universities, training centers, incubators, angel investors and VCs are all important actors in the accumulation of entrepreneurial talent and business acumen (Palacio, Sole, and Batista-Foguet 2008). Moreover, government initiatives that foster connections between locals and expatriates in developed VC industries are helpful in this regard (Lerner 2009). In the case of India, many Indian immigrants set up high-tech businesses in the US and after becoming successful, started to invest in young companies as angels or VCs. These individuals later became transfer agents of the Silicon Valley model to India (Avnimelech and Teubal 2004).

Business angels bridge the funding gap between the stage where the entrepreneur has depleted all personal funds and the stage where VCs are willing to invest. Angels typically make smaller investments than VCs and at earlier stages of the company development (Lumme, Mason, and Suomi 1996; Mason and Harrison 2010). They provide an initial screening and signaling to VCs and they help propel the company forward (Jones-Evans and Thompson 2009). Due to the relatively large size of deals required by VCs, angel investors fill an important funding gap for early stage companies (Lockett, Murray, and Wright 2002; Mason 2009; Collewaert, Manigart, and Aernoudt 2010). Research shows that this gap is more pronounced in Europe, but not as severe in America (Dimov and Murray 2008). BANs (Business Angel Networks),

frequently financed through public funds, are created to facilitate networking and awareness among local business angels and entrepreneurs seeking angel investment (Mason 2009; Collewaert, Manigart, and Aernoudt 2010; Baygan 2003b). In some OECD countries, angel investors have formed groups/syndicates to pool funds and co-invest as a group alongside larger VC funds (Baygan 2004). These private BANs exhibit investment patterns that are quite different from public non-profit BANs. Public nonprofit BANs are the ones mostly filling in the equity gap for seed and startup stages, and therefore the rise of private BANs does not remove the need for the public BANs (Mason and Harrison 1997). Scholarship is divided over the question whether governments should continue to encourage business angel networks, especially after the rise of private BANs. Mason and Harrison (2007 and 2010) as well as Harding (2002) support government intervention to encourage business angels. This position is supported by evidence from Europe at least, which suggests that public BANs have a unique and non-redundant role to play in plugging the equity gap for early stage ventures.

There are several ways in which government may intervene to support angel investors. Mason suggests that governments may provide fiscal incentives; modify legislation to allow advertising of investment opportunities; ‘...capacity building initiatives to raise the competence of investors and to improve the investment readiness of businesses seeking finance; and, co-investment schemes that leverage public money with angel money.’ (Mason 2009, 540). Moreover, some European governments provide loan guarantee schemes for business angels (Aernoudt, José, and Roure 2007). Key demand side policies include helping entrepreneurs become investment ready (Mason and Harrison 2007), and fostering links between angel networks to incubators, universities, and research centers where technology transfer and commercialization take place (Baygan 2004). Demand side initiatives are becoming more important, with rising evidence that angels are investing below their full capital potential (Mason and Harrison 2010).

Avnimelech and Teubal (2004) point to the paucity of literature on organization issues in the VC industry, such as attracting professionals and stimulating collective learning in the industry. The design of government programs can go a long way in building capacity of local investors. For example, The Yozma fund of Israel had, as a primary objective, the acquisition of knowledge from foreign LPs (limited partners) and the creation of an international network of contacts (Avnimelech and Teubal 2004). Sweden and Canada have also resorted to attracting foreign VCs to augment the talent and experience of local VCs and expose them to best practice (Baygan 2004). The encouragement of cooperation with expatriates with a proven record of success is another mechanism toward the same end. National VCAs (venture capital associations) provide important support services for the cultivation of local investor talent. Capacity building initiatives need not only target local VCs; training is also needed for business angels. Less common and much needed is training for intermediaries such as ‘...*accountants, lawyers, bankers, consultants, and business incubator managers*’ who often give advice to entrepreneurs (Mason 2009) as well as technology transfer institute managers (Harding 2002).

Policy Mechanism (2): Investment Laws and Regulations

Laws and regulations may be designed to create an enabling environment for entrepreneurship (demand for VC) as well as VC funds and companies (supply of VC). Several authors have examined the effect of the legal environment on the structure and operation of venture capital (Ribeiro and Carvalho 2008; Cumming, Schmidt, and Walz 2010). Since the functioning of a venture capital industry entails complex contractual arrangements, a well functioning legal system with respect for the rule of law and reduced bureaucratic complications will facilitate VC operation (Haitian, Yi, and Gongmeng 2007). Empirical studies show that in countries with robust legal systems and property rights protection, VCs are more likely to invest in high-tech companies; there is faster origination and screening of deals; there are more exits through IPOs; VCs are less likely to require periodic cash flows before exit; and there is easier board representation by VCs (Megginson 2004; Cumming, Schmidt, and Walz 2010). Contract enforcement reduces transaction costs and closing time due to reducing the need for lengthy shareholder agreements (Bosut 2004). On the other

hand, research shows that in weak legal environments, VCs are more likely to require controlling shares thus leaving lower incentives for entrepreneurs and valuations are positively correlated to the quality of the legal environment (Lerner and Schoar 2005). The quality of the legal environment is especially important if a country wishes to attract flows of foreign venture capital (Baygan 2004).

Investment Laws for Venture Capital Funds

Governments that aim to cultivate vibrant VC industries are encouraged to consider these three important areas of regulation: (1) allowing institutional investors to invest in VC funds; (2) allowing the limited partnership company structure for VC funds; and (3) allowing investors to own their equity shares in the form of convertible preferred stocks. Allowing institutional investors such as private pension funds, university endowments and insurance companies to invest in VC (Baygan 2003a, b, c, d) is an important government policy that has been employed in the U.S. and in several OECD countries to mobilize investment funds in the VC industry (Gompers et. al. 1998; Gompers and Lerner 2001). Institutional investors may be reluctant to invest in VC because of government restrictions as well as the higher risky and illiquidity of VC (Baygan 2003d). VC funds under investment multiplied six fold and pension funds came to represent over half of all VC investments following the U.S. regulatory amendment in 1979 (Romain and Pottelsbergh 2004; Haitian, Yi, and Gongmeng 2007). Regulatory reforms work to reduce the quantitative, qualitative and geographical restrictions on venture capital investments of pension funds and insurance companies (EVCA 2008).

The LP (limited partnership) company structure is the legal structure of choice for VC funds and its adoption increases competence in a national VC industry because it encourages experienced managers to enter and attracts global institutional VCs (Karaömerliolu and Jacobsson 2000; Gompers et al. 1998). A venture capital firm is usually set up as a management company with several LPs under management, each LP being a separate legal entity (Haitian, Yi, and Gongmeng 2007). The investors in the VC funds – mostly institutional investors – are the limited partners in the partnership, who, in case of losses in the portfolio company, are only liable up to their shares of capital in the partnership. The major advantages of the LP structure are the limited liability and the absence of taxation at the partnership level, this avoiding double taxation (Carvalho, Netto, and Sampaio 2012). This tax flow-through advantage allows partners to make use of tax exemptions in their home jurisdiction, which is vital given that most global institutional VC investors are university endowments, pension funds and government funds, which are by nature tax exempt in their home countries. For other taxed investors, the tax flow-through of a limited partnership allows partners to offset their losses from the LP against other taxed income (Lerner, Moore, and Shepherd 2005). It is important for local markets to emulate this US based LP system to encourage global institutional investors to enter the local market (Gompers and Lerner, 2001; Lerner 2009).

The VC firm acts as the general partner and manages the investments in the portfolio companies on behalf of the investors. The general partner is liable for the debts and obligations of the portfolio companies (Lerner, Moore, and Shepherd 2005). In return, the general partner receives a share of the gains in the portfolio companies (normally around 20%) in addition to a management fee. Here, the returns to the VC are tied to its performance, and thereby optimize its incentives to grow the value of portfolio firms (Haitian, Yi, and Gongmeng 2007). In countries that offer lucrative entrepreneurial ventures but lack the regulatory infrastructure, VCs register offshore limited partnerships to invest in local portfolio companies, China being a prominent example (Haitian, Yi, and Gongmeng 2007). Countries that wish to attract VC introduce regulatory reforms that minimize such transaction costs by availing a dedicated or suitable domestic fund structure or vehicle that is tax transparent for domestic and sometimes non-domestic limited partners. The absence of undue restrictions on the investment activities of the fund structure/vehicle further facilitates the operation of domestic and foreign investors in local investment opportunities (EVCA 2008).

Convertible preferred stock is the equity instrument of choice from a theoretical point of view (Trester 1998; Schmidt 2003). Convertible preferred stock is a special type of financial instrument that offers a flexible form of equity ownership by the VC investors in the portfolio company. This instrument has evolved due to serious agency and hold-up risks as well as information asymmetry in the relationship between the entrepreneur and the venture capitalist, often referred to as ‘double moral hazard’ in the theoretical literature (Schmidt 2003; Hellmann 2006). Because the VC contributes the capital and holds liability for the portfolio company’s obligations but knows less about the technology and business than the entrepreneur, the VC is vulnerable to agency problems and opportunistic behavior by the entrepreneur. Therefore, the VC investor needs to be protected in case the entrepreneur exerts less-than-optimal effort and makes avoidable mistakes that lead to the failure of the portfolio company. On the other hand, the entrepreneur needs a powerful incentive of a majority ownership in the portfolio company to put forth optimal effort and diligence, and forego the security and income from employment.

Convertible preferred stock can be made more like a loan or more like common stock, depending on the VC’s decision to exercise the conversion. If the portfolio company fails, the convertible preferred stock is kept more like a loan, which allows an investor to get back the amount invested and thus protects the investor against the downside. If the portfolio company is successful, the investor may convert to common stock and thus participate in the upside gains and enjoy the privileges of common stock holders (Marx 1998; Cumming 2001). From the perspective of the portfolio company’s entrepreneur, the amount of common stock that is owned by the VC in the case of conversion is limited, thereby preserving the high-powered ownership incentives, which drive entrepreneurs to put forth optimal efforts in the venture (Cumming 2001). The theoretical literature lends support that these complex contracts are effective in securing investment in highly risky entrepreneurial firms as they allocate optimal control rights between the entrepreneur and the VC (Trester 1998; Marx 1998; Black and Gilson 1998; Bascha and Walz 2001; Gilson and Schizer 2003). It is noted that the use of convertible preferred stock is much less pervasive outside the U.S. (Gilson and Schizer 2003). In countries where the legal system is not well developed, these complex contracts are not as helpful, and investors will resort to majority ownership to have more control on the results of the VC investment. The latest trend in regulation for VC in the U.S. is the JOBS Act (Jumpstarting Our Business Startups), which will allow crowd funding under certain disclosure requirements (EY 2014). This is still a new development and it remains to be seen how legislation will support the operation of crowd funding as a source of venture capital, besides traditional VC investments.

Investment Laws to Encourage Entrepreneurs

This section discusses regulatory measures that facilitate the setting up and closing down of private companies for entrepreneurs. The extent to which the local environment is inviting to business people and investors is gauged through several worldwide databases such as the *Doing Business* measures and the *World Competitiveness Report*. Besides setting up and registering a new company, closing down to discontinue operations is also important. In this respect, bankruptcy laws that are entrepreneur friendly (Armour and Cumming 2006; Cumming 2011) reduce the punitive measures for executives of bankrupt companies. Since entrepreneurial skill is experiential in nature, punishing failure makes it more difficult for entrepreneurs to amass the needed experience to establish successful start-ups, time and again (Lerner 2009). Furthermore, it discourages individuals from picking the self-employment option. Jeng and Wells (2000) present empirical evidence that shows a significant effect of bankruptcy laws on the intensity of VC investments in a country. A detailed review of government policies to support small business is beyond the scope of this review; any facilitating regulation in the latter realms will help high growth enterprise.

Policy Mechanism (3): Fiscal Policy Tax Incentives

There are several mechanisms through which taxation can provide incentives for entrepreneurial risk taking (demand) and VC investments (supply). Tax incentives operate through the different types of taxes, the

levels of taxation and differentials between personal and corporate taxation. Examples of tax incentives include fiscal incentive schemes for young and innovative companies; lower company tax rate for small business, or a progressive taxation system with lower rates for companies with profits up to a certain limit; deductibility of net interest expense by VC backed companies; R&D tax incentives; treating stock options as capital gains rather than as professional income and taxing them when they are sold rather than when they are granted (EVCA 2008). Without special tax treatment for VCs, the typical taxation system may provide severe disincentives for VC investment because VCs may be taxed at three different levels: (1) the company in which the VC invests, the income of which is taxed (2) the VC fund is taxed for dividends it receives from the investee company (3) the investors in the VC fund get taxed for dividends they receive from the VC fund (Karaömerliolu and Jacobsson 2000).

This is all in addition to the capital gains taxes. From a theoretical perspective, it has been shown that tax cuts are an important stimulant for entrepreneurship in general and VC investments per se, because of the effects on increasing the returns on investment. There are various types and levels of taxation that may stimulate entrepreneurship, innovation and provide an incentive for VCs. The theoretical literature looks at the effects of alternative forms of taxation, such as personal and corporate income tax, and personal and corporate capital gains tax, on the demand and supply of VC (Cullen and Gordon 2002). Corporate income tax affects entrepreneurship in general, while capital gains tax is especially relevant for VC investments in high tech and early stage companies, as the entrepreneurs and the VC realize a significant portion of the return on investment in the form of capital gains when the company is sold or floated on the stock market. The effects of tax cuts will depend on the country and the context (Da Rin, Nicodano, and Sembenelli 2006). For example, in the U.S. reductions in corporate capital gains tax is unlikely to increase the supply of VC funds because the main suppliers of such funds in the U.S. are pension funds and university endowments, both of which are tax exempt (Poterba 1989). Nevertheless, capital gains taxes in the U.S. are kept low at around 20% (Karaömerliolu and Jabosson 2000) to stimulate demand for VC rather than its supply (Gompers et.al. 1998; Lerner 2009). This observation is supported by the formal theoretical work on the effects of various taxation forms on the incentives influencing individual occupational choices, showing that higher capital gains taxes lower the number of people who pick entrepreneurship rather than employment (Poterba 1989; Keuschnigg and Nielson 2001, 2002). Poterba's (1989) work, shows that capital gains due to appreciation of common stock represent a small fraction when compared to capital gains resulting from appreciation of other asset classes. This implies that targeting in capital gains tax reduction is preferable from a government revenue perspective. In Europe, a reduction in corporate capital gains tax is expected to increase VC funds, as most of the funds come from companies/corporations that are taxed (Da Rin, Nicodano, and Sembenelli 2006).

The literature also refers to more subtle effects of reductions in capital gains taxes as they influence VC incentives to monitor and advise entrepreneurial firms, thus increasing the success rate of venture backed companies, increasing their expected returns and stimulating innovation (Keuschnigg and Nielson 2001, 2002). Besides taxation levels, the literature tackles the effects of tax differentials on the demand for and supply of VC. For example, the difference between personal income tax and personal capital gains tax is likely to affect incentives toward entrepreneurial behavior, with a capital gains tax lower than income tax encouraging people to forego secure employment (Poterba 1989). It is also shown that differentials between capital gains taxes and personal income taxes may influence the incentives of entrepreneurs and VCs alike to put forth their best effort to make the entrepreneurial venture a success, thus avoiding the 'double moral hazard' (Keuschnigg and Nielson 2004). Finally, loss carry-forward provisions are also relevant to innovation driven early stage ventures that have a significant upfront investment in R&D. These tax provisions allow companies to deduct current losses from their future taxable income and in effect encourage companies to take risks and thus increase the demand for VC (Da Rin, Nicodano, and Sembenelli 2006). Targeting is an important policy consideration in the design of tax incentives for VC and entrepreneurship as taxation is an important revenue source for the treasury. Therefore, governments may target the capital gains tax cuts to asset sales from investment in entrepreneurial companies that have been

held for a minimum number of years, to ensure they stimulate early stage VC deals (Lerner 2009). The literature presents many examples of such targeting in countries such as UK, Australia and France (Dubocage and Rivaud-Danset 2002; Lerner and Watson 2008; Mason and Pierrakis 2011).

Policy Mechanism (4): Second Tier Stock Market

VCS realize their return on investment when they exit the investee company by selling their equity shares. The most common exit strategies include IPOs, trade sale to a corporate buyer, and buy-back by the original entrepreneurs. IPOs are among the most attractive exit strategies, at least in the U.S., and hence an active second-tier stock market is important. Jeng and Wells (2000) study 21 countries for the determinants of venture capital supply and find that IPOs are the most important determinant of VC funds for expansion capital. Botazzi and Da Rin (2005) show that in the two years after IPO, company sales more than double, employment more than triples, capital expenditures increase twelve fold, leverage decreases while debt increases significantly, and R&D intensity remains high despite growth in sales and employment. Da Rin, Nicodano, and Sembenelli (2006) show, based on panel data from European countries, that the presence of an exit mechanism through the stock market increases the rates of innovation and the proportion of early stage VC investments. Other empirical evidence shows that exit through IPOs increases the amount of capital raised (Rebeiro and de Carvalho 2008). Thus companies go public to invest and grow, and thus it is understandable why IPOs are important from the point of view of the entrepreneur as well as the VC. The NASDAQ (National Association for Securities Dealer Automated Quotation System), the U.S. stock market for relatively small innovative firms, is the exemplar for a second-tier stock market. Established in 1971, it is now a highly developed and active market (Karaömerliolu and Jacobsson 2000).

Many countries have dedicated resources and policy efforts to create vibrant secondary stock markets to improve the exit prospects and attract venture financing in emulation of the NASDAQ. The Canadian market is quite active, second only to the NASDAQ among the secondary stock exchanges in OECD countries (Baygan 2003b). Several European OECD countries created their own secondary stock markets in the latter half of the nineties, with weak levels of activity as indicated by the number of quoted companies and the number of IPOs. Furthermore, Europe tried to create its own EASDAQ in 1996 and failed miserably in a viscous cycle of low liquidity, which further discouraged investors to go through the market, which in turn decreased the market's attractiveness until it ultimately failed (Baygan 2003b). Some developing countries have had more success in building their secondary stock markets, such as the Indian experience (Dossani and Kenney 2002).

The most common problem that plagues secondary stock exchanges in countries that try to create them is the small number of listed companies and the weak trading and IPO activities. A possible solution to this problem is for countries to pool into single regional exchanges such that the cumulative volume of listing and trading for the group as a whole would render the second-tier market dynamic. This proposal should be very feasible given the advances in ICT and the ease of computer and database networking and online trading. This is exactly what several European countries attempted in 1997 when they created the shortlived Euro.nm alliance, which '...has allowed nearly 600 companies to list and raise over \$40 billion in equity capital.' (Botazzi and Da Rin 2002, 232). Integration would result in markets that have enough scale (market capitalization and liquidity) and scope to support IPOs that are less volatile and less prone to speculation. 'The scope of partnerships across exchanges could range from enhancing trade linkages, cross-listings and alliances to full-scale mergers' (Baygan, 2004, 26).

Policy Mechanism (5): Government VC Funds

VC investment is ultimately a private sector activity and the government should not in principle act as a venture capitalist. However, governments in many countries have set up VC funds during the very early stages of the VC sector's development to demonstrate the kind of returns that would stimulate the appetite

of institutional investors who may initially shy away from these investments (McGlue 2002). It may take as long as two or three decades for a VC industry and an active entrepreneurial culture to emerge in a country but it should be very clear that ‘government as VC’ is temporary. Theoretically, VC funds supplied by the government are warranted based on the market failure arguments presented earlier. Therefore, it is essential when setting up government supplied VC funds to ensure that they are actually addressing true market failures. ‘It is clearly insufficient to argue that simply because projects in region x or sector y fail to attract venture capital funding the public sector should intervene to supply the funding.’ (McGlue 2002, 48) Unless these projects are high performers, their lack of finance could just indicate an efficient market mechanism that deprives weak performers of finance (Lockett, Murray, and Wright 2002). Furthermore, a region that suffers from weak VC presence is not in itself a supply side market failure if it also lacks the entrepreneurial critical mass that would attract VC investors (McGlue 2002; Sunley, et. al. 2005).

Government may pump risk capital into the ecosystem in several forms, in some instances to stimulate demand for VC through entrepreneurship and technological innovation and in other instances to leverage private sector investments and augment the supply of risk capital. Demand side programs include government-funded incubators, science parks and research grants. Supply side programs include government VC funds and fund of funds.

Government Funded Incubators, Science Parks, and Research Grants

Government funded incubators, science parks and research grants play an important role in stimulating innovation and entrepreneurship, especially the commercialization of scientific and applied research. Due to the positive externalities and the public good nature of producing scientific knowledge, market forces would produce a level of scientific research that is much less than the socially optimal level. Government initiatives seek to correct these market failures through offering competitive research grants, creating science parks that leverage proximity, knowledge dissemination, technology and best practice exchange as well as incubators where applied research ideas can be transferred into workable prototypes of products that can be commercialized. Empirical work on the ventures that received SBIR grants in the U.S. shows evidence of higher employment, sales growth and greater likelihood of receiving VC financing later on, attesting to the certification effect of the government VC grants (Lerner 1999). Other empirical research conducted on later time periods confirms the above findings regarding federal R&D grants and their effects on awardee company performance as well as innovation rates, as measured by patent counts (Da Rin, Hellmann, and Puri 2011). There are vast bodies of literature on industrial clusters, national innovation systems, technology policy and incubators, the review and coverage of which is beyond the scope of this paper (c.f. Nelson 1993; Salmenkaita and Salo 2002). It suffices here to make reference to these streams of literature for their relevance to enhancing the demand for VC by creating a pool of attractive investment targets. To ensure the effectiveness of such programs, the government must set targeting criteria and built in checks to ensure that the actual beneficiaries are those originally targeted.

A key issue is the geographical dispersion of the above activities and the targeting of specific regions with government support (Murray 1998; Sunley et. al. 2005). In his evaluation of the impact of the SBIR program in the U.S., Lerner (1999) finds that the program produced significant positive impact for companies that were already located in regions with a vibrant VC community. Scholars argue that channeling resources to up and coming “Silicon Valleys” such as Munich, Cambridge, or Bangalore is more effective than regions with weak entrepreneurial activity. The rationale here is that the availability in the vibrant regions of the required concentration of expertise and innovative culture, will render their contribution to national economic growth much higher than less active regions (Murray 1998; Cowie 1999; Lerner 1999). Another important policy consideration is to link the technological and commercial aspects of a proposal when evaluating potential candidates for funding. In many cases, the technology looks attractive, but the entrepreneurs are far removed from creating a working prototype of a product that gains market approval (Lerner 2002b). Another important success factor is the time orientation of policy makers

– usually politicians are very short sighted and with entrepreneurship, projects must have a long term mandate, especially in regions that have not built a critical mass (Lerner 2009).

Public Venture Capital Funds

Government-as-VC is the most obvious mechanism to create or increase the supply of risk capital when the VC industry has not emerged, and where the supply of risk capital is short due to market failures discussed earlier. Research shows that public VCs play an important role as they have been shown to flow mainly to early stage deals, which private VCs tend to avoid due to the small deal sizes and low rates of return (Lockett, Murray, and Wright 2002; Pintado, de Lema, and Van Auken 2007; Beuselinck and Manigart 2007; Nightengale et. al. 2009). It has also been shown that public VCs are more consistent in their supply of risk capital to young companies as they do not typically follow the business cycle or exit alternatives, as do private VCs (Beuselinck and Manigart 2007). In so doing, government VC funds open up opportunities for investment, wealth and job creation in areas that market forces alone would have failed to stimulate (Haitian, Yi, and Gongmeng 2007). Despite their important role, government VC funds are among the most controversial policy areas and empirical evidence continues to confirm skepticism toward government-as-VC. Based on the U.S. experience, Florida and Smith (1993) propose that government should not try to act as VC, even if they hire private venture fund management.

When it came to the key VC activities of immersion and deep involvement in decision-making in the startups, pulling the plug on underperformers, and increasing financial commitment through further investments in perceived winners, state VCs fell short. They produced much lower rates of return and created few jobs at a very high cost (Florida and Smith, 1993). Similarly, one of the latest studies in the UK by Mason and Pierrakis (2011) studies the regional distribution of VC in the UK. The study finds poor performance of VC investments where public VC investments dominate. The poor performance is attributed to both the regional restrictions, which deprive the VCs from picking the most promising investment targets and the cap on the amount of capital invested, which may fall short of the growth needs of high tech companies and deprives them of follow-on funding (Pierrakis and Westlake 2009; Mason and Pierrakis 2011). Beyond the U.S. and U.K., Brander, Du, and Hellmann (2014) study venture capital deals from 25 countries that took place between 2000 and 2008. In this empirical work, the authors compare the performance of companies backed solely by government VC with that of companies backed solely by private VC and companies with a mix of government and private VC backing. The results show that companies with pure government VC backing are the worst performers among the three groups, with the lowest amount of funds raised as well as the lowest successful exit rates. The best performing companies are those that have mixed government and private VC backing, most likely due to the larger size of investment provided (Brander, Du, and Hellmann 2014).

Despite the above criticisms of government VC funds, many governments continue to employ this policy tool and best practices have emerged for government VC. The trend has moved from purely government financed VC funds to hybrids, which contain a mix of public and private capital (Nightengale et. al. 2009). China's SVGF (State Venture Capital Guiding Fund), Israel's Yozma program and New Zealand's Venture Investment Fund (NZVIF) are successful examples where best practices have paid off. The government fund only commits funds after private VCs have invested, and the government shares are privatized after a period of time (Avnimelech and Teubal 2004; Chen 2010; Lerner, Moore and Shepherd 2005). Similar initiatives abound in many countries, with varying degrees of impact and success (Nightengale et. al. 2009). The literature points to several key success factors for effective government VC funds. First, the allocated capital has to be big enough for the fund to have an impact. In this regard, Lerner (2009) discusses the optimal fund size and says that funds that are created with a few million dollars rarely succeed, because even if they can cover their basic expenses (office rental, administrative assistant, travel and salary of investment expert) very little is left to invest in entrepreneurial ventures.

When the invested amounts are small, the funds are not enough for the startups to really take off or grow, producing very little impact (Pierrakis and Westlake 2009; Mason 2009; Murray 1999). Although there are no hard and fast rules, minimum fund size in the U.S. has been estimated at around \$60 million and around £50 million in the U.K.; otherwise, both the growing company and the VC fund suffer serious inefficiencies. The entrepreneur will have to spend time looking for the next round of financing instead of growing the company in which case the VC's equity holding in the company becomes highly diluted. This keeps the potential returns of hybrid VC funds lower than fully private funds (Nightengale et. al. 2009).

Second, it is very important to manage incentives effectively in the design and structure of a government VC fund, to avoid incompetent and politicized decision making (Mason 2009; Lerner 2009). Alignment of fund management incentives with objectives of the fund should follow the best practices of private VC funds, who have evolved ways to manage incentives of the fund management and the entrepreneurs in alignment with the fund investors (Da Rin, Hellman, and Puri 2011). Government interventions are warranted in cases where fund management is incompetent or investments are flawed (Lerner 2009).

Third, government VC funds need to be carefully designed to avoid inadvertent crowding out of private VC investments by competing with private VCs for deals. Crowding out happens when public VC funds are so large that all the attractive investment opportunities have been funded by the public funds, and private funds then have no incentive to invest. Crowding out may also happen when private funds have stricter criteria for funding young companies, such as the requirement of a return on investment of at least 30% (Lerner 2009). When competition among investors for investment-worthy entrepreneurial projects is high, increasing the supply of VC through government funds will likely result in crowding out private VC (Da Rin, Nicodano, and Sembenelli 2006). The empirical evidence on the crowding out effect of government VC funds is mixed (Da Rin, Hellman, and Puri 2011). Brander, Du, and Hellmann (2014) and Leleux & Surlmont (2003) find that government VC funds actually complement private funds and thus find no support for the crowding out hypothesis, using a wide-ranging sample of countries. On the other hand, Cumming and Macintosh (2006) and Brander, Egan and Hellmann (2010) show suggestive evidence of some crowding out effects in Canada and Wallsten (2000) in the U.S.

Fund of Funds

The fund of funds is an alternative mechanism for the government to supply risk capital while avoiding the incompetence and crowding out risks of government VC funds (Pierrakis and Westlake 2009). In this case, the government sets up a venture fund that invests in private VC funds, and matches a dollar of government investment for every one or two dollars of private investment. This matching is a critical success factor as it lets the market point to where government funds should go and ensures that capital will not be allocated to weak companies that would otherwise fail to attract private VC (Lerner 2010). Examples include Australia's IIF (Innovation Investment Fund), the European Investment Fund (EIF), the Yozma program in Israel and the NZVIF (Lerner and Watson 2008; McGlue 2002; Baygan 2003d, Pierrakis and Westlake 2009). Another key characteristic of successful fund-of-funds is their temporary nature and built in stop-loss provisions. The mechanism is meant to stimulate the emergence of the local VC sector and to accumulate a critical mass of entrepreneurial opportunities and investors as well as provide opportunities for capacity building and sharing of expertise to cultivate local talent.

Successful government VC programs have had their termination designed and planned from the first day of implementation (Avnimelech and Teubal 2004; Chen 2010). In some countries, governments may find it necessary to provide further incentives to attract private investors to match government funds. Is it acceptable that public investors accept a higher risk and/or a lower return on their investments than private investors? When this is done, the justification is that private investors need further incentives to invest in specific sectors or regions. For example, the government may give private investors protection on the downside, by bearing more than a proportionate share of the loss; or promising them a higher share of the

upside returns; or by sharing in the operating costs of the fund (Mason 2009). This may go as far as the government handing outright subsidies in the form of free funds to reduce the VC's risks in investing in specific target start-ups, usually high tech ones (Chen 2010). Key risks associated with these types of government incentives include the distortion of market competition (McGlue 2002) and the crowding out of private VC (Da Rin, Nicodano, and Sembenelli 2006). Any policy that alters the risks and returns associated with VC investment may have very negative long-term ramifications (Mason and Harrison 2009).

Results and Discussion: Patterns of Success and Failure

This review has explained the main policy mechanisms used by governments in evolving a vibrant VC industry by tapping on the relevant theoretical and empirical work. The success of public policy initiatives for VC hinges on letting the market lead the process through matching public VC funds with private VC investment. This mechanism ensures that the public funds follow the market, which is much more capable of choosing winners than are public policy makers or academics. This matching process may require government programs to set tight policies and procedures, such as the stipulation that government will only invest after the private VCs have paid in their shares of registered capital (Chen 2010). This ensures that public VC funds leverage rather than replace private sector and institutional investor capital, and mobilizes a greater multiple from private VC funds. The degree of leverage should be an important metric in the evaluation of success of government programs, as was practiced in China (Chen 2010) and France (Dubocage and Rivaud-Danset 2002). This is key in avoiding one of the most common pitfalls of government VC programs, namely crowding out private investment (Mason 2009). Investing hand-in-hand alongside professional VCs will also ensure that the government VC capital requires similar rates of return as private VCs, thus avoiding the pitfall of competing with private VC by reducing the expected rates of return for entrepreneurs (Mason and Harrison 2002). It has also been emphasized that providing artificial incentives to mobilize private venture capital is quite risky.

When government programs alter the risks and returns structure of VC investment with the innocent intention of fostering VC activity, this may inadvertently lead to market and competition distortions that will have very negative ramifications in the long term (McGlue 2002). The Canadian LSVCC is a key example of a very costly government initiative that resulted in meager returns and that had lots of distortive effects (Cumming and Macintosh 2003). Moreover, the mixed objectives of the program, which included a political objective of satisfying the Labor Unions by allowing them a share of economic benefits, led to a governance structure with weak performance incentives and lots of agency costs. Cumming and Macintosh (2003, 2006) find evidence that the impressive mobilization of supply of VC funds through the LSVCC program has crowded out other VC funds that may not have suffered from the same inefficiencies and may thus have produced higher returns.

Other more subtle routes to market distortion may include setting restrictions on the investment decisions of the VC fund management, which increases the risk and the likelihood of commercial failure. Example of such restrictions are stipulating certain geographical areas for investment, as was the case in India in the 1980s and early 1990s, where the first VC firms were mandated to invest in their states and most of them were not successful (Dossani and Kenney 2002). In many cases, the policy makers have positive intentions behind these rules, such as trying to be fair in distributing support among regions, but they end up restricting the freedom of VCs and entrepreneurs so they backfire (Sunley et. al. 2005; Lerner 2009; Nightengale et. al. 2009). Empirical evidence shows that focus, building critical mass and clustering turn out to be more effective in fostering entrepreneurship and VC. The failure of regional targeting has been repeatedly documented in the literature and in practice (Mason and Harrison, 2002; Dossani and Kenney, 2002; Lerner, Schoar and Wongsunwai 2007; Nightengale et. al. 2009).

This also goes for national targeting. Studies of successful experiences with government supported VC funds repeatedly cite the encouragement of internationalization as a key success pattern, whether in the attraction of VC investors or in locating investee companies. The successful Yozma program of Israel was designed deliberately to attract foreign VCs and to forge local-international partnerships for building local talent and experience (Avnimelech and Teubal 2004). In this respect, an important success pattern entails making information available to international investors about the entrepreneurial environment in the country and the returns to previous investments; to local entrepreneurs about the expectations and standards of global VC investors; and to policy makers about the nature of this industry (Lerner, 2010). Furthermore, venture-backed companies that achieved success in Israel went public on the U.S. markets as an exit mechanism (Avnimelech, Rosiello and Teubal 2010). In Brazil, American VCs are the second largest group of VC suppliers after native VCs (Ribeiro and Carvalho 2008).

Government programs to support VC often fail to achieve their objectives due to incompetence, misconstrued incentives, political favoritism or organized capture of government subsidies (Lerner 2009). To avoid these pitfalls, successful government programs need to be designed with clear and specific objectives to start with (Pierrakis and Westlake 2009). Periodic monitoring and evaluation of policies and programs is necessary to ensure their effectiveness and should be the basis for decisions to continue or terminate a program (McGlue 2002). The problem with government initiatives all too often is that vested interests coalesce to fight the termination of such programs even when they are failing. ‘Defining and adhering to clear strategies and procedures for venture initiatives, creating a firewall between elected officials and program administrators, and careful assessments of the program can help limit self-serving behavior.’ (Lerner 2010, 263)

There is a need for policy makers and scholars to adopt a systemic view and an evolutionary perspective in looking at public policy for VC. As far as a systemic perspective is concerned, the various elements of public policy are examined to ensure their separate objectives are met effectively in addition to looking at the totality of policies as a systemic whole and examining the linkages to ensure positive reinforcement among the parts. ‘If the practices, incentives and priorities are optimal at the level of individual organizations while the overall innovative performance of the system is sub-optimal, a systemic failure is said to be present’ (Salmenkaita and Salo 2002, 188). In VC public policy, the importance of the systemic view is reflected in the integration of demand and supply side perspectives. Paying attention to factors that enable entrepreneurs to succeed, other than capital, such as legal, marketing and business strategy issues is a key success pattern that results from taking a systemic perspective. For example, research on Europe indicates that as a whole, VC was not in short supply in the late 1990s and early 2000s, but the problem rather was a shortage of good projects to fund (Da Rin, Nicodano, and Sembenelli 2006). However, research on France indicates that this country experienced a different scenario during the same time period and there was a real shortage in the supply of venture capital, which required policies to stimulate it (Dubocage and Rivaud-Danset 2002).

Furthermore, a systemic view entails that policy makers monitor closely the dynamics of the VC industry and target policy interventions to address market gaps. Lerner (2002a) documents examples of U.S. government initiatives that have had a tendency to ride the VC wave and direct investments to areas of technology that were considered ‘hot’ by VCs and already attracting too much VC investment. Lerner also documents, in the same study, examples of government interventions that took note of such biases in the supply of VC capital, and directed government support to promising companies in technology areas that were not creating VC hype (Lerner 2002a). The latter is the kind of systemic policy intervention that governments are looked upon to provide. Beyond considering both demand and supply of VC, adopting a systemic view also means fostering links and feedback mechanisms through various parts of the system. This is relevant in regional considerations in government policy. As explained earlier, it pays to concentrate government support in areas that have vibrant entrepreneurial ecosystems. However, some links with regions that have lower entrepreneurial and VC concentrations will allow commercially promising

investors/entrepreneurs from those regions to access a matching investee/investor from active regions. Another aspect that highlights the importance of linkages in the system is the issue of the equity gap. Detailed field research has identified equity gaps in specific investment tranches (an example is Harding [2000] in her report on English VC). Linking the investors of the various investment tiers, namely seed/startup, growth/expansion and MBO/MBI tiers, will ensure that companies will find investors as they grow from one tier to the next. This will also help governments target their support funds and policy initiatives to where it is most needed rather than directing support to where it exacerbates the existing equity gaps (Harding 2000). In addition to the systemic view, an evolutionary perspective is also vital.

Examining the stages of development of a vibrant VC sector is an important lens to adopt, from initial conditions and pre-emergence to emergence and beyond. The issue of path dependency needs to be seriously factored into any policy analysis and recommendation. Each country has its own unique history, resources and conditions that will be different from the history, resources and conditions of exemplar countries, such as the U.S. (Guilhon and Montchaud 2006; Nightengale et.al. 2009). Policy design needs to be tailored to these idiosyncrasies if they are to be helpful. Moreover, policy makers need to understand the unique features of the VC industry and adopt a suitable time frame when evaluating policy initiatives. The VC process takes years and therefore judging a program prematurely for not seeing tangible results after a few years indicates a lack of understanding of the VC investment process and the dynamics of building a VC industry (Lerner 2002b; Lerner, Moore, and Shepherd 2005).

CONCLUDING COMMENTS

This literature review has presented an integrated framework for the content of public policies and programs utilized to promote an active VC industry and the corresponding entrepreneurial sector. Figure (1) shows the elements of the framework and their interconnections. The paper has distilled the framework through a comprehensive and in-depth review of the literature of public policy for venture capital. Public policies to enhance the demand for VC have been surveyed and include the stimulation of an entrepreneurial ecosystem, an optimization of investment laws and regulations that are relevant to the limited partnership legal form, and the use of government venture capital to jumpstart early stage investments and plug the financing gap. These demand side policies are augmented by various supply side mechanisms including the availing of exit mechanisms of venture capitalists through the development of secondary stock markets, taxation policies and government fund-of-funds. Patterns of success and failure gleaned from empirical studies on various countries reflect the importance of treating these policy elements as an integrated and mutually reinforcing system that is tailored to the specific context and history of a country. Among the study's limitations is the general level of analysis that overlooks the nuances and contextual particularities of specific countries, which has been necessary to provide a general and comprehensive framework. For future research, it would be fruitful to scrutinize the linkages between the various elements of the framework using a systems methodology and to test the interplay of relations between the different elements.

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