

From Start-up to Scale-up: Examining Public Policies for the Financing of High-Growth Ventures

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Introduction

Over the last two decades Europe and Canada have experienced a ‘start-up’ revolution. In the last decade of the twentieth century, technology-based start-ups were widely seen as the prerogative of the US, with Silicon Valley being at the epicentre. However, over the last decade and a half, other countries have successfully developed an ecosystem for technology start-ups. Whilst Europe and Canada now have comparable numbers of tech start-up companies, there remains a concern about their growth performance. With the US still producing the vast majority of success stories, the challenge in Europe and Canada has become what to do about later stage of the entrepreneurial development process: ‘scale-up’?

While the use of the terminology varies, we apply the term ‘scale-up companies’ or ‘scale-ups’ to start-up companies that are past their initial exploratory phase, have found their initial product / service offering and market segment, and are entering a growth phase where they seek significant market penetration. The term scale-ups is reserved for companies that are aiming for fast growth, possibly seeking to become so-called ‘gazelles’.¹ In the context of venture-capital backed companies, scale-ups can also be pragmatically defined as companies that have passed the Seed and Series A stage and are entering Series B or higher. In principle scale-ups can occur in any industry sector, but we focus on those sectors that attract venture capital. By-and-large this means we are focusing on innovation-based companies that involve some aspects of technology. This includes the information technology sector broadly defined, the life sciences, as well as miscellaneous other science- or technology-driven sectors.

There are a multitude of factors that are likely to influence scale-up success, including market conditions, management, strategic choices, regulation, and finance. In this paper we explicitly focus on the financing of scale-up. We examine the alternative methods by which companies can fund their ambitious growth plans, and ask what types of investors are needed. In the terminology of Wilson and Silva (2013), we are focusing on supply-side factors of financing entrepreneurial companies, whilst remaining cognisant that the scale-up process is also influenced by demand-side factors (such as market conditions and management quality, etc...) as well as the broader regulatory environment (such as taxation, legal system, etc...).

In this paper we ask three closely related questions. The first question is conceptual: What are the alternative options of funding scale-ups, and what are underlying challenges associated with each of those options? The second question is empirical: What are the differences in the way that scale-up companies are currently financed in the US, Europe and Canada, and what explains these differences? The third question is normative: What is the possible role of government and public policies in supporting the financing of scale-ups?

To answer these questions, we divide our analysis into three parts. In the first part, we develop some simple conceptual frameworks for analysing the financing choices at the scale-up stage. Using the analogy of a car at a crossroad, we examine companies’ choices between scaling-up as a privately-held company, as a publicly-listed company, or being acquired by another company. We argue that scale-up investors need to satisfy four important criteria that we label ‘deep pockets’, ‘smart money’,

¹ A standard definition of a gazelle or (successful) scale-up is a company with an average annualised growth in employees or turnover that is greater than 20% over a 3-year period. Alternative definitions add a minimum number of employees (say 10 employees), and possible add a maximum age (say less than 5 years old).

networked investors’, and ‘patient money’. We also explain the importance of providing investors a well-defined path to liquidity.

In the second part of the paper we review descriptive data about scale-up in the US, Europe and Canada. Clearly it takes time to build a vibrant venture capital market, and the US market developed earliest. Some of the key findings are that the US has more later-stage equity investors that have access to deeper pools of money. The US has developed a market for venture debt, which remains in its infancy elsewhere. The stock market environment remains stronger in the US, although there is a recent trend toward private liquidity which requires a market for secondary shares.² While there are some efforts to develop such markets in North America and Europe, this market is not particularly well developed anywhere yet. The lack of financing options for scale-up in Europe and Canada often implies that companies sell earlier. Acquisitions are frequently made by foreign buyers. We also discuss to what extent the current differences reflect temporary challenges versus deeper seated institutional differences.

In the third part of the paper we examine the role of government policies. We describe the main policies currently used by governments to address financing gaps, focusing on supply side financial interventions and selected regulatory framework policies. We explore the underlying rationales for government intervention in this market, and discuss the potential strengths and weaknesses of different policy approaches to help provide a framing for countries seeking ideas regarding policies for financing scale ups.

To set expectations, it is worth mentioning what this paper does not try to achieve. First, our analysis does not try to characterise the challenges of company growth in general, it only focuses on the scale-up challenges of technology-based start-ups broadly defined. Second, this paper provides descriptive statistics, but it does not perform any econometric analysis to explain specific causal relationships. Third, this paper acknowledges the importance of both supply- and demand-side factors, but it cannot cleanly disentangle those two factors. While we provide some evidence that suggests that financing is an important factor, we cannot assess its importance relative to other factors. Fourth, while we try to identify some of the deeper structural factors that explain the gap between Europe and Canada to the US, we do not explain the origins of the structural differences, as this would take us far beyond the scope of this paper.

Our paper builds on multiple prior literatures. Our conceptual analysis draws on the large and growing academic literature about venture capital financing, as well as the larger literature on financial markets. A useful reference for the venture capital literature is the survey article by Da Rin et al (2013). Our empirical analysis draws on a practitioner-oriented literature that documents the problems of scale-up companies. This includes an influential report by Coutu (2015) which focuses on the scale-up challenges in the UK. Other related work is the recent report by Hellmann et al. (2016), and the work of Reynolds and Samel (2013) and Axelsohn and Martinovic (2015). Our policy analysis builds on the work of the OECD including Wilson (2011) and Wilson and Silva (2013) and Wilson (2015). It also draws on the work of Lerner (2008) and Brander et al. (2015).

² Note that what we refer here to as secondary shares are company shares that are bought from one investor to another. This is not to be confused with the market for secondary partnership shares of private equity funds, where limited partners can buy and sell their interests in funds. Nor should it be confused with second tier stock markets, such as the AIM market in the UK or the TSX-Venture market in Canada, which are less regulated segments of the stock market.

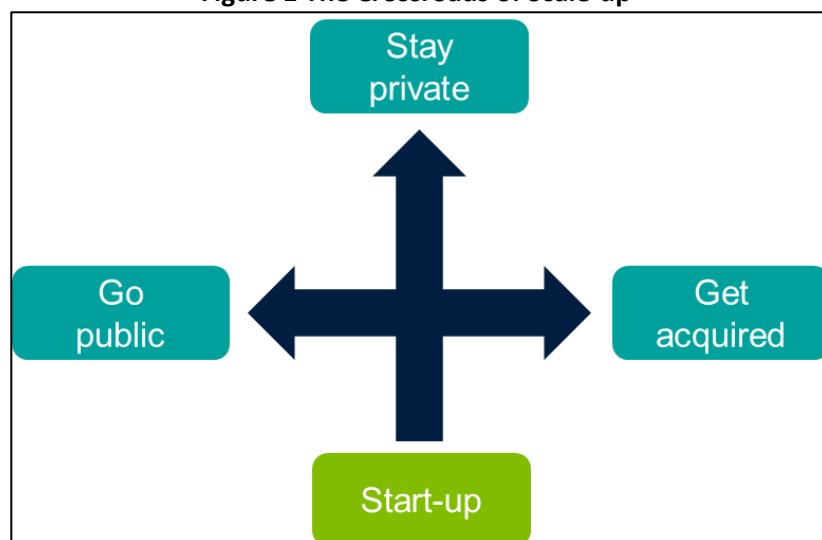
1. Financing Scale-ups: A Conceptual Framework

1.1. The Crossroads of Scale-up Financing

Let us start with an analogy. Think of entrepreneurship as a car journey. At the start the car (read: start-up) needs an engine (read: technology), a driver (read: management), some fuel (read: financing), tires (read: momentum), and possibly a map (read: business plan) or navigator (read: mentors). Along the road the driver encounters variable road conditions (read: market demand), traffic jams (read: competition), and traffic police (read: regulators). The journey is full of risks, where there can be delays (read: business challenges), U-turns (read: turnarounds), and breakdowns (read: failures). Of particular interest here, there are crossroads (read: decision points), where the driver will be looking for the best path (read: scale-up) to get to its destination (read: success).

The decisions taken at the crossroad are crucial for getting to the final destination, so let us take a closer look at the signs for direction. Figure 1 illustrates the simple but far-reaching decisions that define companies' strategic scale-up choices.

Figure 1 The Crossroads of Scale-up³



To scale up, start-up companies take three fundamentally different paths that we described as follows:

1. STAY PRIVATE: Keep driving straight ahead; please refuel first.
2. GO PUBLIC: Turn left onto the fast lane; please pay at the toll.
3. GET ACQUIRED: Turn right; please make room for a new driver.

The choices at the crossroads are fundamentally choices of organizational structure, with far-reaching implications for the strategy, governance and financing of the company. For the first two options (stay private or go public), the company scales up as an independent entity although, in some cases, staying private might have included a leveraged buyout. The difference is that publicly-listed companies (should) have better access to inexpensive capital. However, there is a high cost of going and staying publicly-listed. Being public also exposes the company to the short-term pressures of quarterly

³ Own illustration.

earnings expectations, and makes risky investments more difficult (see Asker, Farre-Mensa and Ljungqvist, 2016, and Bernstein, 2015).

The third option of getting acquired by another company (strategic investor) fundamentally reshapes the company. In some cases the acquirer leaves the operations largely in place but grows them within the confines of its corporate structure. In other case, however, the start-up gets largely absorbed within the acquirer's existing operations. In some extreme cases, the acquirer 'shelves' the start-up to eliminate a competitive threat, in which case scale-up doesn't really take place. Acquirers are also often from a different jurisdiction and may relocate some of the activities of the start-up.

By and large an acquisition by another company is a final decision.⁴ An IPO is also a fairly final decision, in the sense that it is difficult to go back on it.⁵ By contrast, the decision to stay private is essentially a temporary one. It allows the company to drive straight on until it reaches the next crossroad, where it again faces three choices.

How long can a company can drive straight, i.e., how long can it stay private? This depends partly on strategic factors (how long is it efficient to remain an independent entity), and partly on the liquidity needs of the investors. If going public, investors can sell their shares after (and sometimes at) the IPO. If being acquired, investors receive cash or stock from the acquiring company. However, driving straight the company remains private with no immediate prospects for liquidity, except in cases of a financial buyout. One possibility is the sale of shares from one investor to another, all while keeping the company privately-held. The market for so-called secondary share purchases currently remains in its infancy, but is likely to play an increased role as more companies want to remain independent for longer.⁶

1.2. The Four Requirements for Scale-up Investors

What are the financing options of scale-ups that want to stay private? The main source of funding is equity. This can be provided by a combination of new investors and old investors who invested at earlier stages. At the start-up stage the most common outside investors are angels, (early-stage) venture capitalists, and corporate investors. In recent years accelerators and crowdfunding platforms have also become more prominent. At the scale-up stages we again find (later-stage) venture capitalists and corporate investors, but also growth equity funds, private equity funds, hedge funds, cross-over funds, family offices, sovereign wealth funds, and institutional investors investing directly. We collectively call all these investors 'venture equity' investors, to account for the fact that their types go beyond the traditional venture capital model.

What are the requirements for scale-up investors, i.e., what characteristics do scale-up companies require from their venture equity investors? Based on the large prior academic literature, as well as our observation of industry practice, we identify four key requirement: deep pockets, smart money, networked investors, and patient money. We now explain each of these in greater detail.

⁴ Technically speaking the acquirer could spin-out the division at a later point.

⁵ It is possible to go private at a later stage by structuring a buyout. . However, the option of getting acquired remains open even after going public - see Zingales (1995).

⁶ An alternative model is one of extremely patient investors that are willing to hold on to the company's stock for the indefinite future. In this case the return to investors has to come from dividends or share repurchases, funded by the company if and when it becomes cash flow positive. This model is problematic for most venture capital funds that have long but finite investment horizons, and that require liquidity to pay back their limited partners at the end of their fund lives.

Deep Pockets

'Deep pockets' pertains to the ability of scale-up investor to support large funding rounds. While the amounts of funding at the start-up stage are typically fairly modest, scale-up requires substantially larger funding rounds. In Section 3 we provide the relevant data. The question is how to assemble such large rounds. Basic maths suggests you either need an investor that can make a large investment, or you need a syndicate of several investors that collectively fund a large round. Two constraints are relevant. First, from an investor perspective there is a portfolio choice problem, where investing too much in any one companies over-exposes the fund to one idiosyncratic risk. Standard limited partnership agreements also set a limit on how much a venture funds can invest in any one company, typically in the 10-15% range. Second, from a company perspective, having too many small investors may create an unwieldy ownership structure that imposes costs on management or limits strategic flexibility. Both of these suggest that investors need to have sufficiently large funds to fund scale-ups.

The concept of deep pockets also pertains to the ability of investors to provide additional funding if and when needed. Some early stage investors like smaller angels or accelerators quickly lose the ability of continue funding in later rounds. The same is true for smaller venture capital funds at the scale-up stage. From a company perspective, the continued involvement of inside investors is beneficial in terms of providing continuity, and because inside investors have an economic interest in defending the company's valuation from new outside investors. From an investor perspective, however, continued involvement requires patience. We discuss this further under the fourth requirement.

Smart Money

'Smart money' refers to the value-adding capabilities of scale-up investors. A prior academic literature establishes the importance of venture capitalists' expertise. Beyond financial engineering, successful venture capitalists need to have specific sector knowledge, general business expertise, and possibly even entrepreneurial experience (Bottazzi et al. 2008, Zarutskie 2010). Industry experience and deep domain expertise are of central importance in venture capital, both at the start-up and scale-up stage. Smart money pertains to investment selection, and to post-investment value adding (see Sorenson, 2007). At the selection stage, business experience and domain expertise are needed to make good investment decisions. This requires judgment about technology, markets, and management (i.e., knowing how to check the engine, road conditions, and the driver). After the investment is made, scale-up investors play an important role in guiding the company through its growth challenges and helping with the professionalization of its management structures (Hellmann and Puri, 2002) (i.e., knowing how to change a tire, navigate the backroads, or pep up the driver).

Networked Investors

The requirement for 'networked investors' is closely related to 'smart money' but adds the notion of access to resources that are beyond the reach of the company. Well-networked investors can help the company reach two types of networks: business networks and financing networks. Business networks are needed for a large variety of growth challenges, such as providing access to international markets, strategic partners, industry talent, or regulatory authorities (see Hochberg, Lindsey, and Westerfield, 2015, Hochberg, Ljungqvist and Lu, 2007). Financing networks are needed to create attractive choices at upcoming crossroads. For turning left (i.e., going public), well-networked investors can help the company identify the right investment bankers and potential management team members. For driving

straight (i.e., remaining private), they can help to bring in additional investors with complementary skills and networks as well as identify senior executives to join the company or board. For turning right (i.e., getting acquired), they can initiate discussions with potential acquirers. For example, internationally-networked investors may facilitate a listing on a foreign stock market (such as the NASDAQ for non-US companies), they may bring in renowned other international investors, or they may enlist potential foreign acquirers.

Patient money

The final requirement of 'patient money' is premised on the fact that scale-ups are risky and require long-term investments. A fundamental difference between privately-held and publicly-listed companies concerns their investment horizon. Stock markets impose short-term discipline on companies, focusing them on meeting quarterly earnings expectations. Privately-held scale-ups by contrast have the ability to look at multi-year investments without pressures for short-term performance. Venture capital investors take a longer-term perspective, but still have a finite horizon, i.e., they cannot hold on to the equity indefinitely. This is because most funds have a limited life structure, the norm in venture capital being 10 years.

An interesting question is what factors affect investors' costs of holding illiquid equity. Traditional venture capital funds are also under pressure from their limited partners. This becomes explicit towards the end of a fund, as the limited partners want to get paid in cash or liquid assets. Long before that, venture capital firms are already under pressure to realize returns to prepare for their own fundraisings.⁷ Overall we note two important aspects about patient money. First, the nature of scale-ups requires investors to be willing to make illiquid long-term investments. Second, there is a limit to investor patience, and therefore a desire for investors to create liquidity opportunities.

Our discussion so far focuses on venture equity investors. In addition to equity, scale-up companies can access some forms of debt financing. Some debt is linked to specific business processes, such as assets leasing, or lines of credit for working capital. In addition, there is venture debt, which we can think of as term loans to scale-up companies. This is relatively rare at the start-up stage but becomes more common at the scale-up stage. Venture debt does not fit banks' standard loan criteria, as borrowers have negative cash flows and few collateral assets. Loan payback is expected to come from one of three possibilities: the company may turn cash flow positive before loan maturity, it may get acquired before then, or the company may raise a fresh round of equity.

In practice venture debt is typically issued by companies that also have venture capital investors, and where the debt providers rely in part of the due diligence and support of the venture capitalists (Hochberg, Serano, Ziedonis, 2014). There are two distinct types of venture debt providers: banks and venture debt funds. Given the high risk and limited upside of venture debt investing, banks sometimes justify this type of lending with building client relationships (see Hellmann, Lindsey and Puri, 2008 for a

⁷ In recent years there has been a growing interest in alternative venture structures that create longer horizons than those afforded in the traditional venture capital model. Of particular note are so-called 'evergreen funds' that can reinvest the returns from earlier investments, and that have no pre-defined end date.

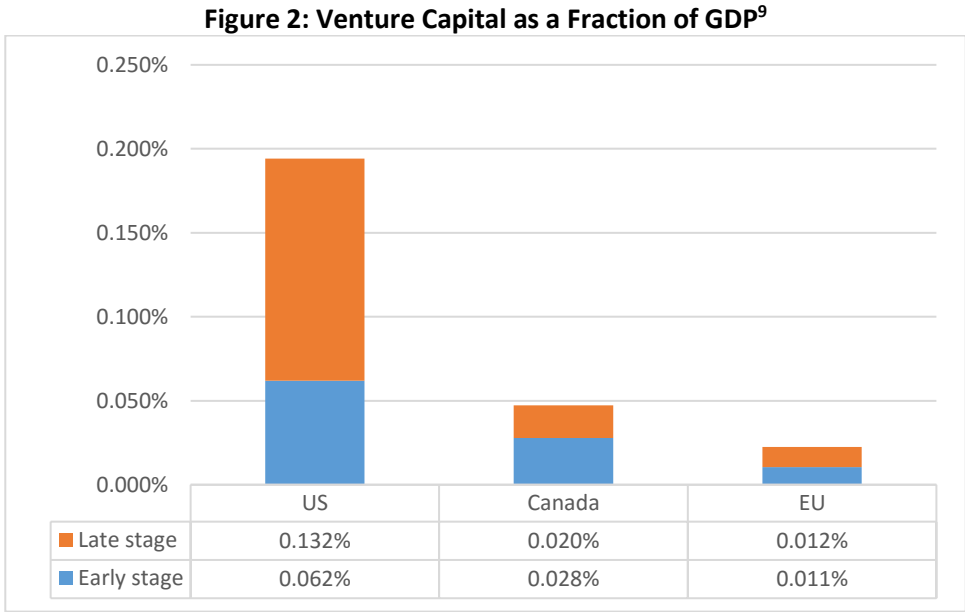
related argument). Venture debt funds, on the other hand, entirely rely on a financial return. To justify their loan investments, they require some upside returns in the forms of equity or warrants.⁸

2. Comparative Evidence on the Financing of Scale-ups

We now examine the main evidence on the differences between the US and Europe in terms of financing of scale-up. Where possible we also include data on Canada. It should be noted in this context that there is no comprehensive international data source for venture capital. In this paper we draw data from diverse sources that may at times be not fully consistent with each other. In the appendix we provide a brief description of each of those datasets, and discuss their respective strengths and weaknesses.

2.1. Comparing Funding to Start-ups and Scale-ups

Figure 2 shows that amount of venture capital as a fraction of GDP, for the period 2007-2014. The data comes from the OECD who obtains the data from the respective venture capital associations, namely NVCA for the US, CVCA for Canada, and Invest Europe (f.k.a. EVCA) for Europe, and then processes it to make it more comparable. Figure 2 shows a clear pecking order, with the US being by far the largest market for venture capital, followed by Canada, and then Europe. Figure 2 also differentiates between the investment amounts at earlier stages (start-ups) versus later stages (scale-ups). In the US approximately two thirds of all venture capital goes to scale-ups, compares to less than half in Europe and Canada.



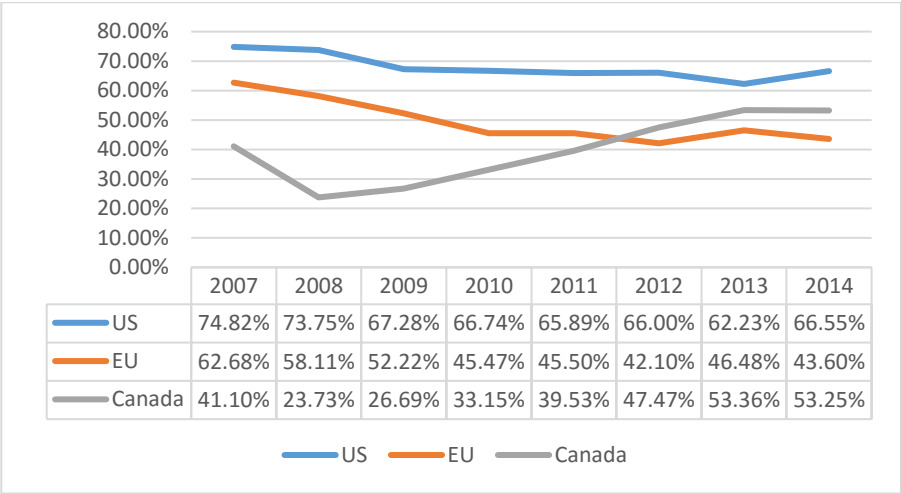
To get a better sense of the breakdown between early and late stage financing, Figure 3 uses the same data from the OECD, and shows the levels and time trends of the share of late stage financing for the US, Canada and EU. The figure confirms that the amount of funding going into later stages is highest in

⁸ Venture debt providers typically do not satisfy the four requirements of venture equity listed above. While they help to address the need for deep pockets, they are unlikely to have the same expertise or networks of venture equity investors, and they are typically less patient investors that expect to get repaid within the medium-term.

⁹ Data is from the OECD for the period 2007-2014.

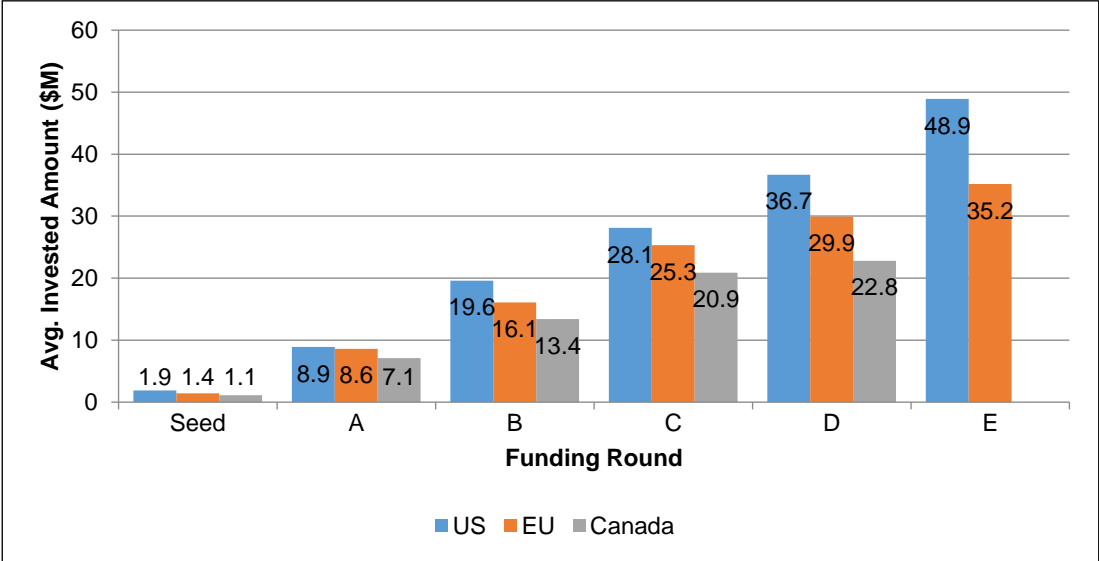
the US. While Canada had the lowest percentages before 2011, later stage financing is on the rise in Canada. The opposite trend applies to Europe.

Figure 3: Percentage of late stage investment amounts¹⁰



Going beyond aggregate data, we consider individual deal level data from Preqin, for the period 2010-2015. Preqin records venture capital investments in the US, Canada and Europe. Figure 4A shows the average size of investments across different rounds. We find that at the seed and series A stage (i.e., at the start-up stage), there is virtually no difference between the US and Europe. However, after series A, (i.e., at the scale-up stage) US companies receive larger funding rounds.

Figure 4A Average Investment Amounts by Funding Round¹¹



¹⁰ Data is taken from OECD for the period 2007-2014.

¹¹ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the average funding size across fundraising stages. Data for the EU represents the EU-27 region.

Larger investment rounds can be structured by having more investors and/or by having larger investments per investor. We therefore decompose the results from Table 4A into two further tables. Table 4B shows the average number of investors in an investment round, whereas Table 4C shows the average investment per investor (sometimes referred to as ‘ticket size’) in an investment round. The main insight here is that while investment rounds have larger syndicate sizes in the US, there still remains a clear difference in the ticket sizes, with investors paying the highest ticket sizes when investing in US companies.

Figure 4B Average Number of Investors in Funding Round¹²

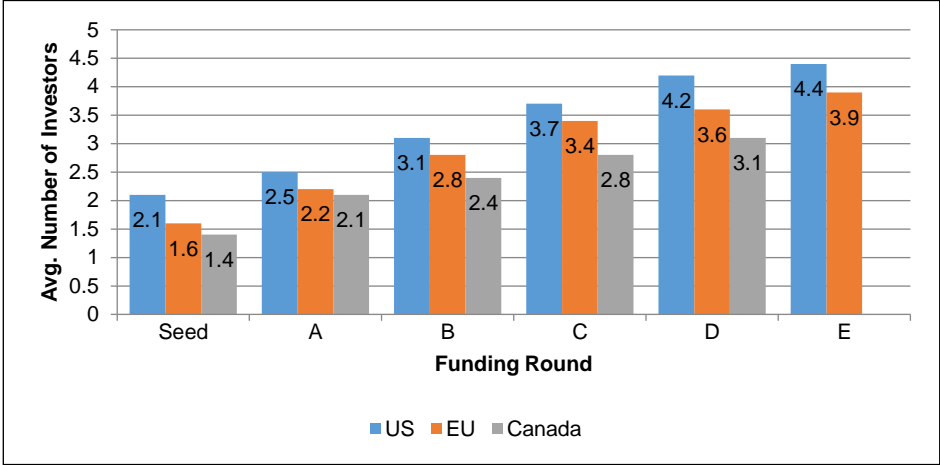
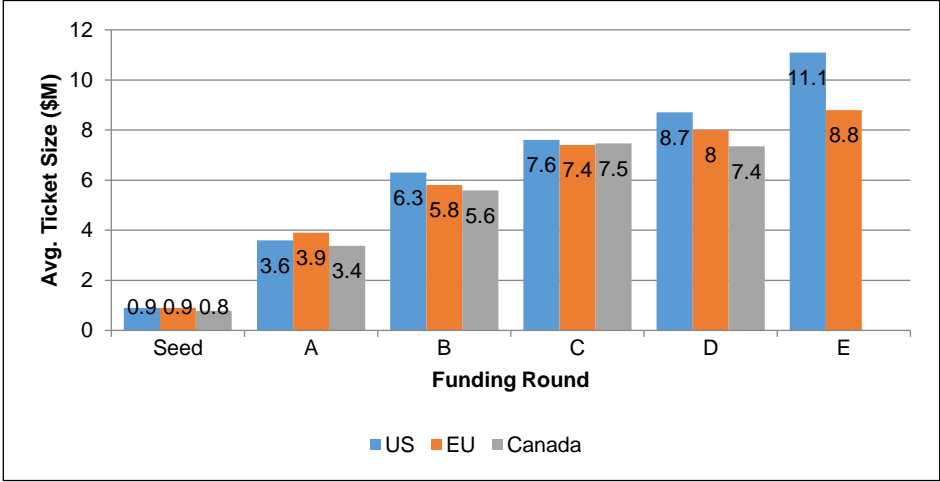


Figure 4C Average Investment per Investor in Funding Round¹³



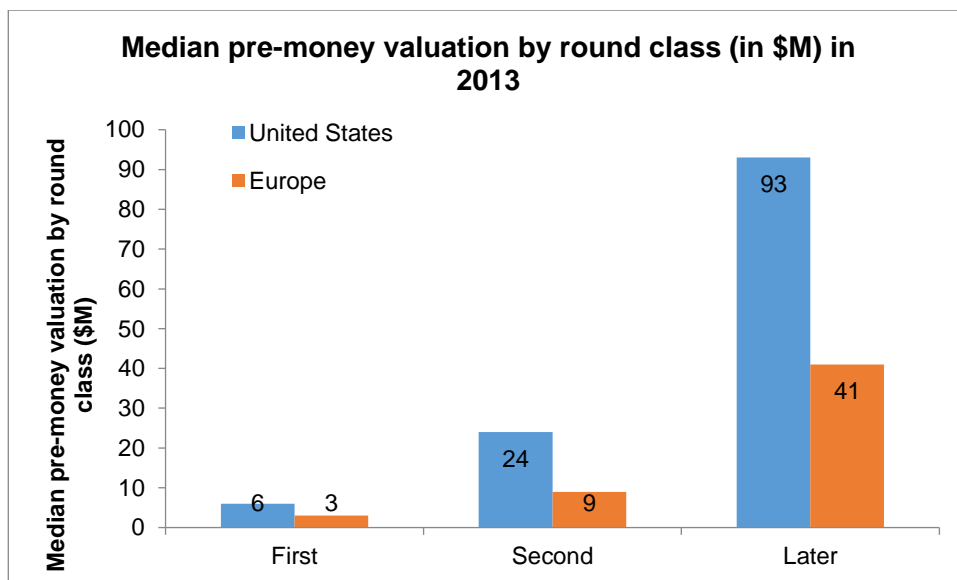
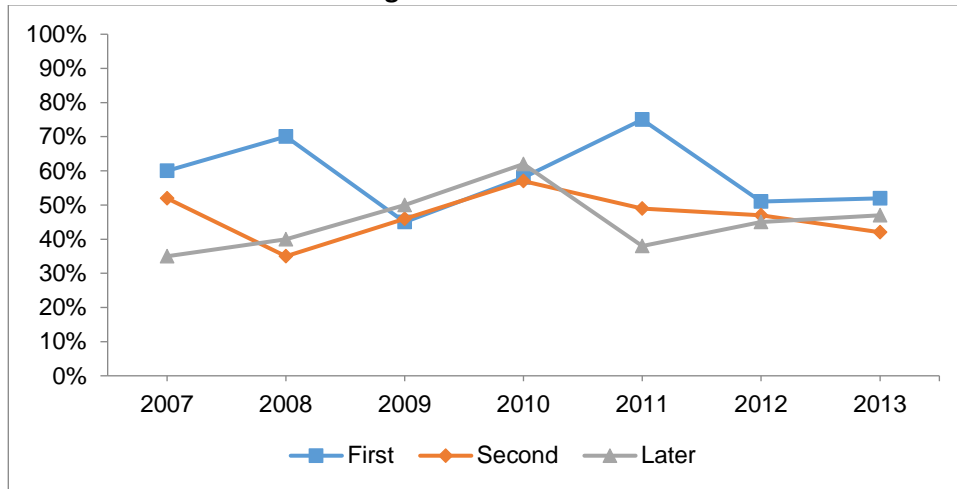
So far this data shows the investment amount, we now consider valuations. Figure 5 is based on data from VentureOne for the period 2007-2013. It reports median valuations in first, second, and higher rounds. Figure 5 shows that US based companies receive significantly higher valuations. While

¹² Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the average number of investors in a funding round, across fundraising stages. Data for the EU represents the EU-27 region.

¹³ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the average investment size per investor in a funding round, across fundraising stages. Data for the EU represents the EU-27 region.

European valuations may be attractive for investors, and may explain the increased investments of US investors in European companies, they also suggests that there is a problem: European entrepreneurs either have less valuable companies, and/or face less competition for their deals.

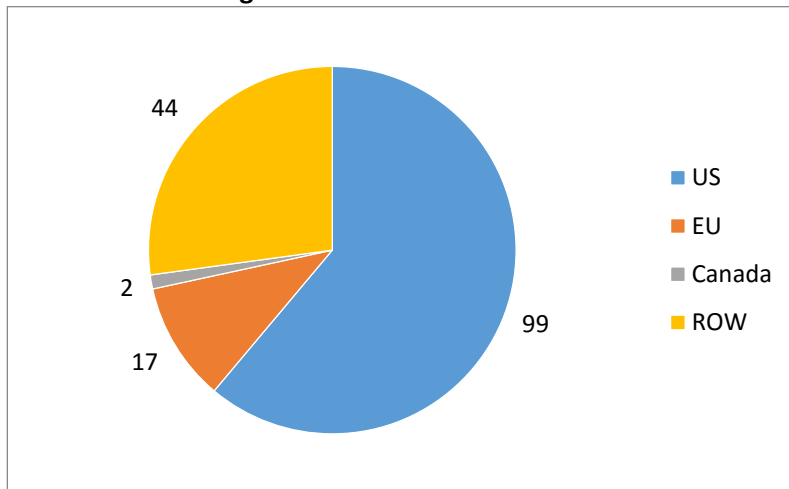
Figure 5 Valuations¹⁴



A recent trend is the rise of so-called ‘unicorns’, privately-held companies that are valued above US\$1B. While this measure is somewhat arbitrary, and can be easily manipulated with the use of preferred shares and other contractual clauses, a simple count of unicorns is still a useful measure of the success of countries to generate successful scale-ups. Figure 6 uses data from Crunchbase to show the global distribution of unicorns. The US clearly leads the count. Two things are worth noting about Europe and Canada. Both have succeeded in raising some unicorns. This refutes the more pessimistic view that Europe and Canada are simply unable to create entrepreneurial success stories. At the same time, it also shows that a gap persists, as European and Canadian unicorns still remain relatively rare.

¹⁴ Data taken from VentureSource for the period 2007-2013. The Figure illustrated the median pre-money valuation of European companies as percentage of US median pre-money valuation.

Figure 6 Number of Unicorns¹⁵



2.2. Venture Capital Fund Size

The amounts of funding required at the scale-up stage are considerably larger than at the start-up stage. The question arises in terms of what fund sizes are needed to support scale-up financing. For this we examine data about venture capital fund sizes using the Preqin data.

We first compare the sizes of venture capital funds in the US, Canada and Europe, looking at all funds for the vintage years 2005-2015. Figure 7 shows the fund size distribution, showing what fraction of funds fall into the respective size categories. Funds are allocated to countries on the basis of their headquarter locations. The Figure shows 11% of US funds are over \$500M, compared to 4% in the EU and Canada. Similarly, 28% of funds are over \$250M, compared to 11% in the EU and Canada.

Figure 7 Fund Size Distribution (US vs. EU vs. Canada)¹⁶

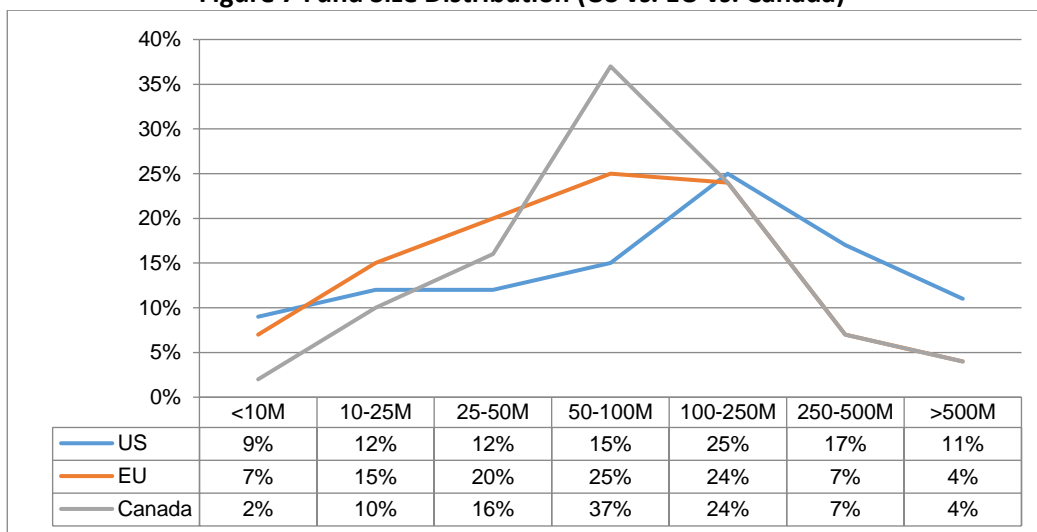


Figure 8 shows the median fund size of investors that invested across different rounds. The data comes from PREQIN, and looks at all deals for the period 2010-2015 by investment round. Figure 8

¹⁵ Data on unicorns is taken from CrunchBase and CB Insights as of March 2016.

¹⁶ Data is taken from the Preqin Venture Capital database, and shows all VC funds with vintage years 2005-2015. The Figure illustrates the fund size distribution. Data for the EU represents the EU-27 region. Funds are allocated to countries on the basis of the fund's headquarter location.

shows the median size of all funds that invested in a deal of a given round (Seed, A, B...), in the company’s country (US, Canada, or EU). At the start-up stage (Seed and Series A), there is relatively little difference between European and US funds. However, at the scale-up stage US companies are funded by significantly larger funds. The larger funding rounds observed in Figure 6 therefore come from larger funds. This data suggests that scale-up funding is related to the presence of large funds, be they local or foreign.

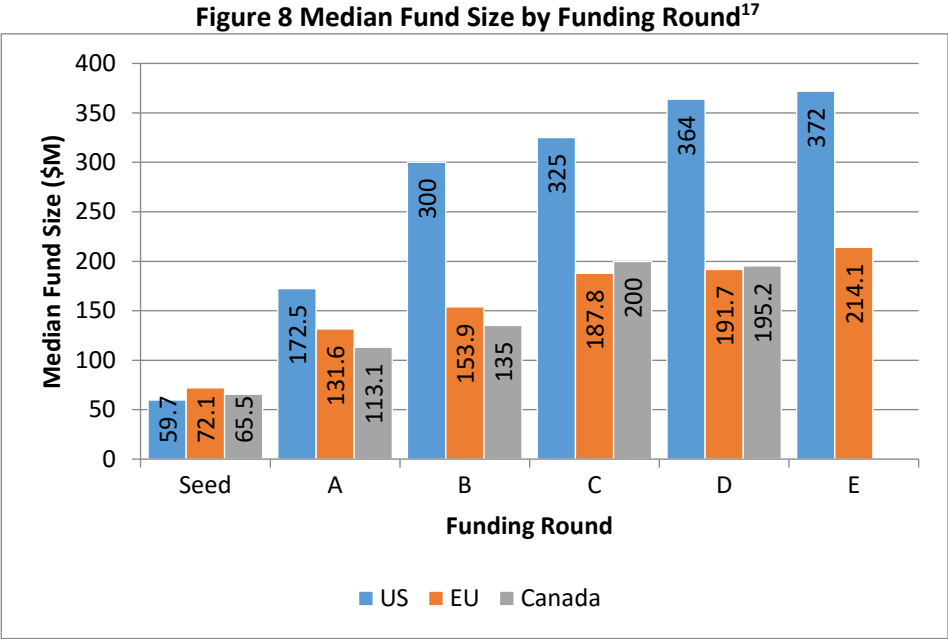
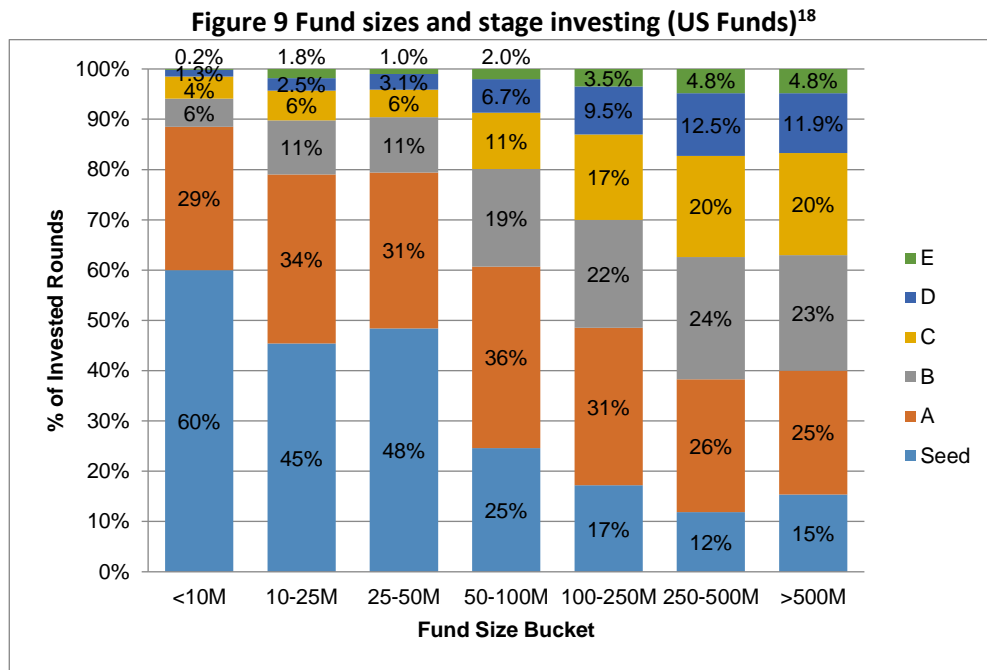
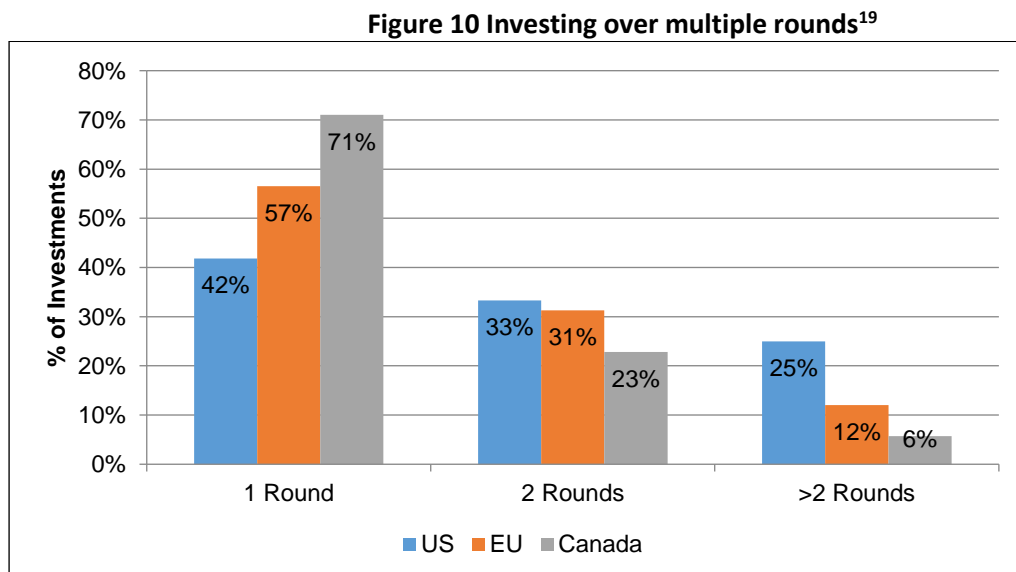


Figure 9 looks at the same question from a fund perspective. Focusing on US funds (the Figure looks very similar if we also include European funds), this Figure looks at the number of investments by stage, for funds across different size categories. It shows that smaller funds make the vast majority of their deals at the start-up stage. Only for funds with over \$100M do the majority of deals occur at the scale-up stage.

¹⁷ Data is taken from the Preqin Venture Capital database for the period 2010-2015. Funds are allocated to countries on the basis of the company’s location.



As noted in section 2, deep pocketed investors can not only afford larger funding rounds, they are also more likely to invest in a company over multiple rounds, thus providing greater funding continuity. Figure 10 looks at the propensity to fund a company over multiple rounds (as measured at the end of 2015). On the low end of the distribution, European companies have 57% of their investors investing in a single round, compared to 42% in the US. On the high end of the distribution European companies have 12% of their investors investing in three or more rounds, compared to 25% in the US. This suggests that US companies have investors that are more willing to invest for longer.

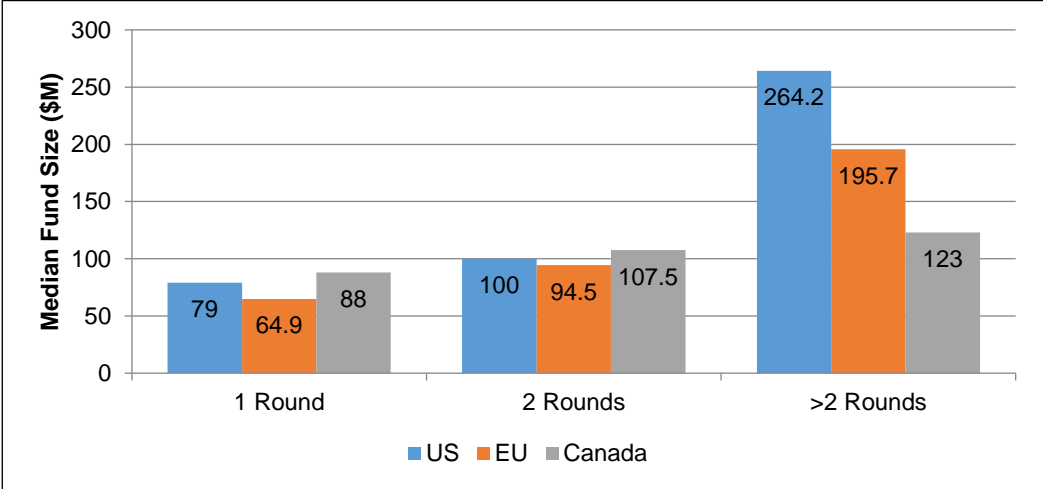


¹⁸ Data is taken from the Preqin Venture Capital database for the period 2010-2015.

¹⁹ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the frequency of multiple investments by funds in the same company. Data for the EU represents the EU-27 region.

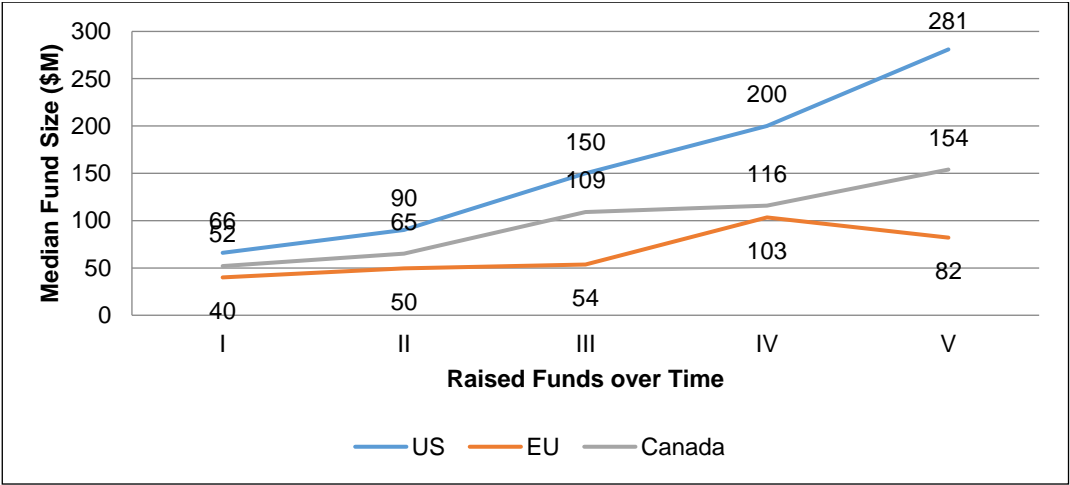
One may expect that the ability to invest for more rounds is related to fund size. Figure 11 looks at the median fund size when the company received one, two, or more than two rounds of financing from that investor. The Figure shows that those investors who invest over multiple rounds are also larger, especially those that invest in more than 2 rounds, and especially in the US.

Figure 11 Fund size and Multiple Round Investing²⁰



What explains the lower fund sizes in Europe? Doubtlessly one can point to the relative youth of the industry, and the shorter track records of European venture capital firms. However, there may be further factors at play. One interesting exercise is to compare how funds grow over successive fundraisings. Figure 12 examines the evolution of fund sizes as venture capital firms proceed from one fund to another. US funds are larger at each stage, and the differences grow over time. After their second fund, the median fund size is two to three times as large in the US than in Europe. While there may be several explanations for this pattern, it does raise some concerns about the willingness of limited partners to support venture financing in Europe.

Figure 12: The Evolution of Fund Sizes²¹

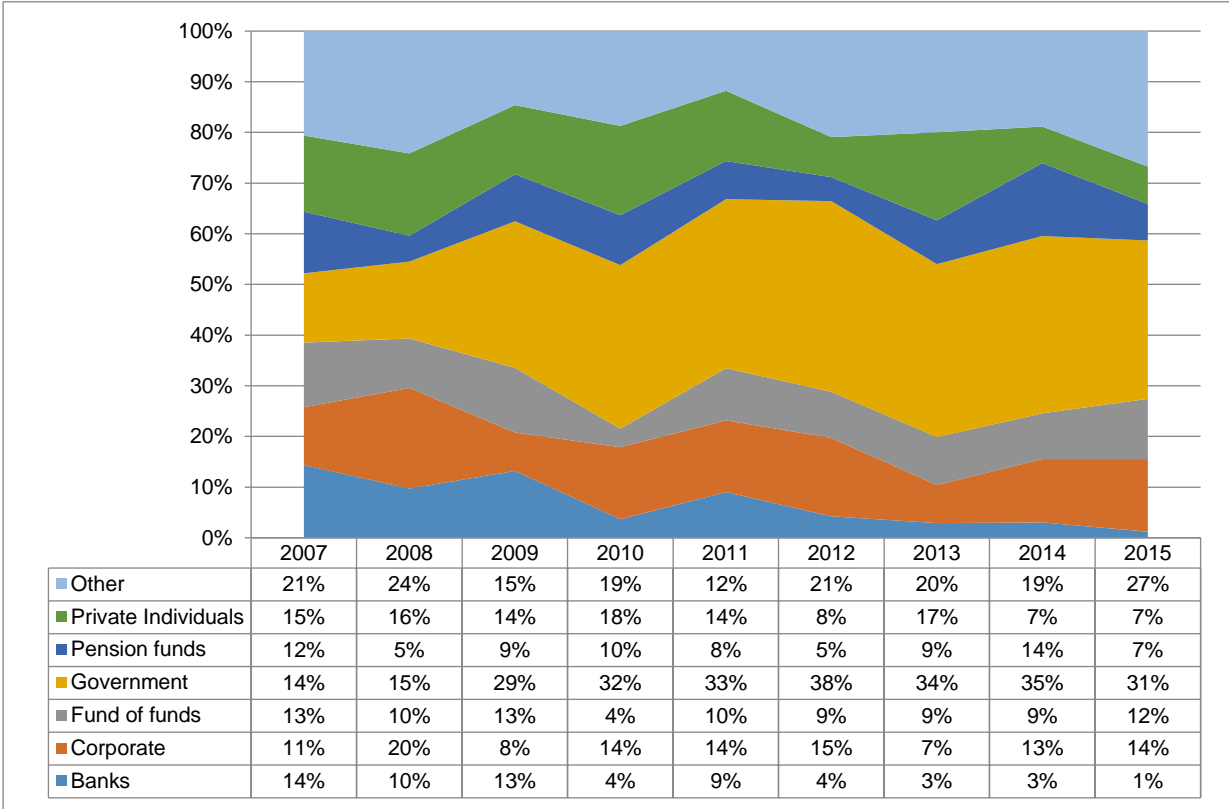


²⁰ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the median size of funds investing in multiple rounds of the same deal. Data for the EU represents the EU-27 region.

²¹ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the fund size evolution over successive funds. Data for the EU represents the EU-27 region.

Another interesting fact concerns the funding sources of European venture capital funds. Venture capital firms can be funded from a variety of sources, including banks, insurance companies, corporations, fund of funds, government programs, pension funds, private individuals and others. Based on Invest Europe data, Figure 13 shows the evolution over time of the funding sources. An important trend is the relative rise of government funding. This is in largely driven by the decline in private but not in public funding sources. While different governments use different approaches, there is a tendency especially amongst some European governments to disperse their venture capital investments over a large number of smaller funds, which may thus further help to explain the European size distribution.

Figure 13 Funding Source of European VC Funds²²



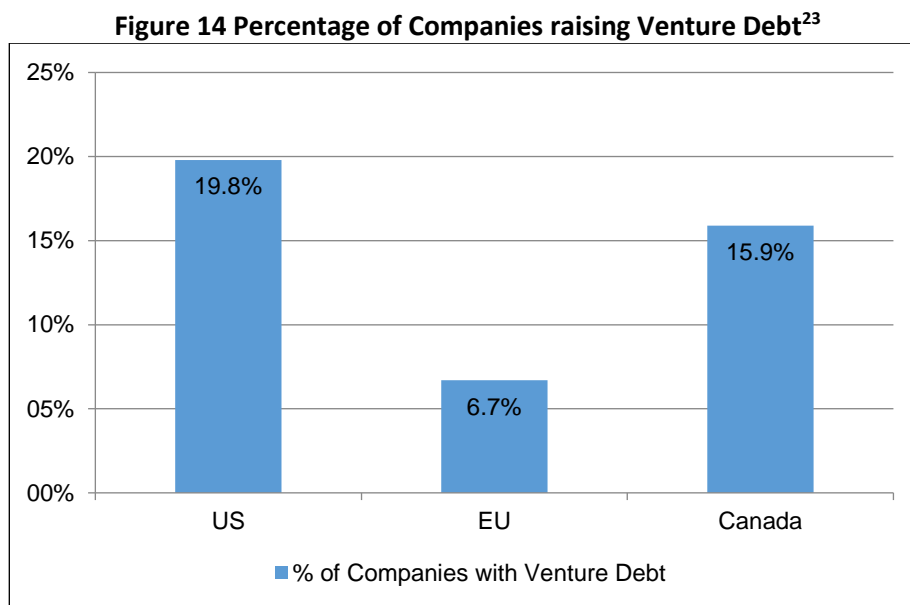
Finally, it should be noted that beyond traditional venture capital funds, other types of funds are increasingly financing scale-ups in the US. These include growth equity funds which traditionally focus on funding growth of established and profitable mid-sized companies; they include cross-over funds, which invest in private companies with a view of listing on public markets and then holding them for the longer term; finally they include specialized buyout funds that are buying companies from the venture capitalists with a view of growing private independent companies. To date there is little systematic data about these new investor categories.

²² Data is taken from the EVCA (2007-2015). Other includes Academic institutions, Capital markets, Endowments and foundations, Family offices, Insurance companies, Other asset managers (PE houses other than fund of funds), Sovereign wealth funds, and unclassified investor types (definitions are taken from EVCA).

2.3. Venture Debt Funding

There is no universally accepted definition of what constitutes venture debt, and data on venture debt remains sparse. The common understanding in the industry is that venture debt is associated with companies that also raise venture capital. Consequently we can obtain some idea of the venture debt market by looking at the Preqin data, which collects information on venture debt for those companies that also raise venture equity.

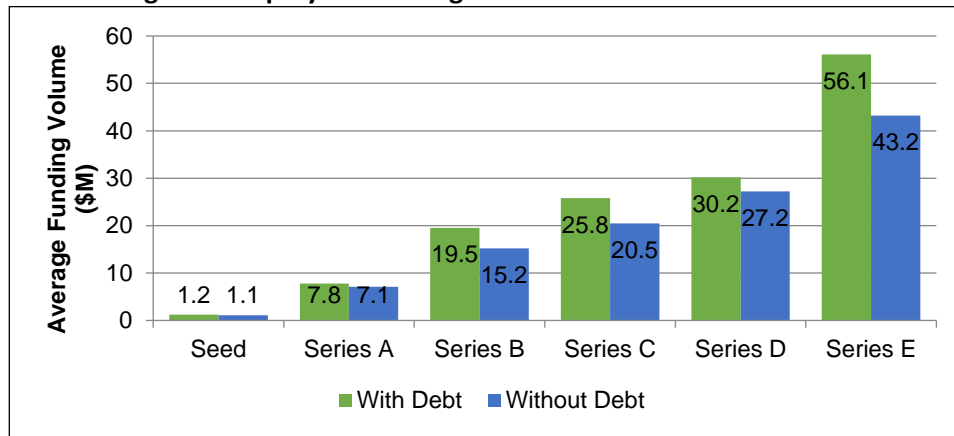
Figure 14 shows the fraction of companies in Preqin that raise some venture debt. We find that 20% of US companies raise venture debt at some point, compared to 16% for Canadian and 7% for European companies.



Is venture debt just a substitute for venture equity, or do companies raise more money by also going to the venture debt market? To examine this we look at the amounts of equity raising, comparing companies with and without venture debt. Figure 15 shows that companies with venture debt actually raise more equity than those without. This is true even without counting the amount of venture debt. This suggests that venture debt is a complementary tool for scale-up companies that have significant funding needs. European scale-ups, however, seem to have less access to this complementary form of funding.

²³ Data is taken from the Preqin Venture Capital database for the period 2010-2015. Data for the EU represents the EU-27 region.

Figure 15 Equity fundraising with or without Venture Debt²⁴

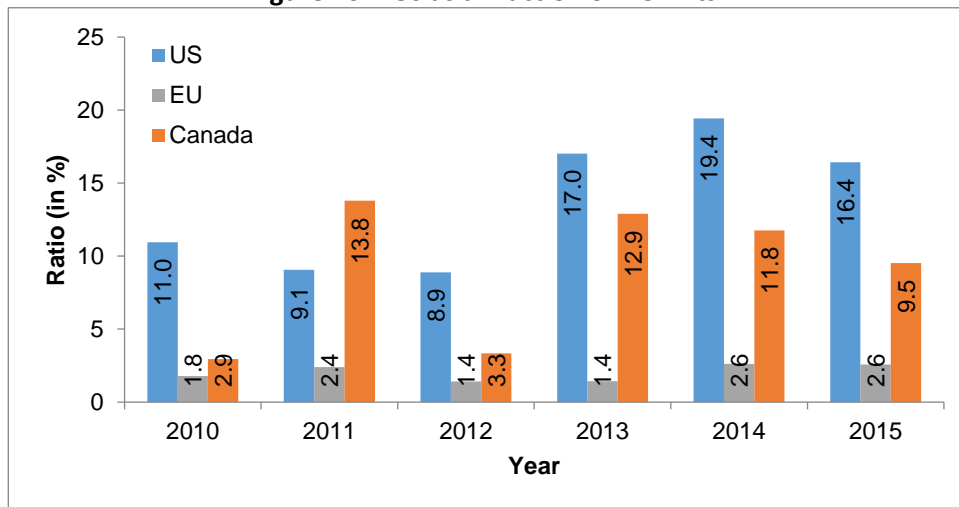


2.4. The role of IPOs and alternative paths to liquidity

In theory stock markets should play two important roles for scale-up companies. They should be a source of primary funding for companies, and they should give investors liquidity by allowing them to sell their shares either at or after the IPO. However, there is widespread concern in the industry that stock markets rarely succeed in playing these roles for the vast majority of scale-up companies. There are also marked differences in the way that stock markets work in different countries, how different segments of the market work within a country, and how receptive stock markets are over time to listing new companies. For a more comprehensive discussion, see Ritter (2014), Ritter, Vismara and Paleari (2012), and Wilson and Silva (2013).

The main point we want to establish here is that IPOs play a relatively minor role in the financing of European scale-ups. Figure 16 shows that amongst all the exits of European VC backed companies, less than 3% went public. In the US this percentage hovered between 9-11% between 2010 and 2012, and climbed to 20% in 2014. In Canada it lay between 9-13% since 2013.

Figure 16 IPOs as a Fraction of VC Exits²⁵

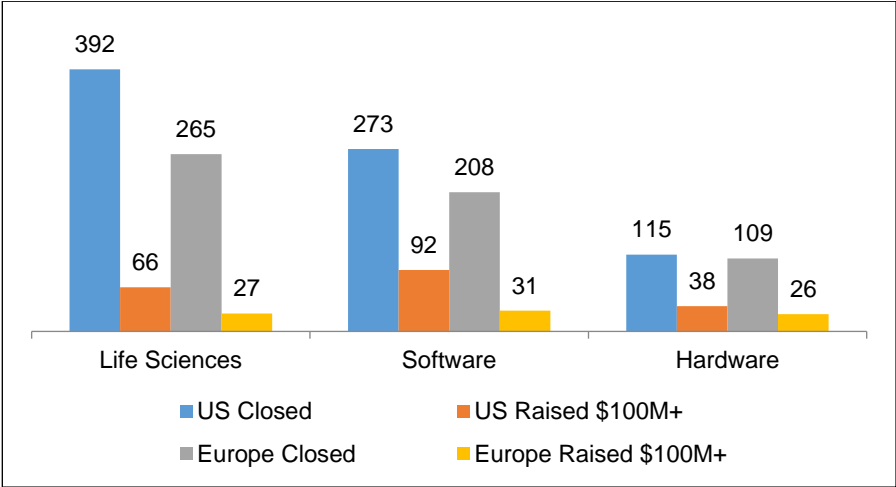


²⁴ Data is taken from the Preqin Venture Capital database for the period 2010-2015. The Figure illustrates the average funding volume per round for deals with and without venture debt.

²⁵ Data is taken from EVCA, NVCA, and CVCA for the period 2010-2014. The Figure illustrates the IPO ratio of EVCA, NVCA, and CVCA reported exits.

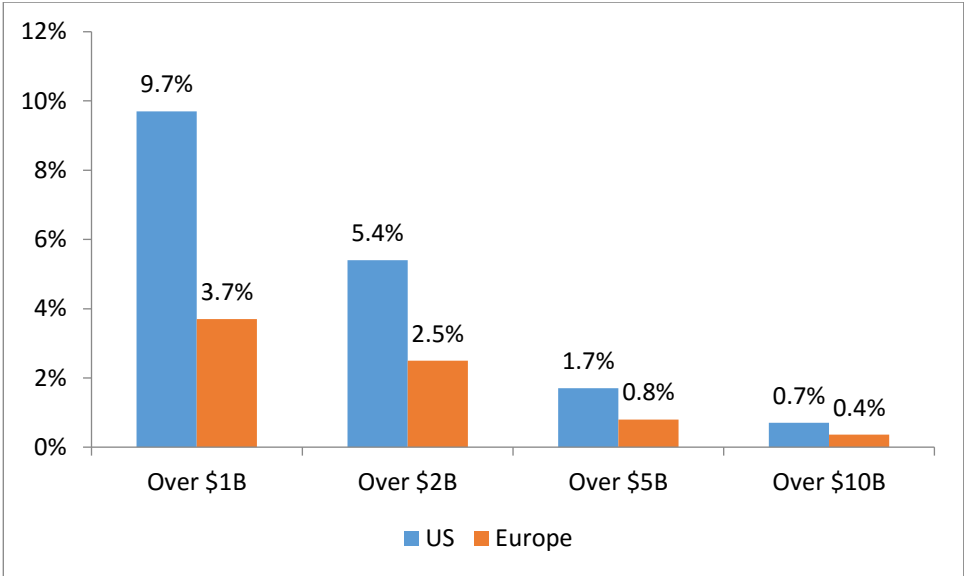
Going public can mean very different things depending on where you go public and how much you raise. Figure 17 uses data from Capital IQ for the period 2002-2015, focusing on three classes of technology scale-ups: life sciences, software and hardware. The Figure reports the number of IPOs as well as the fraction of IPOs that raised over US\$100M. Not only are the absolute number of IPOs higher, the fraction of large IPOs (i.e., those raising over US\$100M) is also higher in the US.

Figure 17 Large Tech IPOs over \$100M²⁶



Moreover, the growth performance of companies after the IPO does not seem to be the same in Europe versus the US. Figure 18 shows that the fraction of companies that went public over the period 2002-2015 that grew into billion dollar valuations (as measured in May 2015). For each of the size categories we find that the fractions of public companies are larger in the US than in Europe.

Figure 18 Post-IPO Growth²⁷

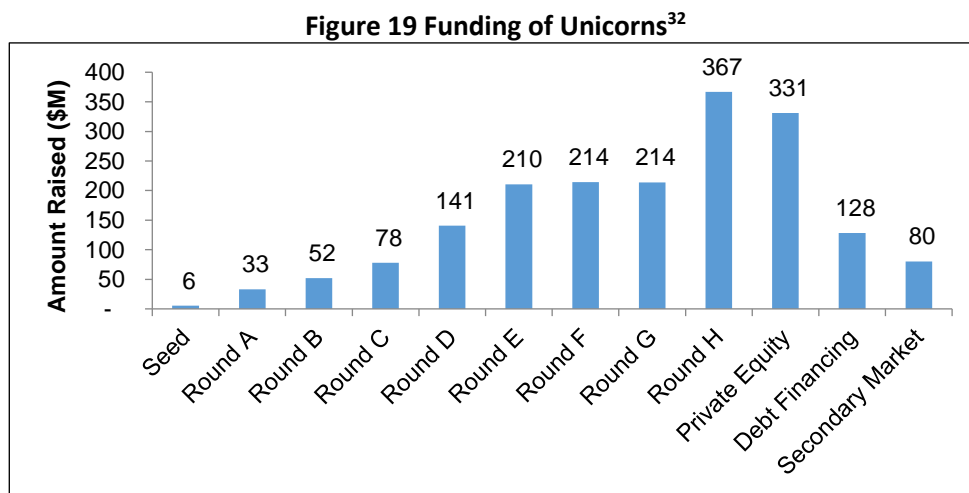


²⁶ Data is taken from Capital IQ for the period January 2002 – May 2015.

²⁷ Data is taken from Capital IQ for the period January 2002 - May 2015.

Unlike the US, Canada and some European countries have so-called second tier stock markets that have lower listing and disclosure requirements. Examples include the TSX Venture Exchange in Canada, or the Alternative Investment Market (AIM) in the UK. However, these markets are targeted at small and medium-sized business in general, and are rarely suitable for scale-ups. For example, there are two main stock market segment in the UK. For the period 2010-2015, the median IPO on the main board of the London Stock Exchange raised between a low of \$50.5M (£32M) and a high of \$301.6 (£191M), whereas the median for the AIM ranged between \$6.3M (£4M) and \$20.53 (£13M), which is lower than the typical amount of funding sought by scale-ups (See Hellmann et al., 2016).²⁸

If a scale-up company wants to remain independent (i.e., not get acquired), and there is no stock market that can serve its needs, then we know from Figure 1 that it can only drive straight at the crossroad, possibly remaining a private company for some time longer. In recent years, this path has become increasingly more common, as witnessed by the rise of the unicorns. By definition these companies are outliers, but they still hold some useful lessons. Figure 19 is based on the Crunchbase data and shows the average investment size for unicorns. Compared to Figure 4A, the funding amounts are vastly larger, which is consistent with their status as outliers.²⁹ Of particular interest to us here is the last column, which shows that the average amount of secondary transactions for unicorns has reached \$80M for those unicorns.³⁰ This highlights the fact that secondary transactions are becoming increasingly important as scale-ups want to remain private for longer.³¹



²⁸ The historic annual GBP-USD conversion rate has been applied for 2010-2015.

²⁹ Also of interest is the data about venture debt. Figure 20 shows an average amount of US\$128M of debt funding, which is the average amongst the 24% of unicorns that reported using any venture debt. Note that the average is affected by one outlier - Uber raised US\$1.6B of venture debt -, but the median amount is still \$50M.

³⁰ Note that this average is merely based on 6% of unicorns that reported having secondary transactions and reported the values. The median was \$63M.

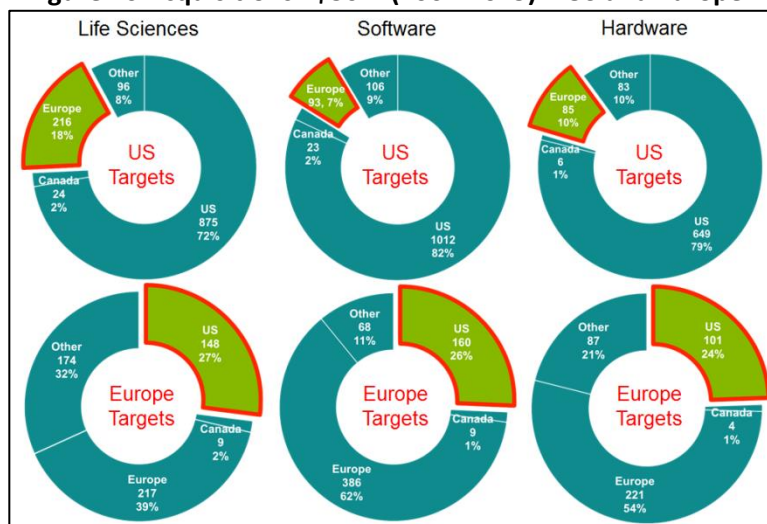
³¹ Apart from the above data on unicorns, there is very little data on the secondary sales of private shares. Moreover, this market remains fragmented and lacks transparency. In the US one of the leading marketplaces is called 'Secondmarkets'. It gained some visibility around 2009 when investors wanted to buy and sell shares in Facebook before it went public. Trades on Secondmarket valued Facebook well above its eventual IPO price, causing some controversy. Secondmarkets subsequently changed its business model towards helping private companies organize tender offers of their shares. It was acquired by NASDAQ Private Markets in 2015.

³² Data on unicorns is taken from CrunchBase and CB Insights as of March 2016.

2.5. Acquisitions

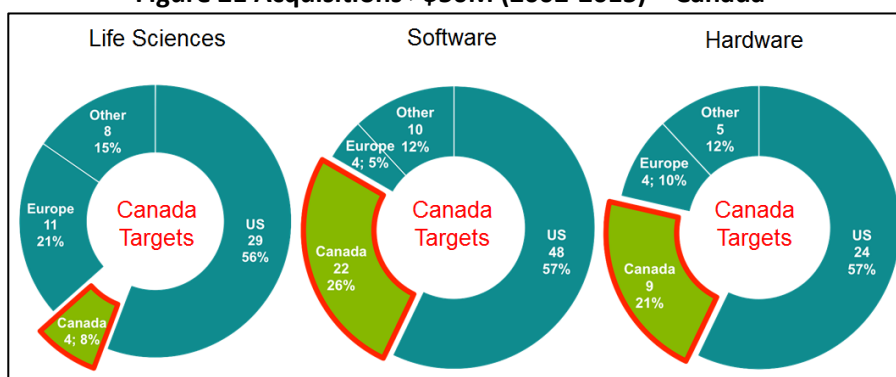
The most common outcome for a successful start-up is to be acquired by another company. This is the end of the road for the start-up as a separate company. There is little data on how the acquired entities grow within the larger corporations. One of the concerns of policy makers has been the role of foreign acquirers, and the possibility of relocation. Unfortunately there is almost no data on relocation. What is more readily measurable is the incidence of foreign acquisitions. Figure 20 and 21 uses data from Capital IQ for the period 2002-2015, focusing on acquisitions valued over US\$50M. It shows that US companies were bought by European acquirers in 7-18% of all cases, whereas European companies were acquired by US companies between 24%-27%.

Figure 20 Acquisitions >\$50m (2002-2015) – US and Europe³³



For Canada the numbers are more extreme, reflecting the smaller size of its economy, and its geographic proximity to the US. Over half of all Canadian targets were bought by US acquirers.

Figure 21 Acquisitions >\$50M (2002-2015) – Canada³⁴



³³ Data taken from Capital IQ for the period January 2002 – May 2015.

³⁴ Data taken from Capital IQ for the period January 2002 – May 2015.

2.6. An Interpretation of the Facts

To conclude our empirical analysis it is useful to briefly interpret the evidence presented so far. The data analysis does not lend itself to any definitive conclusion, given the limitations of the underlying data and the lack of any natural experiments to establish causal relationships. However, it is still possible to generate some preliminary insights from the overall pattern that emerges from the data. Six challenges stand out to us:

1. Relative to the US, the European and Canadian venture capital market remain smaller. Importantly, the gap is larger at the scale-up stage than the start-up stage.
2. Financing scale-up requires large venture equity rounds, which in turn requires sufficiently large funds. Relative to the US, Europe and Canada has fewer large experienced venture equity funds. Most large equity rounds in Canada and Europe include US investors.
3. Given the relatively lower access to scale-up financing in Europe and Canada, successful European and Canadian companies often seek to be bought out by foreign (especially US) acquirers. This may result in the firm relocating its headquarters.
4. Venture debt in the US complements venture equity as a source of funding scale-ups., however, the European and Canadian market for venture debt remains underdeveloped.
5. In addition, European stock markets have not been able to serve as a major source of funding for scale-ups, nor provide an important source of liquidity for venture equity investors.
6. Secondary sales of shares are an alternative for giving investors liquidity, but secondary markets remain underdeveloped in all of the markets studied.

What are the fundamental institutional factors that explain the differences between the US versus Europe and Canada? The US venture capital and buyout industries are older than their Canadian and European counterparts, so some of the differences can be thought of as different stages of market development. At the same time there are differences across countries in terms in their economic institutions, i.e., such as the countries' regulations, business practices, and level of expertise. In the short run, one cannot change institutional constraints, and in the long run all economic institutions are endogenous, so this questions is mainly about the medium term: What does the US have that is currently lacking in Europe and Canada, but that could be built over the medium term?

To address this important question, we briefly discuss what we see as the underlying institutional challenges. We anchor our discussion on the six main insights from the empirical analysis listed above.

First, while there has been a cultural shift in Europe and Canada around entrepreneurship, and a corresponding explosion of entrepreneurial start-up activity, up until recently there has been limited awareness about the importance of scale-up, particularly in Europe. An important step to changing the institutional setting in Europe and Canada is the cultural awareness that entrepreneurial success is not possible without growth and exit, and that scale-up is an essential aspect of completing the entrepreneurial value creation cycle. The situation is changing in Canada as the new government has made scaling up of companies one of the primary focus of its new innovation and growth agenda.

Second, in principle there is a large amount of institutional investment in Canada and Europe which could be invested in larger venture funds as has been the case for other types of alternative investments such as private equity or hedge funds. However, institutional investors need to be convinced that there is a sufficient market for venture capital finance that will generate attractive returns. Most importantly, institutional investors need to see credible teams of venture capitalists that have the expertise and networks to successfully operate such large funds.

Third, we would argue that the influx of foreign acquirers is not a problem by itself. Instead we see it is a symptom of two underlying forces: (i) the quality of entrepreneurial ventures in Europe and Canada is improving, to the point that experienced US corporations are taking an interest in those companies; but (ii) the domestic financial and business infrastructure in Europe and Canada is not yet strong enough to retain many of the promising scale-ups.

Fourth, the creation of a venture debt market faces two obstacles: regulation and banks' organizational practices. In the US, a large portion of venture debt is provided by private independent funds but in Europe, where the capital markets are less developed, the main providers would typically be banks. The regulatory burden on venture debt remains considerable, as banks are required to hold significant capital against venture loans, which are considered high risk under the Basel rules. Beyond regulation, venture debt is a formidable challenge for banks, as it runs contrary to standard prudential thinking. It typically requires a separate loan approval process that is run outside of the standard corporate lending operations.

Fifth, NASDAQ remains by far the most liquid stock market for high technology companies. Stock markets benefit from thick market externalities, where more buyers attract more sellers, and vice-versa. There are also important economies of scale in the economics of analyst coverage. The biggest challenge in Europe is the fragmentation of stock markets.

Sixth, the development of secondary markets for private shares remains a challenge everywhere. At present this largely remains an unsolved market design challenge. The advent of electronic trading platforms hold promise for future developments.

Section 3: Public Policies for Supporting the Financing of Scale-ups

3.1. The Role of Government in Scale-up

Scale-up poses some challenges not only for the private sector but also for policy makers. In this section we take a closer look at the tools available to public policy makers, and the trade-offs involved in applying them to the challenge of financing scale-ups. As noted earlier, we describe the main policies currently used by governments to address financing gaps, focusing on supply side interventions and selected regulatory framework policies. We explore the underlying rationales for government intervention in this market, and discuss the potential strengths and weaknesses of different policy approaches to help provide a framing for countries seeking ideas regarding policies for financing scale ups.

To address the challenge of financing scale-ups, policy makers must look at the entire entrepreneurial ecosystem, from start-up to scale-up. It can be misguided to expect one policy to provide the solution. Instead the main challenge is to identify what the main forces are, and how they interact with each other. Our analysis therefore looks at the main policy tools available, but refrains from picking specific solutions. Instead it tries to explain the advantages and disadvantages of the main policies, and elucidate how they can play complementary roles for solving the scale-up financing challenge.

In particular, we seek to address the 6 challenges outlined in Section 2.7 including the need for: 1) greater policy focus on the scale-up issue 2) larger and more experienced VC funds in Europe and Canada 3) developing the venture debt market 4) encouraging European and Canadian institutional and corporate investment in venture-backed firms in Europe and Canada 5) enhancing the reach and

liquidity of European and Canada stock exchanges 6) facilitating the development of secondary markets. Addressing these challenges will also help to develop the necessary requirements in Europe and Canada for scale-up investors - deep pockets, smart money, networked investors, and patient money.

Any policy analysis should lay out its objectives: what market failures justify a role for government, and what goals should the government pursue? A large prior economics literature explores the various types of market failures in entrepreneurial finance, related to informational imperfections, innovation externalities, and coordination failures - Lerner (2008) provides a useful summary. However, the overarching goal of government action is often to stimulate economic growth, especially job creation. This may lead policy makers to strive to stimulate innovation, augment risk capital, provide investment incentives and/or create new market institutions.

Building on the work of Wilson and Silva (2013), governments have three broad approaches for stimulating an entrepreneurial environment. First, they set the regulatory framework that defines some broad parameters of economic activity: rule of law, macro-economic stability, regulation, taxation, and so on. Second, governments can use public policies to stimulate the 'demand-side', promoting entrepreneurship and encouraging innovation. This may involve infrastructure investments in science and technology, investments in human capital, entrepreneurship education, and so on. Finally, governments can use public policies to stimulate the supply-side, using a variety of ways to fostering investments into entrepreneurial companies.

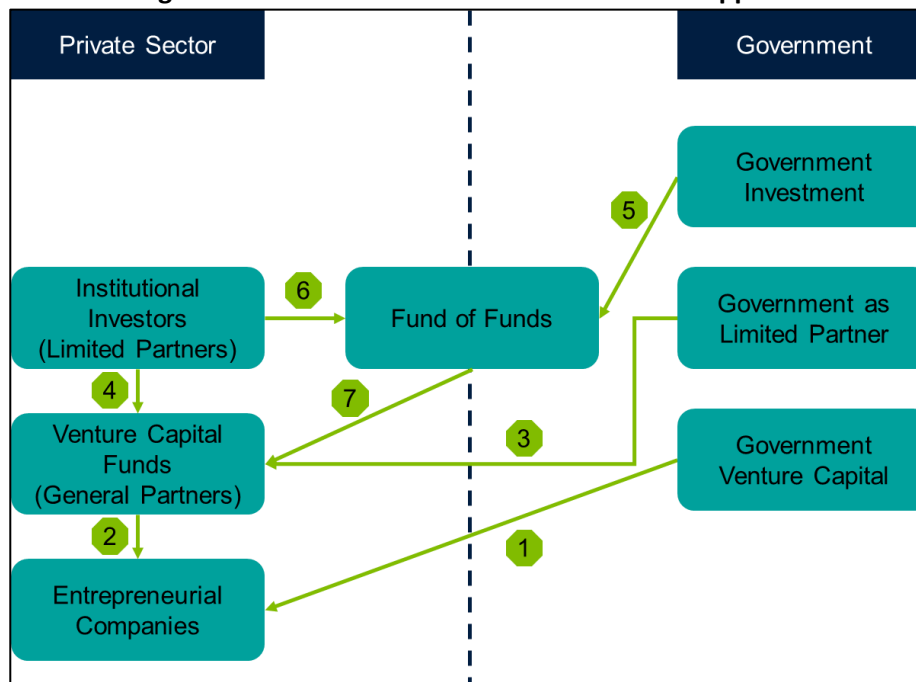
In this paper we recognize the importance of all three types of public policies. However, given our aim of understanding the financing of scale-up, we focus our analysis mainly on supply-side financial policies. We also consider a subset of regulatory policies that directly affect the financing of scale-ups. Finally we note that policies for scale-ups should not be confused with policies for small- and medium-sized enterprises, where the typical targets are not high growth companies, nor should they be confused with R&D policies, which typically target a much wider set of companies, especially large established corporations.

3.2. Funding Policies for Scale-ups

The vast majority of government support for entrepreneurial companies has come on the supply side. However, these interventions have been almost entirely at the seed and early stage financing stages. Relating this to our six empirical challenges in section 2.7., these supply side policies address the issues of funding gap (1st challenge), and the challenge of large and experience funds (2nd challenge), although some aspects also relate to the role of foreign acquirers (3rd challenge) and venture debt (4th challenge).

There are multiple ways that policy makers intervene in the venture capital market. This includes by investing directly in start-ups, co-investing in venture capital funds or setting up fund of funds to invest in multiple VCs. Figure 24 provides a conceptual overview of the main approaches. On the left hand-side it shows the structure of the private venture capital industry, where institutional investors (aka limited partners) invest in venture capital funds (aka general partners) – see arrow 4 – who in turn invest in entrepreneurial companies – see arrow 2. On the right hand side we identify the three main types of government funding approaches.

Figure 22 Alternative Models of Government Support³⁵



The first approach involves government-owned venture capital funds investing directly into companies – see arrow 1. These investment funds are often managed by government development banks. Examples of such banks making some direct investments include the Business Development Bank of Canada or BPI France. Sometimes the government funds invest on their own, sometimes they join syndicates of private VC funds – see arrow 2. The empirical evidence of Brander et al. (2015) suggests that companies funded solely by government VCs have lower performance outcomes. One interesting variant are government-run co-investment funds. These funds cannot invest on their own, but private VCs can approach them to join as a syndicate partners. In terms of Figure 24, an arrow 1 investment can only occur if it is initiated by an arrow 2 investment. The Scottish Co-Investment fund or the Ontario Capital Growth Corporation are examples of this. This approach provides additional funding to the entrepreneurial firms but does not address the challenges of increasing the size of VC funds or encouraging more institutional investors into the market, in fact, the unintended consequence could be quite the opposite.

For the second approach the government acts as a limited partner. This way the government does not pick companies, instead it picks venture capital firms that pick companies. As shown in Figure 24, the government invest in a venture capital fund (arrow 3) alongside with other private limited partners (arrow 4). Removing the government from making investment decision addresses concerns that governments lack the expertise and appropriate incentives for making good investment decisions. These concerns are partly alleviated when governments are only limited partners, as they delegate investment decisions to a private investor. The government is also one of several limited partners, further limiting their influence over the venture capital firms. While there are many benefits of delegating investment decisions to private investors, there are also some costs to the government, most notable the fact that government has to pay management fees and carried interest to the venture capital firms. From the perspective of the private venture capital firms, there are also costs of

³⁵ Own illustration.

accepting the government as a limited partners, because the money typically comes with additional restrictions and reporting requirements. Examples of this type of approach include the programs managed by the European Investment Fund, the British Business Banks's Enterprise Capital Funds and Venture Capital Catalyst Funds, programs administered by BPI France, the Business Development Bank of Canada, or the Alberta Enterprise Corporation. Note also that the SBIC program in the US falls under this type of program. The advantage of this approach is that it helps to increase the size of venture capital firms and therefore their capacity to invest larger amounts of funding.

A third type of approach is that the government invests through a fund of funds. The government makes funding available to a fund of fund (arrow 5), with other institutional investors investing in the same fund of funds (arrow 6). The fund of funds then invests in venture capital firms (arrow 7). Under this approach the government is removed one more level: it doesn't pick venture capital teams, it only picks a fund of funds. One argument is that picking successful venture capital teams is a challenge for governments, whereas picking fund of fund managers is relatively easier. The cost of this approach is obviously a second layer of management fees and carried interest. The advantage of using fund of funds is they are a vehicle for engaging institutional investors (i.e., arrow 6). The value proposition of a fund of funds is to allow smaller institutional investors with limited understanding of venture capital dynamics to build a diversified portfolio of venture capital funds. For larger institutional investors, the value proposition is to allow them to make a larger investment in one transaction, given their reluctance to engage in multiple transactions with lots of smaller venture capital funds. The need for government support, however, remains a topic under discussion. Examples include the Canadian VCAP program, and Quebec's Teralys Capital. It should be noted that the Capital Markets Union proposal of the European Union, as a result of consultations with experts and market players calls for the creation of a venture capital fund of funds at the European level.

In principle these three funding mechanisms can target various stages of investment. However, several of the challenges are different at the scale-up stage. First, the amount of funding required is more substantial (need for "deep pockets"), suggesting that going alone is particularly unattractive for governments. Therefore it is imperative for the government to find ways of engaging with private investors, and thus focus on a role of catalysing private money. Second, the notion of smart money is subtly different for start-ups than scale-ups. The additional expertise required at the scale-up stage concerns managing growth, which involves the establishment of efficient organizational practices as well as access to new markets, partners, and networks ("connected money") that play a lesser role at the start-up stage. Different types and combinations of expertise are therefore needed at the scale-up stage. Finally, an international growth perspective is particularly important at the scale-up stage. Funding solutions must therefore pay particular attention to attracting long term ("patient money") and international investment.

Across all three government venture capital financing models, there is a question regarding the terms under which the government should invest relative to the private investors. One approach is that the government invests on exactly the same terms as private investors, this is referred to as 'pari passu'. Another approach is that the government provides some form of subsidization. This can be structured as a downside protection where private investors can get their money back before the government does. There may even be some additional loss guarantees. In recent years this approach has come out of favour, because of its poor incentive properties. If one wants to move away from pari passu, probably a more sensible approach is for the government to limit its returns on the upside, but to have equal sharing of losses. This has better incentive properties, although it may deprive the government

of ever making a good return. More generally, any form of subsidization imposes some costs on the government. The choice between *pari passu* versus subsidization is therefore a function of how willing the government is to potentially incur lower returns, or even losses, as well as concerns about market distortions.

One of the major concerns with all government funding programs is the extent to which they crowd out private markets. Clearly the presence of government funding affects the market equilibrium. The debate is whether these programs have a large effect on total investment quantities with limited effect on valuations (the intended market expansion effect), versus a limited effect on total investment quantities with large effects on valuations (the unintended crowding out effect).³⁶

There are several important challenges for the design of government funding programs. We relate these, back to the four investor criteria we identified in Section 2: deep pockets, smart money, networked investors, and patient money.

The deep pocket requirement runs contrary to the natural instincts of most governments. Politicians typically try to please everyone, spreading their funding as wide as possible. Of particular importance is supporting companies across all part of the country. This approach may already cause problems at the start-up stage, where economies of agglomeration suggest that investments are more likely to succeed inside than outside the main entrepreneurial hubs. At the scale-up stage, a distributed funding approach becomes even more problematic, because scale-up means backing a relatively small fraction of start-ups that have extraordinary growth potential. Policy makers designing government programs can often make some choices about the geographic distribution, imposing more or less stringent local requirement. On average it is probably fair to say that that government-supported funding programs are typically more dispersed than what would be economically efficient. Often this has to do with political objectives directing interventions in ways which can divert the program from its intended outcomes.

The requirement to only fund 'smart money' is also challenge for governments. As noted above, governments are unlikely to have the expertise in house: hence the move towards more indirect investment approaches described in Figure 24. However, even when working with private investors, there is relatively little that the government can do to improve the quality of venture capital teams, which is largely based on prior experience. One possible avenue for government to consider is attracting the best international talent to set up venture capital operations in their jurisdiction. Some successful examples include the role of Yozma, and more recently the Israeli Biotech fund program, in attracting foreign venture capitalists to Israel, and possibly Teralys attracting foreign investors to Quebec. However, top venture capital firms have proven to be somewhat reluctant to set up office in locations that are outside of their preferred geographic areas.

The requirement of being well networked points to another challenge in the design of venture capital programs, namely the appropriate definition of geographic boundary restrictions. The natural instinct of most governments is to create programs for domestic companies and domestic investors. However, if scale-up requires international networks, such domestic restrictions may be inappropriate. One issue

³⁶ This is a difficult question to assess empirically, mainly due to the lack of a counterfactual. The work of Brander et al (2015) finds evidence that there appears to be some partial crowding out (both at the level of individual companies and at the aggregate market level), but that the crowding out was far from way full. Note also that their analysis pertains to crowding out at the company investment level. There have been no systematic studies about potential crowding out at the level of institutional investors investing in funds.

is whether domestic companies can still make use of the program when their investors come from abroad. This is a particularly sensitive question for tax credit programs (discussed below in Section 3.3.), but the issue also arises in co-investment programs. Another issue is whether investors that receive government support (whether through direct or indirect channels such as fund of funds can make investments in foreign companies. From a government perspective it can be difficult to justify why government funds might be invested abroad. However, from the perspective of the venture capital firm, a restriction to only be able to invest in domestic companies might preclude it from becoming a global specialist, and force it to become a local generalist. Moreover, it may limit the firm's ability to build stronger international networks which may be important to support its scale-up companies.

Finally, it is unclear to what extent the government can influence the patience and investment horizons of private investors. Being only one among several limited partners means that the government has limited influence over the terms of the partnership agreement. In practice most government-supported venture capital funds continue to have the standard 10 year fund life.

3.3. Taxation Policies for Scale-ups

Beyond the financial investment programs described in section 3.2, the other main set of financial supply-side policies concerns the tax system, including a variety of tax credits or tax reliefs. In terms of our six empirical challenges in section 2.7., tax policies address mainly issues of the funding gap (1st challenge). From an economic perspective, tax-based approaches can be thought of a pure subsidies. The government effectively transfers funds to the investor or company without taking any ownership stake in return. From an administrative perspective, this approach is very different from the funding programs discussed in section 3.2. Tax benefits are entirely driven by rules, leaving the government with no discretion. This helps to eliminate political favouritism, but it also limits the government's ability to fine-tune its programs to the most deserving investors and companies. Tax benefits also encourage unsavoury investors, companies or fund managers to find ways of abusing the system.

Tax benefits can be given either to the company or to the investors. Moreover, they may pertain either to investments (i.e., inputs) or returns (i.e., outputs). This generates a simple two-by-two matrix of tax options shown in Figure 25. In the top left quadrant we find company-based investment tax credits, which typically come in the form of R&D tax credits. The Canadian SR&ED tax credits or the French J.E.I programs are examples of this. In the top right quadrant we find investor-based tax credits, where eligible investors receive a tax credit on their equity investments. The EIS/SEIS tax credit in the UK is a prominent example where the tax credit goes to the individual investor, the Canadian Labour-sponsored funds or the French FCPIs are examples where the tax credits are obtained by investing in a tax-advantaged fund. There are many subtle differences to these two approaches, but one of the most important concerns the fact that R&D tax credits are available to a much larger base of companies (including large established corporations) although the rates might vary by the size of the firm, whereas investment tax credit are only available to those companies that attract some outside investors. It is therefore likely that the quality of the recipient pool is higher with investment tax credits.

The left bottom quadrant concerns corporate tax relief, i.e., a reduction of the taxes paid on company profits. This is typically only relevant for companies that are generating profits, and therefore of limited importance to most start-ups and scale-ups. In the right bottom quadrant we finally find capital gains reliefs that bolster the net returns of investors at the time of exit. The important

comparison is with the right top quadrant. Under a tax credit, investors are rewarded for making investments, irrespective of their eventual success. Capital gains relief, by contrast, are only valuable in case of success (and their value depends on the prevailing rates). We can thus think of this as a risk-return trade-off. With the former the government helps by sharing risk, with the latter the government helps by increasing investors’ upside returns. The relative desirability of these two policies therefore depends on the degree of investor risk-aversion, and the importance of investor incentives on the upside.

Figure 23 Alternative Tax Policies

Tax policies	Company-focused	Investor-focused
Investment-based	R&D tax credits	Investment tax credits
Returns-based	Corporate tax relief	Capital gains relief

Investment tax credits have been mainly used at the start-up stage, and are rarer at the scale-up stage. One of the reasons is that is easier to administratively define a start-up than a scale-up. Another reason is that the cost of offering tax benefits can be substantially larger at the scale-up stage. Overall we note that the extent to which tax policies can be used at the scale-up stage remains an open and delicate question.

3.4. Financial Regulatory Policies for Scale-ups

We then consider some of the regulatory policies that directly affect the financing of scale-ups. Whereas the funding and tax policies discussed in 3.2 and 3.3 respond mainly to the 1st and 2nd challenge of our empirical findings (see section 2.7), regulatory policies address the four remaining challenges.

Our 3rd empirical challenge concerns facilitating cross-border investments and cross-border fund raising. This is related to the 2nd challenge of creating larger, more experience and better networked funds. In the European context there may be opportunities for the further harmonization of security laws to facilitate venture capital. Finally, regulations should seed to facilitate, not discourage foreign investments and acquisitions. For example, the new MiFID regulation might be an impediment to non-European LPs investing in EU funds.

Our 4th empirical challenge relates to venture debt. The regulation of banks matters for venture debt, particularly in Europe and Canada as discussed earlier. In principle venture debt can be provided by either banks or specialized funds, while banking regulation only affects the former not the latter. Still, banks may have some advantages over funds in providing venture debt, because of complementarities with traditional banking services. Thus the regulation of banks is likely to affect the overall supply of venture debt. Capital requirements are an obvious concern: venture debt is typically classified as a high risk loan, and given a high risk weight. This seems unlikely to change over the short term, because venture debt remains a small asset class, and because defining a clear regulatory exemption is likely to be challenging.

Our 5th empirical challenge concerns the role of stock markets. As shown in section 2, European and Canadian stock markets have not been a sufficient source of funding for tech scale-ups, and therefore have not provided much liquidity to investors. Part of the challenge is to design better listing and disclosure requirements. The JOBS act in the US, for example, defined on ‘on-ramp’ structure that

allows companies to maintain greater confidentiality during the listing process (see Dambra, Field, and Gustafson, 2015). The biggest challenge is the current fragmentation of European stock markets. As noted in Section 2, there are network externalities that make larger stock markets more efficient. There are also economies of scale in analyst coverage that suggest that markets get more liquid when there is a critical mass of listed companies with a common investment theme. It is hard to see how any one European country could achieve such a critical mass on its own. We would therefore argue that the creation of a pan-European stock market or at least inter-listing or networking mechanisms among European tech stock markets is desirable. The implementation of such an initiative remains challenging, but the economic benefits for the scale-up ecosystem would be substantial (see Wilson and Silva, 2013).

Finally, our 6th empirical challenge concerns the establishment of markets for the secondary sale of private shares. To a large extent, this is a private sector challenge, in terms of establishing new platforms for structuring such transactions. Regulators, however, can play a role by simplifying and harmonizing securities laws. Secondary markets will become much more efficient if they attract a broad class of international buyers.

Conclusion

This paper examines the challenges of scale-up financing. It provides a theoretical framing for understanding the challenges conceptually. The paper then provides an overview of data suggesting that Europe and Canada have started to catch up to the US in early stage financing, but continue to lag behind at the scale-up stage. Finally the paper provides an overview of the role of government policy to address the financing scale-up challenge.

In this paper we asked three closely related questions. The first question is conceptual: What are the alternative options of funding scale-ups, and what are underlying challenges associated with each of those options? The second question is empirical: What are the differences in the way that scale-up companies are currently financed in the US, Europe and Canada, and what explains these differences? The third question is normative: What is the possible role of government and public policies in supporting the financing of scale-ups?

To answer these questions, we divided our analysis into three parts. In the first part, we develop some simple conceptual frameworks for analysing the financing choices at the scale-up stage. Using the analogy of a car at a crossroad, we examine companies' choices between scaling-up as a privately-held company, as a publicly-listed company, or being acquired by another company. We argue that scale-up investors need to satisfy four important criteria that we label 'deep pockets', 'smart money', 'networked investors', and 'patient money'. We also explained the importance of providing investors a well-defined path to liquidity.

In the second part, we compared data about start-up and scale-up financing in the US, Europe and Canada and Identified six empirical challenges including the need for: 1) greater policy focus on the scale-up issue 2) larger and more experienced VC funds in Europe and Canada 3) developing the venture debt market 4) encouraging European and Canadian institutional and corporate investment in venture-backed firms in Europe and Canada 5) enhancing the reach and liquidity of European and Canada stock exchanges 6) facilitating the development of secondary markets.

In the third part, we provided an overview of selected policy approaches to addressing the scale-up financing issue but we refrained from making specific recommendations as those would need to be country and situation specific.

Overall, the scale-up challenge can be thought of as the second act of a drama, where the first act was the start-up revolution. Policy makers need to take a long-term perspective when embarking on the financing of start-ups and make sure the firms will have enough fuel to get successfully to the finish line.

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Appendix on data sources

OECD:

VC investment data is taken from the OECD 'Entrepreneurship at a Glance 2015' report. Data on Gross Domestic Product (GDP) was obtained from the Organisation for Economic Co-operation and Development (OECD) database. Data used in Figures 2 and 3.

Preqin

All data for Fund- and Funding-level analyses are taken from the Preqin Venture Capital data base. The full data set covers about 30,000 funding rounds in 10,000 deals in the period 2010-2015 for Western and Eastern Europe, the Nordics, and North America.

The analysis focuses on Funds and VC deals in the EU-27 region, as well as the United States and Canada. Specifically, the observed countries are (countries listed in alphabetical order): Austria, Belgium, Canada, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and United States. The data includes all Nordics to cover the Scandinavian VC market comprehensively, as well as Switzerland in order to have full coverage of continental Europe.

Several filters are applied to the data, such as the availability of funding volume per investment round, or the location information for VC funds. The data is merged across different Preqin data sets, resulting in further losses of observations. The final data set therefore covers 23,537 funding rounds in 7,957 VC deals made by 1,995 funds of 1,198 different fund managers. Data used in Figure 4A, 4B, 4C, 7, 8, 9, 10, 11, 12, 14, 15, 22, and 23.

VentureSource

Data taken from VentureSource is for the period 2007-2013. Data used in Figure 5.

CrunchBase:

Data on unicorns was sourced from CrunchBase (<http://www.crunchbase.com>). CrunchBase is a crowd sourced database which captures contributions from users, investment firms, and their network of global partners.

Unicorn data was first selected according to a list of unicorns reported by CrunchBase (<http://techcrunch.com/unicorn-leaderboard/>) and CB Insights as of 17 March 2016. The CrunchBase and CB Insight lists contained 161 and 155 companies, respectively. The CrunchBase list was used as the basis for this research, with some adjustments made for companies with known additional information. While a thorough review of each unicorn was not completed, additional information on three companies was used. One company, POWA Technologies, was removed due to confirmation of entering 'administration' (bankruptcy). Two companies, Transferwise (UK) and Hootsuite (Canada), were added due to inclusion on many other unicorn lists. Some countries of origin were adjusted to align with other sources of information.

871 unicorn rounds were pulled from a total of 125,478 deals reported in the CrunchBase dataset between 1960 and 2016. For the unicorn companies, the relevant period of deals is 01 May 2001 to 16

March 2016. Of the 871 unicorn rounds, 793 include the amount raised and 791 identify the round in which the funding event took place. Combined, this left 728 unicorn funding rounds for analysis.

Geographic distribution of unicorns was determined using the adjusted CrunchBase data set. Companies were categorised into four areas, Canada, US, Europe (Czech Republic, France, Germany, Luxembourg Netherlands, Russia, Sweden, Switzerland, UK), and Rest of World (Argentina, China, India, Israel, Japan, Korea, Malaysia, Nigeria, Singapore, South Korea, Thailand, UAE). Data used in Figure 6 and 19.

Invest Europe (f.k.a. EVCA):

Data for Fundraising activities and Venture Capital Divestments (e.g. IPOs) in Europe are taken from the Invest Europe Annual Activity Statistics. The data captures activities from more than 1,800 private equity firms, which are representing Invest Europe's members. The full data set covers approximately €39b in Funds raised for the period 2007-2014 for the following countries in Europe (countries listed in alphabetical order): Austria, Baltic countries, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Other CEE (Ex-Yugoslavia & Slovakia), Poland, Portugal, Romania, Spain, Sweden, Switzerland, Ukraine, and the United Kingdom. Data used in Figure 16.

National Venture Capital Association (NVCA):

Data for Venture Capital activities (Investments and Divestments) in the United States are taken from the PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, which comprises data from Thomson Reuters. The full data set covers 24,829 investment deals for the period 2010-2015 for the United States. Data used in Figure 16.

Canadian Venture Capital and Private Equity Association (CVCA):

Data for Venture Capital activities (Investments and Divestments) in Canada are taken from the CVCA Industry Statistics Infobase databases. Data used in Figure 16.

Capital IQ

Data for US and European tech IPOs are taken from S&P Capital IQ for the period January 2002 – May 2015. The data comprises IPOs across the US and Europe within the life sciences, software, and hardware industries. Data used in Figure 17, 18, 20 and 21.