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Institutions and Venture Capital

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ABSTRACT

We survey the literature on venture capital and institutions and present a case study comparing the development of the venture capital market in the US to Sweden. Our literature survey underscores that the legal environment, financial market development, the tax system, labor market regulations, and public spending on research and development correlates with venture capital activities across countries. Our case study suggests these institutional differences led to the later development of an active venture capital market in Sweden compared to the US. In particular, a later development of financial markets and a heavier tax burden for entrepreneurs have played a key role.

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1 Introduction

During recent years we have seen an increase in initiatives by governments around the world towards encouraging entrepreneurship in order to spur growth and job creation. A part of these efforts have been oriented towards trying to generate an active venture capital market: either through direct participation in the form of government venture capital programs or through indirect efforts aimed at creating the right institutional environment.

In this paper, we provide a review of the academic literature on institutions and venture capital to get a sense of which institutions correlate with an active venture capital market. We also provide a case study in which we detail and contrast how venture capital markets have developed in the US and in Sweden.

Our survey reveals that institutions matter. An extensive literature in economics and finance on venture capital and institutions exists that stretches back to the 1980s. This literature has underscored the importance of the legal environment, financial market development, the tax system, labor market regulations, and public spending on research and development. Our case study comparing the historical development of venture capital markets in the US to Sweden supports this literature. Later development of venture capital markets in Sweden compared to the US can be related to differences in financial market development and tax policy, but labor market regulations, public R&D spending and technology transfer policies have also played a role. In Sweden, the government has played a more prominent role than in the US. Financial market liberalization and active government policies towards supporting the venture capital market has likely contributed towards the fact that during the last two decades the Swedish venture capital market has taken off and become one of the top ten most active in the world (as measured by investments relative to GDP).

The next section discusses the role of venture capital firms in the economy and why supporting them, through developing a good institutional environment, matters. Section three provides an overview of the academic literature on venture capital and institutions, and in section four we contrast and compare the institutional environment in the US and Sweden. We end with a discussion on unanswered questions in section five.

2 The role of venture capital in the economy

An active venture capital market can boost economic growth.¹ Economic growth is driven by innovation, spearheaded by young entrepreneurial firms where financing of these firms can be hard because of moral hazard and asymmetric information. Venture capitalists specialize at solving these problems, thereby connecting idea-rich entrepreneurs with cash-rich investors. Ensuring funding for innovative firms has positive externalities on the economy, so it makes sense for governments to promote an active venture capital market.

The argument for supporting the venture capital markets starts with standard macroeconomic theory: to produce output, capital and labor needs to be available. How capital and labor is combined is central to how much output is produced. To increase output given the inputs, productivity needs to increase through innovations.² Innovations are often brought to the market and dissipated through the economy by young entrepreneurial firms. Acs and Audretsch (1988) show that small firms contributed almost half of the innovation in their sample, but that there was considerable heterogeneity across industries: small firms tended to be more important in less concentrated immature industries. New smaller firms also choose more risky product introduction strategies compared to more established firms (Aron and Lazear, 1990). They fail more often, but they also successfully bring riskier high impact innovations to the market more often.

Young entrepreneurial firms with risky product introduction strategies may have trouble raising funding from equity investors and banks because of two imperfections in capital markets. The first one is moral hazard (or agency problems, see Jensen and Meckling, 1976). Conflicts of interest between entrepreneurs and investors limit the ability of young firms to raise equity funding: the entrepreneur faces excessive incentives to spend the firm's money since he or she does not bear the full cost of the expenditure. Debt financing from banks may not be available either, because the entrepreneur has incentives to take on excessive risk from the banks perspective. He or she benefits if the firm is successful, while the bank stands to lose if the firm fails. The second imperfection is asymmetric information. Equity investors fear that entrepreneurs would only issue equity when the firm is overvalued (Akerlof 1970; Myers and Majluf, 1984; Greenwald, Stiglitz and Weiss, 1984). Bank financing might not be

¹ See Lerner (2009) for an expanded discussion of this issue.

² See the foundational theoretical work by Solow (1956) and Romer (1986, 1990). For a survey on the link between entrepreneurship, innovation and growth, see Carree and Thurik (2010) and Braunerhjelm (2011).

available either, as banks fear that for given interest rates, only high risk entrepreneurs would apply for loans (Stiglitz and Weiss, 1981).

Venture capital firms are experts at solving problems of moral hazard and asymmetric information and thereby earn their keep by bridging the gap between financiers and entrepreneurs. They employ detailed screening processes to generate information about the firm and the entrepreneur (Chan 1983), they make use of financial contracts such as requiring preferred stock and imposing restrictive covenants (Kaplan and Strömberg, 2004), they stage funding (Admati and Pfleider 1994), and they demand seats on the board to be able to closely monitor the entrepreneur and provide advice on the development of the firm (Cornelli and Yosha, 2003; Hellmann, 1998). Moreover, temporary ownership by venture capital firms give strong incentives to invest in developing the entrepreneurial firm because eventual buyers are willing to pay both to obtain the developed firm and to prevent rivals from obtaining it (Norbäck and Persson, 2009).

Evidence suggests that venture capital funding is particularly helpful for innovative firms. Hellman and Puri (2000) used a sample of entrepreneurial firms in Silicon Valley, gathered between 1994 and 1997, and divided them into innovator firms (that are the first to introduce new products in the market) and imitator firms (firms that also introduce new products, but are not first movers into a market). Using this data, they showed that innovator firms are more likely to obtain venture capital financing compared to imitator firms. Evidence of a connection between innovation and venture capital investments also exist at the industry level. Kortum and Lerner (2000) used a policy change in the late 1970s to study how an inflow of capital to the venture capital industry affected industry level patenting activities. They showed that a dollar of venture capital seems to be on average three to four times more potent in increasing patenting than a dollar of traditional corporate research. They also found that patents from venture backed firms are more frequently cited by other patents than patents by non-venture backed firms.

Thus, a healthy venture capital market can spur economic growth through helping innovative entrepreneurial firms find funding. But simply allowing venture capital firms to emerge may not be enough. Their activities are associated with significant positive externalities in the economy. First, there is an inherent virtuous cycle in venture capital activities. Once a critical level of activities has been established, it is much easier to keep the industry going and growing. Structures and experience have been established, peers and intermediaries such as

lawyers and accountants are available, and investors and entrepreneurs have obtained experience with, and confidence in, how the industry works. At the start, a venture capital market might require help getting off the ground. Second, research and innovation activities have spillovers on the rest of the economy. Griliches (1992) found that the gap between the private and social rate of return on research activities is likely to be between 50 to 100 percent of the private return. Thus, venture capital firms may not internalize the effect they have on the economy as a whole. This suggests that an active government policy to promote venture capital activities is warranted, and that creating the right institutional environment matters.

3 A survey of the academic literature

An extensive literature in economics and finance on venture capital and institutions exists, that stretches back to the 1980s. This literature has found that the institutional environment indeed correlates with local venture capital activities. In particular, the legal environment, financial market development, the tax system, labor market regulations, and public spending on research and development seem to matter.

3.1 The legal environment

The legal environment in a country matters for venture capital activities because it affects the extent to which efficient contracts between venture capitalists and entrepreneurs can be written and enforced.³ This has implications for how entrepreneurs are compensated, how they are screened and monitored, and for their, and the venture capitalists', effort provision.

Evidence that the legal environment affects contract complexity is given in Lerner and Shoar (2005), who studied 210 investments by private equity firms made in developing countries. They found a clear correlation between the legal environment and the contractual use of convertible preferred stock with covenants. When the legal environment is weak and contracts are hard to enforce, private equity firms tended to rely more on direct ownership stakes in firms rather than using more complex contracts, such as using convertible preferred stock. Moreover, they found that investments in firms operating in weak legal environments tended to have lower returns and valuations. This latter finding, that the legal environment can affect

³ Seminal work on the connection between legal systems and financial markets was done by La Porta, Lopez-de-silanes, Shleifer and Vishny (1997, 1998, 2000).

the success of investments, is also documented in Hazarika, Nahata and Tandon (2009) for a larger sample of investments in a broader set of countries.

But the legal environment may also affect other aspects of the venture capital investment process. Cumming, Schmidt and Walz (2010) study a sample of 3 848 venture capital investments across 39 countries between 1971 and 2003 and find that a better legal environment leads to faster deal screening and that it facilitates board representation in the entrepreneurial firm. Deal screening is slowed down by a weak legal environment because writing enforceable contracts is harder and dealing with slow bureaucracies takes time. Board representation is facilitated in better legal environments because the legal environment enhances the marginal benefit of monitoring as better information regarding the firms' activities is available to the board.⁴

Effort provision by venture capital firms and entrepreneurs may also be affected by the legal environment. Bottazzi, Da Rin, and Hellman (2009) argue that venture capitalists should have stronger incentives to give non-contractible support to entrepreneurs, and to invest in developing capabilities for providing this support, if the legal environment is strong. The reason is that a good legal environment ensures that providing and investing in support activities pays off for the venture capitalists. They find support for these predictions in a sample of 1 431 venture capital deals across 17 European countries between 1998 and 2001.

However, small differences in the legal environment may not matter much, and may be dwarfed by differences in experience of the venture capital firms. Studying venture capital investments in Europe, Kaplan, Martel and Strömberg (2007) find that there appears to be learning involved in the use of complex contracts: venture capital firms tend to use contract terms similar to those used in their home countries, but more experienced venture capitalists use US style contracts independently of the legal environment. In their sample, the effect of experience dwarfs the impact of the legal environment on contracting terms.

3.2 Financial market development

Financial market development matters because a developed stock market provides good exit opportunities for venture capital firms. Additionally, fewer restrictions on the investment

⁴ Moreover, Armour and Cumming (2006), using a sample of venture capital investments covering 15 countries and 14 years, point out that the legal environment in terms of liberal bankruptcy laws could stimulate demand from entrepreneurs for venture capital.

activities of public pension funds can boost the venture capital sector through infusions of cash.

The exit is crucial for venture capital firms as the skills and funds they provide have the greatest impact in the early stages of an innovative firm's lifecycle (Black and Gilson 1998). Once a firm matures, it becomes easier to attract financing from equity investors or banks. At this point, the capital and skills venture capital firms provide can be better deployed elsewhere. If a local stock market is well developed, the venture capitalists can arrange an initial public offering through which their equity stake is liquidated. The presence of well-developed stock markets will then boost the effect of an active venture capital market on innovation and growth, because holding periods are shortened, and more young and innovative firms are able to benefit from the skills and capital venture capitalists provide (Micchelacci and Suarez 2004).

An initial public offering offers two additional benefits (Black and Gilson, 1998). First, listing on a stock exchange gives the entrepreneur, who has received the investment from the venture capital firm, the ability to regain control of the firm, because the control rights awarded to venture capitalists expire. The ability to regain control of the firm, in the case of success and listing, gives the entrepreneur a strong incentive to exert effort. If financing comes from banks or equity investors, who are not required to exit their investments, control rights will be retained if the entrepreneurial firm is successful. Second, listing the firm helps venture capitalists signal their ability to future investors and thus makes it easier for them to raise further funds. Investors also benefit from a listing since it helps them better choose where to direct their future funds: from less successful venture capital firms to more successful venture capital firms. Black and Gilson (1998) illustrates the importance of developed stock markets by comparing venture capital markets in the US, UK, Japan and Germany, while Jeng and Wells (2000) empirically show that venture investing is more intense in countries that have more initial public offerings (IPOs)

In addition to well-developed stock markets, deregulation of investment activities by public pension funds has the potential to boost venture capital activities in a county by increasing the cash available for venture capital firms to invest. As Gompers and Lerner (2001) argue, the US venture capital market benefitted greatly from a large inflow of funds after the US Department of Labor allowed pension fund managers to invest into venture capital funds.

3.3 The tax system

The tax system in a country affects venture capital activities through affecting entry into entrepreneurship, the demand for venture capital investments, and contracting between venture capitalists and entrepreneurs.

An extensive literature exists on the relation between taxation and entry into entrepreneurship.⁵ For example, several authors have empirically demonstrated that taxation correlates negatively with entry into entrepreneurship. Gentry and Hubbard (2000) show that a progressive income taxation reduces entrepreneurial entry, because increased progressivity acts as a "success tax" that taxes successful ventures at very high rates. Djankov, Ganser, McLiesh and Ramalho (2010) find support that excessive corporate taxes affects not only the investments of mature firms, but affects entrepreneurship through diminishing the gains from starting a new business, as expected profits when the firm matures are lower.

In a series of theoretical articles on entrepreneurship, taxation and venture capital, Keuschnigg and Nielsen (2003; 2004) point out that high wage taxes could actually increase the supply of entrepreneurs. This is a general equilibrium effect, as higher wage taxes discourage employment and encourage entrepreneurship, if income from entrepreneurship is mostly capital gains income. Capital gains taxes, on the other hand, hinder the development of venture capital activities by reducing the returns entrepreneurs and venture capitalists earn if the project is successful. This lowers incentives for entrepreneurs to exert effort and venture capitalists' incentives to provide support.⁶

Capital gains taxation also affects the demand for venture capital. Gompers and Lerner (1998) show that decreases in capital gains taxes in the US lead to increases in committed capital to venture capital funds, due to an increased demand for venture capital investments by entrepreneurs (the tax changes affect similarly both taxable and non-taxable investors).

Finally, the tax system can also affect the way entrepreneurs are compensated. Cumming (2005) studies venture capital contracts and capital gains taxation in Canada, and found that decreases in capital gains taxes correlate with increases in the use of convertible preferred equity, indicating that reductions in capital gains taxes eases restrictions on what types of

⁵ See, for example, the papers cited in Henrekson and Sanandaji (forthcoming) and Cullen and Gordon (2007).

⁶ For an analysis of the effects of imposing Swedish taxes and tax legislation on entrepreneurship in the US, see Cullen and Gordon (2006).

contracts venture capitalists can write with entrepreneurs (see also Poterba (1989a,b), who also underscore the role of capital gains taxes in venture capital investing).

3.4 Labor market regulations

Labor market regulations affect venture capital markets through affecting the supply of entrepreneurial firms in need of financing. Labor market regulations come in various forms, but they all have the common element that they increase the expected costs of starting and growing a firm, and thereby raise the barrier to entrepreneurship.⁷

First, employment protection laws make it hard for firms to lay off workers, meaning that they are reluctant to grow and hire workers in the first place. Strong employment protection laws also mean that workers pondering on becoming entrepreneurs give up a high level of income security and seniority benefits at their current workplace, making the option of becoming an entrepreneur less desirable.⁸ Second, minimum wage laws and collective wage setting directly raise the costs of hiring workers and expanding the business. Third, social insurance systems in a country also impose additional wage costs as they require firms to pay social security taxes and provide social security benefits to workers.

Evidence suggests that these labor market regulations are much more harmful for sectors in which employment volatility is high. Micco and Pagés-Serra (2008) show that employment protection reduces the size of sectors characterized by high intrinsic labor volatility, and Cuñat and Melitz (2007) show that countries with less flexible labor market policies tend to specialize (in terms of international trade) in sectors with low labor volatility.

But sectors with high labor volatility are also those sectors in which venture capital firms thrive since they specialize in dealing with situations of high risk and high information asymmetries. Fallick, Fleischman, and Rebitzer (2006) show that job hopping is extremely high in Silicon Valley, as it facilitates the reallocation of talent to firms with superior innovations. Bozkaya and Kerr (2011) document that labor volatility tends to be higher in venture capital backed firms in Europe than in similar non-venture backed firms. Data from the global entrepreneurship monitor shows a clear negative correlation between stickiness of

⁷ For a formal argument of the connection between startup costs in entrepreneurship and employment, see Fonseca, Lopez-Garcia and Pissarides (2001).

⁸ See Skedinger (2010) for an overview of the effects of employment protection legislations.

labor protections and the share of population involved in high-growth expectation early stage entrepreneurship (Bosma and Levie, 2010).⁹

Consistent with these arguments, Jeng and Wells (2001) finds a negative correlation between labor market regulations and venture capital activities in their study of venture capital investments between 1986 and 1995 in 21 countries, with the largest negative effect on early stage investments. Using much more recent data, Bozkaya and Kerr (2011) show empirically that strong employment protection regulation has inhibited venture capital market growth between 1990 and 2008 in Europe and, in particular, in sectors with higher labor volatility. However, they also show that the effects of labor market regulations differ greatly depending on the type of worker insurance provided. Separating between employment protection regulations and labor market expenditures (such as unemployment benefits) they show that the type of regulation matters more than the level of regulation: countries who relied more on labor market expenditures to provide worker insurance developed much stronger venture capital markets than countries who had a greater emphasis on employment protection regulations.

3.5 Public R&D spending, IPR and technology transfer

The institutional environment in terms of public spending on research and development, the intellectual property rights regime, and the laws governing technology transfer can matter for the development of local venture capital markets.

Public R&D spending can be divided into spending on basic university research and military R&D spending. Both types of spending matter because they generate innovations that could have commercial potential. Wilson (1983) argued that military spending mattered for the development of venture capital markets in the US. Indeed, the first US venture capital firm was founded to help commercialize military inventions. Aizenman and Kendall (2008) find evidence of a positive correlation between military spending in a country and an inflow of venture capital investment activities. Da Rin *et al.*(2006) studied 14 European countries between 1988 and 2001, and found a correlation between public R&D spending and venture capital activities in the aggregate. This is consistent with Gompers and Lerner (1998), who found a positive link between academic R&D and US state-level venture capital activity both in terms of amount invested and number of investments made.

⁹ For a survey on the connection between high growth firms and tax/labor market policies, see Henrekson, Johansson and Stenkula (2010).

But for inventions generated by public spending on research and development to easily be commercialized, intellectual property rights protection and a good system of technology transfers need to be in place.¹⁰ An extensive literature on academic entrepreneurship has documented the importance of formal patents for the commercialization of research at universities.¹¹ For example, Baldini, Grimaldi and Sobrero (2006) find that patenting at Italian universities increases substantially when a university implements internal intellectual property rights regulations. Ueda (2004) argues that good IPR protection assures entrepreneurs that venture capitalists will not steal their ideas, and entrepreneurs are therefore more comfortable with bringing in their help. When intellectual property rights protection is weak, entrepreneurs choose bank financing to avoid having to reveal critical information to venture capitalists. Mann and Sager (2007) found, for a sample of software startup firms, that patenting activities positively correlate with firm performance as measured by total investment and number of rounds of investments by venture capital firms, the exit status and how much late stage financing is obtained.¹²

The importance of venture capital for university research lies in that researchers and venture capitalists complement each other. That innovation and growth requires both researchers, who provide ideas, and entrepreneurs, who commercialize them, is underscored by Michelacci (2003). The authors formally argue that resources need to be allocated both to researchers and to entrepreneurs to ensure that growth is maximized. As Samila and Sorenson (2010) show for a sample of metropolitan areas in the US, the correlation between research grants to universities and the rates of patenting and firm formation in a region strengthens when the venture capital firms are more active in that region. Ortin-Angel and Ventgrell-Herrero (2010) show that university spinoffs are more likely to receive venture capital than other technological startups. Using survey evidence, they explain this finding by the fact that academic entrepreneurs very often lack the managerial skills needed to commercialize innovations—skills that venture capital firms are particularly good at providing. The presence of university support in terms of connecting researchers with venture capitalists can thus be

¹⁰ For recent empirical work on the relation between IPR and commercialization decisions, see e.g. Dechenaux, Goldfarb, Shane and Thursby (2008) and the references therein. The IPR environment may also affect the commercialization strategy of the entrepreneur in terms of affecting whether the idea is developed independently or sold to an established incumbent firm (see Gans and Persson (2013)).

¹¹ Rothaermel, Agung and Jiang (2007) provide an extensive survey.

¹² The allocation of ownership of inventions funded by public spending on research and development can also play a crucial role for incentives for entrepreneurship and commercialization decisions of entrepreneurs. Färnstrand Damsgaard and Thursby (2013) compare the institutional environment in Sweden to that of the US and analyze the difference between giving the university ownership of the invention (US) or giving the faculty the ownership (Sweden).

crucial, given that sufficient intellectual property rights protection exists. Hellmann (2007) develops a theoretical model showing that stronger IPR protection allows researchers to delegate the work of finding a commercialization partner to the technology transfer office, thereby allowing researchers to focus more on their research.

3.6 Putting the pieces together: the empirical cross-country evidence

Surveying the empirical cross-country literature on the correlation between the above mentioned institutions and venture capital activities emphasizes how institutions matter for the development of local venture capital markets.¹³

Jeng and Wells (2000) examine venture capital investments between 1986 and 1995 in 21 countries and underscore that stock market development in terms of number of IPOs correlate strongly with active venture capital activities. They also find that labor market rigidities tend to affect early stage venture capital investments, but not later stage investments, and that IPO activity mainly affects later stage investments but not early stage investments.

Da Rin *et al.* (2006) study 14 European countries between 1988 and 2001 and find that the opening of stock markets for small firms, reductions in corporate capital gains tax rates, and reductions in labor market regulations correlate strongly with the share of high tech and/or early stage venture capital investments. Public R&D spending seems to matter less and they find no evidence of a shortage of supply of funds to venture capital firms.

Lerner, Sorensen and Strömberg (2009), studying a sample of private equity and venture capital investments world-wide between 1990 and 2008, find strong indications that equity market development and protection of minority shareholder rights matter for venture capital firms. They do not, however, find any relation between venture capital investments and labor market rigidities, barriers to entrepreneurship, or the tax rate for the highest bracket of corporate income.

Taking a different perspective, Aizenman and Kendall (2008) examine the flows of international venture capital investments as opposed to investments in a given country. For a sample of some 100 countries from 1992 to 2007 they find that better business environments,

¹³ See also Black and Gibson (1998) and Mayer, Schoors and Yafeh (2005) for studies comparing a smaller set of countries. Lerner and Shoar (2005), Kaplan *et al.* (2007), Cumming, Fleming, and Schwienbacher (2006) and Hazarika *et al.* (2009) study only how the legal environment affects venture capital activities. Lerner and Shoar (2005) found that it matters for contracting terms, Kaplan *et al.* (2007) found that experience with contracting seems to be more important than the legal environment, and Cumming *et al.* (2006) and Hazarika *et al.* (2009) found that the legal environment and stock market development matters for the success of venture capital investments.

the presence of high-end human capital (as measured by the number of university students per 1000 population), higher levels of military spending, and deeper financial markets matter for attracting international venture capital investments. They also point out that the share deal volume that involves cross-border deals has grown greatly from 15% in the early 1990s to around 40% in 2007. Up to three quarters of all deals in Europe and Asia involve cross-border investments, while only one quarter of US deals involve international investors.

4 The development of venture capital markets in the US and Sweden

The academic literature thus reveals that the institutional environment correlates with venture capital activities. In this section, we will take a more detailed look at how the institutional environment affects the development of local venture capital markets, by comparing the development of venture capital markets in the US to Sweden. We find that key institutional differences are consistent with a more sluggish development of a venture capital market in Sweden. In particular, later development of well-functioning stock markets and unfavorable tax policies likely delayed development in Sweden. Additionally, stricter labor market regulations and technology transfer policies could also have played a role.

4.1 Historical developments

The venture capital market developed much later in Sweden than in the US. Though the venture capital industry in both countries received government support, the Swedish venture capital market was supported by government initiatives to a greater extent than the US market.

The venture capital industry started in the US in 1946 when MIT president Karl Compton, General Georges Doriot and a set of business leaders established American Research and Development as a closed end publicly listed fund (Gompers and Lerner, 2001). The idea of American Research and Development was to invest in firms that commercialized technology developed for World War II by the US military. In the years that followed, several similar firms emerged and the first venture capital limited partnership formed in 1958.

The government became involved in supporting the venture capital market in the 1960s when the Small Business Investment Company (SBIC) initiative was launched. The SBICs were federally chartered risk capital pools. When private investors had been found for investment through SBICs, the government matched the private funds or provided loan guarantees. While initially heavily used, they were poorly designed and most of them collapsed. During the

1970s and the 1980s venture capital activities increased in the US. The economy was doing well and a change in rules for pension funds in 1979 allowed them to invest in venture capital, which contributed to the increase of the share of funds committed to venture capital by pension funds, from 15 percent in 1978 to 50 percent in 1986.

Overall venture capital activities declined when the economy slowed towards the end of the 1980s and the beginning of the 1990s (Figure 1 displays real GDP growth for the US and Sweden). Compared to the latter half of the 1980s, commitments to venture capital funds for the first half of the 1990s were roughly halved (Gompers and Lerner, 2001). But this changed during the latter half of the 1990s. Commitments grew eightfold compared to the first half of the 1990s, partly a response to several high profile IPOs generating impressive returns to investors (Gompers and Lerner, 2001). Furthermore, corporations also became increasingly interested in investing and partnering with venture capital firms as a complement to their own internal R&D.

During this era, information technology industries received a large share of all venture capital investments (up to a full 60% in 1999). Among others, venture capital firms invested in firms such as Apple, Microsoft, Cisco and Sun Microsystems. Figure 2 displays capital under management between 1980 and 2010 as a share of GDP and clearly shows the increase in capital committed to venture capital funds during the late 1990s.

After the IT boom ended and the stock market crashed in 2001, several venture capital firms were hit hard and perished. As Figure 3 illustrates, the number of transactions dropped from around 5 000 in 2000 to around 1 600 in 2003 (a drop of almost 70%).¹⁴ However, the market rebounded shortly after and has stabilized to around 3000 transactions yearly. This decade was also marked by a drastic increase in the internationalization of the US venture capital industry, which prior to the 1990s was mainly a US industry. Aizenman and Kendall (2008) show that the proportion of worldwide deal volume, in their sample of over 100 countries that involved cross-border deals, grew from 15% in the early 1990s to over 40% in 2007. According to their data, the US has consistently been the world's largest net exporter of venture capital.

A large recipient of these venture capital flows has been Sweden. Historically though, the venture capital industry, in Sweden, took off several decades later than in the US. Whereas

¹⁴ Information on transactions in Figure 3 comes from the Capital IQ database. A transaction is an investment made by a venture capital firm independently of the size of that investment.

the first US venture firms were private initiatives, in Sweden the government was heavily involved from the start. In 1973 the first Swedish venture capital firm, Företagskapital, was set up through a partnership between the Swedish government and several Swedish banks (Herzog 1990; Isaksson and Cornelius, 1998). This led to several other firms being started towards the end of the 1970s and the beginning of the 1980s, most of which were government initiatives directed toward supporting small firms in various regions in Sweden (Isaksson 2006). It was not until 1983 that the first institutional investment into a Swedish private venture capital fund took place (Söderblom, 2011).

The government initiatives to jump start the venture capital market were part of a general reform of the Swedish financial system from a heavily regulated bank-based system, to a more lightly regulated market-based system (Englund 1990). At the peak in 1986-87, the Swedish government provided roughly 42% of the funds under management by slightly more than 20 venture capital firms (Herzog 1990; Isaksson and Cornelius, 1998; Isaksson 2006). In 1990 the Swedish economy went into sharp decline with real GDP growth remaining negative up until 1993, much longer than in the US (Figure 1). As Hyytinen and Pajarinen (2001) notes, this decline was due to insufficient monitoring by banks and inadequate public policies (i.e., no efforts to constrain aggressive lending) and was triggered by a general decline in exports in the beginning of the 1990s. When the economy tanked, the venture capital industry was hit hard. Returns were dismal and the supply of capital from investors stopped flowing (Herzog, 1990; Isaksson, 2006). According to Isaksson (2006), the number of venture capital firms dropped to around 10 in 1991 from the peak of over 20 in 1986.

However, as in the US, the 1990s saw a marked increase in venture capital activities. In Sweden, this was the decade in which the private venture capital industry became firmly established. As Figure 2 shows, capital under management as a share of GDP increased continuously during the decade. This derived from a better performing economy, increases in private savings and government initiatives including allocating part of the funds in the Swedish National Pension Fund to venture capital investments. The venture capital market continued to boom right up until the stock market crash in 2001, with the number of active venture capital firms reaching 160 in the year 2000. Activity was intense during the latter part of the 1990s. During 1998-2000, almost three times as many venture capital funds were founded and these were triple in size on average in comparison to the period 1983-1997 (Söderblom, 2011). Intense competition between newly established venture capital firms for companies to invest in drove Swedish venture capital firms to invest in progressively earlier

stages in the run-up to the crash in 2001. Not surprisingly, the stock market crash in 2001 led to the disappearance of many inexperienced and newly founded venture capital firms. From a peak of 160 local venture capital firms in 2001, only 80 were left in 2006 (Isaksson, 2006). The initial drop in the number of transactions undertaken was around 60% (from around 100 in 2000 to around 40 in 2002); but as in the US, the industry did recover after 2005, with the number of transactions even exceeding the peak in 2001 (though not in terms of total transaction value).

Despite the excesses of the 1990s and the extensive crash in 2001, the two decades around the turn of the millennium succeeded in firmly establishing a healthy venture capital market in Sweden. Figure 4 displays venture capital investments in 2010 as a share of GDP, revealing that Sweden is in sixth place with investments corresponding to 0.07% of GDP while the US is in second place with investments corresponding to 0.20% of GDP. While the gap is still large in a worldwide comparison, Sweden has the most sizeable venture capital market among European countries. Part of the explanation behind the high share of investments to GDP is that Sweden has become an attractive destination for cross-border venture capital investments. According to Aizenman and Kendall (2008), for the period 2003 to 2007 the second largest net importer of venture capital in the world was Sweden, with the largest net exporter being the US.

4.2 Financial market development

In explaining the late development of venture capital markets in Sweden compared to the US, financial market development appears to have played an important role for two reasons. First, Sweden has historically had a bank centered financial system as opposed to a stock market centered system. It was not until the 1980s that financial markets were deregulated and the stock market was allowed to develop. Second, regulations regarding the use of public pension fund money much later allowed investments in venture capital in Sweden (in 1996) compared to in the US (in 1979).

On the first point, it is clear that the pace of financial market liberalization in the US and Sweden has differed. Rajan and Zingales (2003) present evidence that financial market development across the world over the last century first declined and then rose again. This holds true for both the US and for Sweden, though the regulation of financial markets in Sweden went much further than in the US. This likely contributed to the late development of a local venture capital market in Sweden (in the 1970s, compared to the 1940s in the US). The

1960s and the 1970s in Sweden entailed low valuation of listed companies, depressed stock market activity and few IPOs (Henrekson and Jakobsson, forthcoming). In the US, things looked different with a much more active stock market and deregulated financial market. Figure 5 displays the number of IPOs in the US and in Sweden weighted by real GDP and illustrates that the US had IPO booms both in the early and the late 1960s, while the first IPO boom did not occur in Sweden until the 1980s.

The boom in the 1980s was triggered by a policy shift in the political climate towards the right and a deregulation of financial markets both nationally and internationally. This included the creation of a market for the trade of small firm shares (the “over-the-counter” market), which was set up by the government in 1982 (Isaksson 2006). The deregulation of the financial markets and the IPO boom significantly improved the exit market for venture capitalists and allowed the industry to develop, by fueling the surge in capital under management of Swedish venture capital firms towards the end of the 1980s (Figure 2). When the Swedish economy began to recover from the deep crisis in early 1990s, capital under management for venture capital funds increased dramatically. This was likely driven by frequent IPOs and an inflow of capital from public pension funds.

This brings us to the second point; the time it took for pension funds in Sweden to be allowed to invest in venture capital. In the US, a deregulation of the use of public pension funds took place in 1978. The US Employment Retirement Income Security Act (ERISA) regulates investment, risk management and administration policies of defined benefit and defined contribution employee benefit plans. As Baygan (2003) notes, traditionally most OECD countries had imposed strong restrictions on the riskiness of investments made by pension funds, rendering venture capital investments infeasible. The change in 1978 involved revising the “prudent man rule”, allowing pension funds to invest in new companies and in venture capital funds as a part of their portfolio. Also, in Sweden, public pension funds had historically been barred from investing in venture capital. This was changed in 1996 when the 6th AP-fund (a public pension fund) was setup specifically to invest in small growing firms and venture capital funds. The fund was given an initial sum of 10.4 billion SEK, which was large in comparison to the 17 billion SEK under management by private Swedish venture capital funds at the time. Despite the stock market crash of 2001, the 6th AP fund has been quite successful: it has generated a 3.4% real annual return between 1996 and 2010.

4.3 Tax policy

Apart from the later development of financial markets, Sweden has historically had a stricter tax policy than the US. This has likely impacted venture capital investments in three ways. First, the Swedish tax code has historically, and all the way up until the 1991, been biased against equity investments in small firms favoring instead large firms financed by debt. Second, the taxation of entrepreneurial income has been much harsher in Sweden than in the US even after the tax reform in 1991.¹⁵ Finally, Swedish regulatory and tax policy has disfavored the structures venture capital firms need to efficiently be able to raise capital from institutional investors.

Sweden had from the 1960s to the beginning of the 1990s a tax code with extreme differences in taxation for different sources of finance (Henrekson and Rosenberg, 2001). Debt was most favored, new share issues most disfavored, and individuals were taxed at much higher rates than large tax exempt institutions. This meant that the tax system systematically favored capital intense, large and publicly traded firms. Davis and Henrekson (1997) report that in Sweden, in 1970, households effective marginal tax rates on income from investing in startup firms was 51.3% if the investment was in the form of debt and 122.1% if it was in the form of equity. For tax-exempt large institutions the marginal tax rates on debt financed investments was -64.8% and the effective marginal tax rate was 15.9% on new share issues. Between the 1960s and the tax reform in 1991, effective marginal tax rates on returns were above 100% for investments by individuals in entrepreneurial firms through new share issues. It is no surprise that a venture capital industry did not gain a foothold until the 1990s. Indeed, the early government supported initiatives towards establishing a venture capital industry failed, in the sense that almost all investments became directed towards larger firms and later stage investments because of the tax code (Braunerhjelm, 2000).

Additionally, the way entrepreneurial income had been taxed has limited incentives to become an entrepreneur, and continues to do so. Sweden follows a dual tax system that distinguishes between capital income and labor income. In contrast to the US, where entrepreneurs are taxed on the individual income tax schedule, entrepreneurs in Sweden must follow special tax rules that designate part of their income as capital income (taxed at a low flat rate) and part as labor income (taxed at a high progressive rate). Specifically, since the tax reform in 1991 the tax code separates between active business income and passive business income (the 3:12

¹⁵ For a good description on the taxation of entrepreneurs in Sweden, see Edmark and Gordon (2013).

rules). If an individual is a large shareholder in the firm in which he or she works, then his or her income is defined as active income from labor rather than capital income (and the firm is defined as a closely held corporation). This contrasts to an equity investment in a large firm, in which one has no ownership, which would be taxed as passive income at a lower capital income tax rate. At the start of the 1990s the return to passive investors was taxed at around 30%, while active investors were taxed at around 41% (Braunerhjelm 2000). Over time, the rules have changed such that the tax pressure on active investors and entrepreneurs has been lowered but the separation between active and passive income still means active investors are taxed higher than passive investors, and remains a hotly debated issue.

The difference between active and passive income also has another side effect: it is particularly harmful for venture capital backed firms as stock options are classified as labor income. This implies that they are taxed higher, but also that the firm must pay social security taxes of roughly on third of the value of the options (Henrekson and Rosenberg, 2001). Total taxes on stock options can thus amount to around 68% on the value of the options. This contrasts sharply to the treatment of stock options in the US tax code. The Incentive Stock Option Law passed in 1981 meant that stock options became an attractive way of compensating workers and entrepreneurs in small firms. The recipient of the stock option pays no taxes when obtaining the stock option or when exercising it, but is only taxed at capital gains rates (now around 15%) when the stocks acquired on exercising the option are sold (Gilson and Schizer, 2003). Prior to the reform, capital gains taxation was imposed when the options were exercised, not when the stocks were sold. This "tax subsidy" for options based compensation makes it possible for young and rapidly growing firms to hire and retain talent even if cash flow is low. It also gives venture capitalists a good tool for ensuring effort provision by entrepreneurs.

Finally, the Swedish tax code has been, and continues to be, problematic for venture capital firms wishing to raise capital from international investors. The reason is that the limited partnership incorporations form, commonly used for venture capital funds in the US, is not tax transparent in Sweden. This implies that international investors investing in a venture capital fund located in Sweden are forced to pay Swedish taxes on any income from the limited partnership (even if they are tax exempt in their home country). This has forced many local venture capital firms to incorporate in international tax havens. This substantially increases their operating costs which makes smaller venture capital funds unprofitable. The

alternative would be to incorporate as a limited liability company, but at the cost of alienating international investors, who are wary of investing in structures they are not used to.

4.5 Labor market regulations

According to Botero, Djankov, Laporta, Lopez-de-Silanes and Shleifer (2004) Sweden (compared to the US) has substantially higher employment law index (0.74 versus 0.21), collective relations index (0.54 versus 0.26) and social security laws index (0.85 versus 0.65). Two central differences between the US and Sweden can be related to the development of local venture capital markets.

First, Sweden has historically had a highly compressed wage structure compared to the US as a result of high labor union membership and collective agreement coverage. In 1980, 88% of the population in Sweden belonged to a labor union whereas the same figure for the US in 1983 was 20% (Davis and Henrekson, 2005). Comparing the wage distribution in the US to Sweden, Davis and Henrekson (2005) show that starting in the 1960s a great gap between the US and Sweden in wage inequality emerged as the wage structure in Sweden became compressed. The authors argue that this was driven by the wage formation process in Sweden in which most wages were set by negotiations between the employer confederation (SAF) and the labor organization (LO), who aggressively argued for a compression of the wage structure ("equal pay for equal work"). This regime broke down in the 1980s, and the wage structure in Sweden has since converged back towards the US one. It still, however, remains more compressed than in the US.

The intensely compressed wage structure was a big problem for small firms. Indeed, as Davis and Henrekson (2005) show, the compressed wage structure shifted the composition of the Swedish industry away from industries with high and low mean wages, but also away from industries with high wage dispersion. Thus, it is likely that centralized wage setting shifted the industry structure away from entrepreneurial industries and quickly changing innovative industries in which venture capital firms tends to operate. Since collective agreements also covered workers not formally belonging to a labor union, it raised the costs of hiring workers for young firms. One indication that the compressed wage structure could have depressed entrepreneurship is that the proportions of nonagricultural self-employment as a share of employment in 1973 in the US was 6.7% and in Sweden only 4.8%, whereas by 1990 when the system of centralized wage setting had been dismantled it was 7.6% in the US and 7.0 %

in Sweden (Davis and Henrekson, 1997). Moreover, as Henrekson and Sanandaji (2004) show, out of the 50 largest private companies by turnover in Sweden in 2000 not a single one was founded after 1970.

The second central difference is that in the 1960s and 1970s in Sweden, strict employment protection legislations were put in force. The Swedish Employment Security Act (LAS) implemented in 1974 mandates tenure based seniority rules when laying-off workers and severely limits the reasons for valid dismissal. It was not until 1997 that temporary employment contracts were allowed (giving firms the ability to employ up to five workers for a maximum of one year) and rights were given to firms to negotiate away some of the provisions in the LAS act from 1974. The seniority based rule (last in/first out) was relaxed slightly in 2001, when firms with less than 10 workers were allowed to exempt a maximum of 2 workers from the seniority rule.

Centralized wage setting and strict employment protection laws have thus likely hindered the development of a venture capital industry in Sweden before the 1990s. As of today, employment protection laws likely remain an obstacle to further developments. With the Bozkaya and Kerr (2011) study in mind, a shift away from employment protection regulations (such as LAS) towards a greater focus on labor market expenditures as a way for providing worker employment insurance (along the lines of Danish flexicurity) would likely support the development of the local venture capital market. If strict employment protection regulations remain, there is a risk that, as Cuñat and Melitz (2007) argues, there could be a shift away from innovative sectors with high labor volatility, which in the long run could hurt Sweden's innovative power.

4.6 Technology transfer policies

The US and Sweden also differ to a large extent in terms of technology transfer from universities. Goldfarb and Henrekson (2003) point out that Sweden has traditionally followed a model of “top-down” policies towards encouraging commercialization of university research. This has implied that policies are put in place to connect academics with financiers and companies, but fewer efforts have been made towards generating incentives for academics to commercialize their research. The US system, on the other hand, is based more on a “bottom-up” approach with the US government pursuing policies such as the Bayh-Dole act in 1980 that allowed universities to appropriate the property rights to inventions that arose

from federally funded research and encouraged universities to set up technology transfer offices (Jensen and Thursby, 2001). In Sweden, academics obtain full patent right for their inventions, and neither they nor universities have access to technology transfer offices. (see Färnstrand Damsgaard and Thursby (2013) for a detailed comparison between Sweden and the US in terms of ownership of faculty inventions). Some help is available through patent corporations that are intended to help the commercialization of university research (Henrekson and Rosenberg, 2001). At the more aggregate level, the US has likely benefitted from competition between universities in terms of commercialization (Goldfarb and Henrekson, 2003). This contrasts sharply to the Swedish system in which most universities are government-owned and entry of private universities is regulated.

Another factor that could have influenced the commercialization of patents in Sweden is the strong reliance on government financing to develop patents. As Svensson (2007) found in a study of patents and small firms in Sweden, the government support programs has historically been badly designed. In his study, patents that had relied on government financial support were less likely to have been commercialized. This was likely due to the terms of the government supported loans that stipulated that the whole loan could be written off if the patent was not commercialized.

Nevertheless, the Swedish venture capital market has likely benefitted from the presence of an educated workforce and an increase in domestic R&D expenditure. Figure 6 displays the gross domestic expenditure on R&D for Sweden and the US as a percentage of GDP. Since the early 1990s, Sweden has spent substantially more on R&D than the US with a peak difference in 2001.

4.7 Summary

We have argued that later development of venture capital markets in Sweden relates to differences in financial market development and tax policy, but that labor market regulations and technology transfer policies could also have played a role. An important aspect of the development of a venture capital market in Sweden is the crucial role played by the government. Increased financial market liberalization and active government policies towards the venture capital market have helped the Swedish venture capital market take off during the last two decades.

However, there is still room for improvement in the institutional environment in Sweden. Entrepreneurial income and the taxation of stock options is still harsher in Sweden than in the US, and the fund structures for local venture capital funds need to be taxed transparently in order for Sweden to attract international investors to Swedish venture capital funds. Employment protection legislations could be relaxed, and initiatives towards improving technology transfer from universities would be welcome.

Improving the institutional environment further could help in strengthening the general trend towards increased foreign venture capital investments in Sweden. As Lerner (2009) discusses, the presence of international venture capital firms have numerous benefits for a country. First, international investors may have better experience with venture investing and can bring in much needed human capital to the country, in particular, if they syndicate deals with local venture capital firms. International venture capital firms also typically have extensive networks that can be valuable to local entrepreneurs. Second, once international venture capital firms have learned how the local market functions they are more likely to return in the future. Third, local entrepreneurship can be boosted by international venture capital investments, as success stories of firms receiving investments by prestigious global venture capital firms inspire local entrepreneurs. And finally, even if entrepreneurs move their firms abroad after an investment by an international venture capital firm these entrepreneurs usually retain strong ties with their home country and are likely to return as angel investors and mentors to local entrepreneurs at a later point.

5 Concluding remarks

We have provided a review of the academic literature on institutions and venture capital and a case study in which we detailed and contrasted how venture capital markets have developed in the US and Sweden. The literature indicates that institutional frameworks matter. Key institutions are the legal environment, financial market development, taxation, labor market regulations and public R&D spending. Out of these, there is ample empirical support for the view that the legal environment and financial market development matters for the development of active venture capital markets. There is also less consistent evidence that taxes, labor market regulations and public R&D spending is of importance.

Contrasting the US and Sweden revealed that local venture capital markets seem to have developed in response to institutional changes. A central feature is that the venture capital

market in Sweden developed much later than it did in the US. The main reason for the delay was likely later deregulation of the financial markets, a tax system that discouraged equity investments in small firms, and the use of stock options to compensate entrepreneurs and other key employees.

With respect to future work, there are numerous avenues that can prove fruitful. First, there are several other institutions that could be important, but are harder to measure and model. For example, the attitudes towards entrepreneurship are shaped by culture and religion, which also affect incentives to take risk. These factors further affect the desire of entrepreneurs towards growing their business and seeking the help of outside financiers. Educational institutions are also important since what is taught in schools shapes future career choices. Mass media and peers could be important in retelling and highlighting successes which inspire entrepreneurial careers.¹⁶ These aspects underscore the potential for path dependency. The better the environment, the more viable is a career as an entrepreneur, the more people enter entrepreneurship, which helps create a critical mass of entrepreneurs needed for a local venture capital market to develop. An active venture capital market, again, particularly attracts high potential and quickly growing firms that generate successful entrepreneurs who work as role models for aspiring young entrepreneurs and shape attitudes towards entrepreneurship. Second, another area for future research is cross-border venture capital investments and local venture capital markets. A relevant question relates to how important cross-border investments are for the development of a local venture capital market. On one hand, foreign venture capital firms could subdue the local venture capital market by “picking the cherries”. On the other, they could help in generating a critical mass of venture capital activities.

¹⁶ Nanda and Sorensen (2010) find empirical evidence of peer effects in the work place: a worker is more likely to become an entrepreneur if his or her co-workers have been entrepreneurs before.

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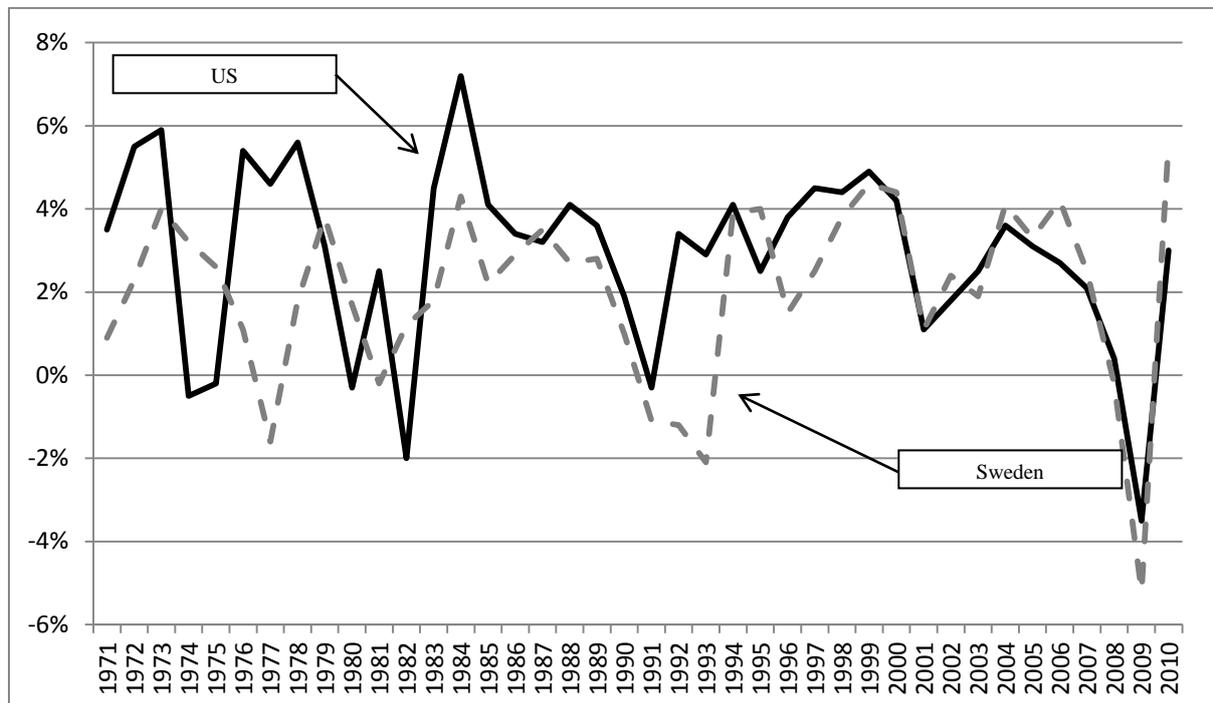
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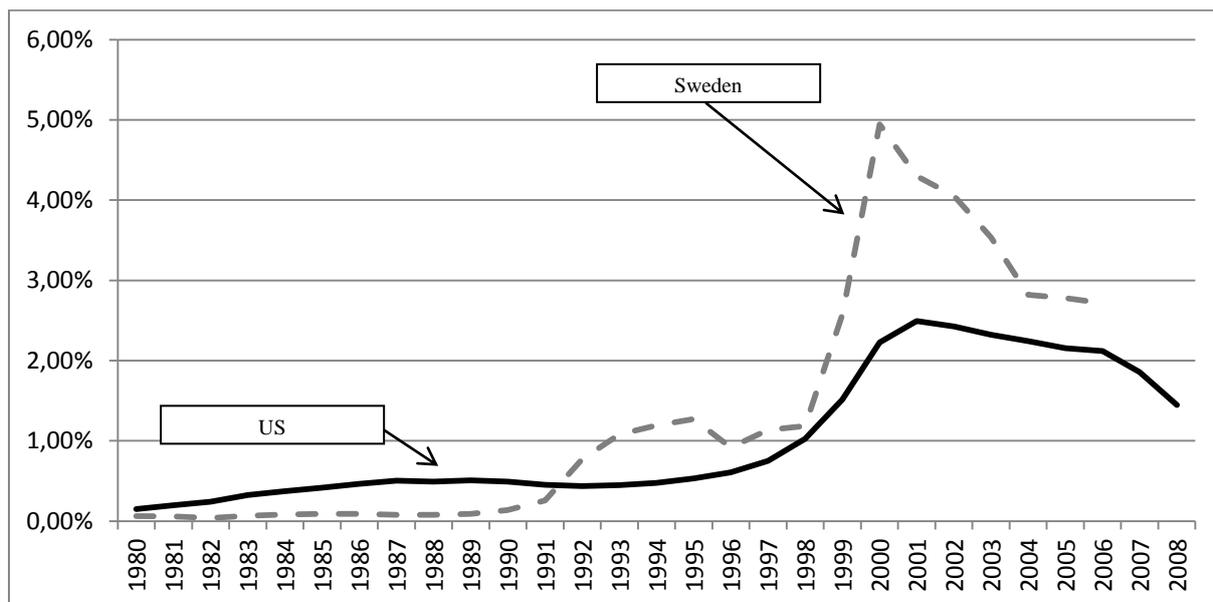
Figures

Figure 1: Real GDP growth



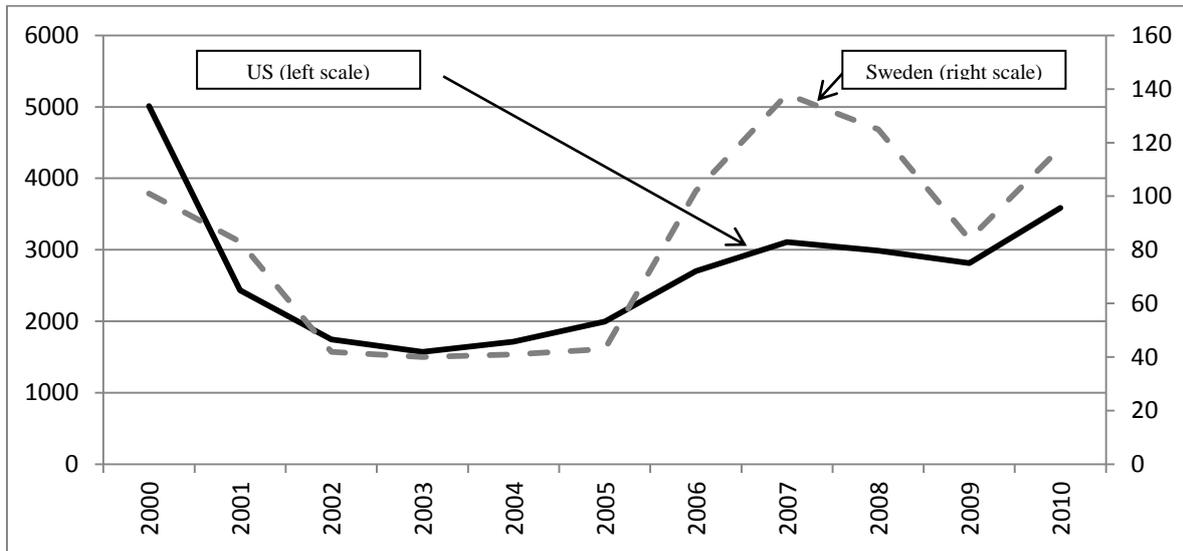
Source: OECD Factbook 2010 and Eurostat.

Figure 2: Capital under management by venture capital firms as % of GDP



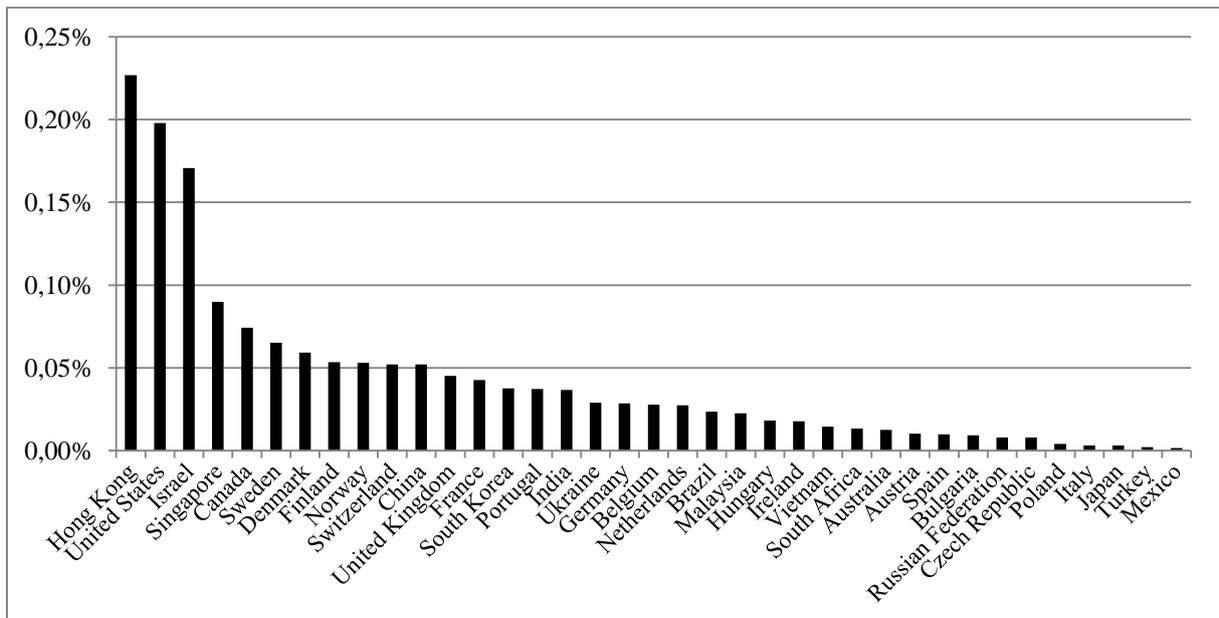
Source: World Bank, Statistics Sweden, Isaksson 2006; EVCA, SVCA and NVCA.

Figure 3: Yearly number of venture capital transactions



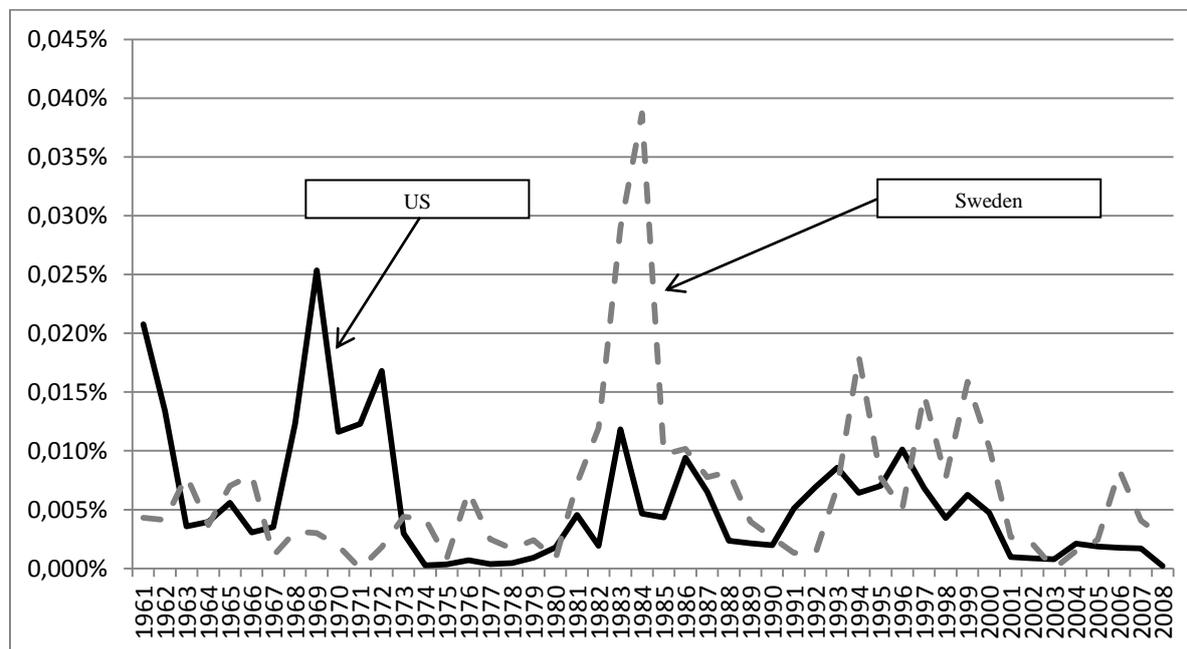
Source: Capital IQ. Transactions are closed or effective and the targets headquarters are located in U.S and Sweden.

Figure 4: Investments by venture capital firms as % of GDP in 2010



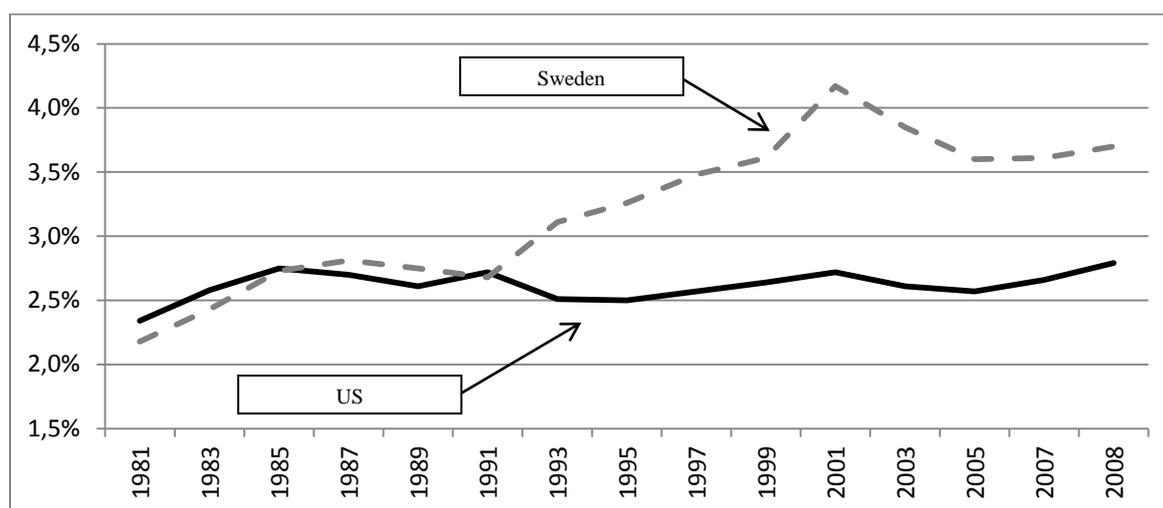
Source: VentureXpert; Various national VC association yearbooks.

Figure 5: Initial Public Offerings in US and Sweden weighted by real GDP



Source: Data compiled from OECD Factbook 2010, Gompers and Lerner (2003), Jay R. Ritter (<http://bear.warrington.ufl.edu/ritter/ipodata.htm>), from NasdaqOMX (www.nasdaqomx.com/) and from Angus Maddison (<http://www.ggd.net/MADDISON/oriindex.htm>). Real GDP measured in million 1990 International Geary-Khamis dollars.

Figure 6: Gross domestic expenditure on R&D as % of GDP



Source: OECD Factbook 2010 and Eurostat. Until 2005, R&D data for Sweden excluded R&D activities of State and local governments; SMEs were not fully covered, and prior to 1993 the surveys in the Business Enterprise, Government and Private Non-Profit sectors excluded R&D in the social sciences and humanities. For the US, capital expenditure is not covered and R&D conducted by state and local governments is excluded.