THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

Venture capital as a tool for regional development

Exit patterns and long-term consequences

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Abstract

Venture capital (VC) funded high-tech startups are often cited drivers of economic impact and catalysts of regional growth. Public support of high-tech startups and investments into venture capital has thus been a popular focus for public policy globally in the past decades. This is despite that the long-term, and post-exit, impact of most venture capital funded startups is little known, especially for regional development. To the degree startups have been tracked after exit, there is evidence of startups both growing and disappearing post-exit, with exit route often suggested as an influence of post-exit growth as well as relocation. The purpose of this thesis is thus to investigate the suitability of venture capital for regional development, by studying the long-term and post-exit outcome for venture capital funded startups.

This licentiate dissertation builds on four studies on startup exits. The first study, '*Migration patterns of venture capital funded startups*', explores quantitatively startups exits in five innovative regions: San Francisco Bay Area encompassing Silicon Valley, Colorado, North Carolina, Israel and Sweden. Conclusions are that regional exit patterns are dominated by acquisitions, with ownership of the most valuable startups concentrated to Silicon Valley. In the other four regions, only a small portion of the value of the startups remain owned in their regions. The second study, '*Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy?*', quantitatively tracks the post-exit growth of venture capital funded startups in Sweden 1992-2010. Conclusions are that post-exit growth is dependent on exit route. Startups which exit by IPO grow faster than acquired startups, and half of the acquired startups are consolidated within a couple of years after exit.

The third study, '*Venture capitalist's exit choice: Deciding the fate of successful startups*', examines how venture capitalists make exit choices for startups. Conclusions are that venture capitalists alone decide on exit, overriding entrepreneurs if required, with a preference for acquisition exits and a reluctance to take firms public. The final fourth study, '*Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths*', maps qualitatively the post-exit behavior of entrepreneurs, business angels, venture capitalists and key employees in startups dependent on the financial exit success. Conclusions are that growing entrepreneurial ecosystems require a minimum of profitable exits, and without which entrepreneurial ecosystems will stagnate and depopulate.

This thesis increases our understanding the long-term regional economic consequences of using venture capital to accelerate startups. Venture capital accelerate startups in the time period following their initial investment until the exit. At exit, the venture capitalists have a preference of exiting by acquisition, rather than going public, with the most valuable startups acquired by firms in Silicon Valley. Acquired startups have lower post-exit growth than startups going public, and many acquired startups are consolidated post-exit. For regions other than Silicon Valley, the likely outcome is that their most valuable startups will not remain long-term in their ecosystems. Regions using venture capital as a policy tool for regional growth, should consider modifying their policies to account for the startup migration effects and consider supporting alternative funding mechanisms in their entrepreneurial ecosystems.

Keywords: Entrepreneurship, Startups, Exit, Policy, Venture Capital, Ecosystem.

List of appended papers

This thesis is based on the work contained in the following papers:

Paper 1:

Hulthén, P. and Graff, G. (2019). Migration patterns of venture capital funded startups.

The paper was co-authored with Gregory Graff of Colorado State University. I conceived the idea and research design for the paper. Myself and Gregory conducted the data collection and clean-up, with some assistance by research assistant Ivan Velinov. Literature review, method, analysis and discussion was done jointly by me and Gregory. From start to finish, the process took three years.

Paper 2:

Hulthén, P., Glücksman, S., Lundqvist, M. and Isaksson, A. (2019). Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy?

The paper was presented at the annual Entrepreneurial Finance conference in Trier, in July of 2019, and is presently under review in the Entrepreneurship and Regional Development journal. The paper was co-authored with Sarah Glücksman, Mats Lundqvist and Anders Isaksson. I conceived the idea and the research design was co-developed with Sarah. Myself and Sarah conducted the data collection and clean-up with assistance by research assistant Marcus Silkisberg. Literature review, method, analysis and discussion was done jointly by all four co-authors. From start to finish, the process took two years.

Paper 3:

Hulthén, P. (2019). Venture capitalist's exit choice: Deciding the fate of successful startups.

The paper was presented in an early version as poster at the annual RENT conference in Toledo in November of 2018. A later version was presented at the annual Entrepreneurial Finance conference in Trier in July of 2019. I am sole author of this paper and conducted all parts of the research process by myself. From start to finish, the process took two years.

Paper 4:

Hulthén, P. and Dimov, D. (2019). Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths.

The paper was presented at the annual ACERE conference in February of 2019. The paper was co-authored with Dimo Dimov of Bath University. I conceived the idea, research design and method for the paper. Literature review, analysis and discussion was done jointly by me and Dimo. From start to finish, the process took two years.

All four papers were conducted within the Exit Value Study (EVS) research project financed by VINNOVA and Västra Götalands Regionen (VGR). I was co-initiator of the EVS project together with Mats Lundqvist, and acted as project manager as the research was conducted in collaboration between Chalmers University of Technology and IMIT Foundation.

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1 Introduction

Venture capital (VC) funded high-tech startups are often cited drivers of economic impact and catalysts of regional growth, based on evidence from Silicon Valley with examples such as Apple, Facebook and Google (Florida & Kenney, 1988; Gompers et al, 2010; Lerner et al, 2012; OECD, 2010a). Studies in the U.S., and globally, reinforce that the most successful startups contribute a disproportionately large turnover and employment, and by extension, economic growth (Shane, 2008, 2009; WEF, 2011). Venture capitalism has spread almost worldwide with the expectation that VCs will be a generalized driver of economic growth and innovation (Kortum & Lerner, 2001). This thesis systematically questions this widely held expectation.

Public support for using venture capital, as a mechanism for identifying and accelerating the most promising startups, has hence formed the basis for innovation and entrepreneurship policy, as regions have attempted to replicate the success of Silicon Valley (Storey & Tether, 1998; Lerner, 2009; Lerner et al, 2012; OECD, 2001, 2010b; World Economic Forum, 2009, 2011). As an example, approximately 35 percent of the €4bn annually raised by private European venture capital funds stem frommed European taxpayers through their national and regional governments or the European Investment Fund (Höppner, 2015). Government agencies contributed over €2bn to European venture capital funds raised in 2018 (Invest Europe, 2019).

The popularity of venture capital as a policy tool for regional development is widespread, despite that the long-term, and post-exit, impact of most venture capital funded startups and policies to support them remains unknown (Nightingale & Coad, 2013) and that most regions fail at replicating Silicon Valley's success (Rosenberg, 2002). The largest studies on venture capital funded startups have only followed the startups until exit, when startups usually are acquired or go public (Cumming & MacIntosh, 2003; Lerner et al, 2012). What happens to startups after exit is outside the scope of most studies, often due to the difficulty of tracking firms post-exit (Duruflé et al, 2017).

To the limited extent post-exit growth of startups has been studied, indications are that different exit routes, such as going public or being acquired, lead to divergent post-exit growth trajectories for startups (Mason & Harrison, 2006; Mason & Brown, 2013; Brown et al, 2017; Carpentier & Suret, 2014; Hogan et al, 2018; Xiao, 2015). The long-term impact of startups is to a large extent dependent on the subsequent performance of the startups following their exit events. Whether startups remain long-term in their regions of origin, and grow post-exit, are important policy concerns (Wennberg & Mason, 2018). There is an extensive research gap regarding what happens to startups long-term and post-exit, and specifically to venture capital funded startups, whom are the focus for considerable policies. As we are unsure about the long-term effects of using venture capital for accelerating startups, the question arises whether venture capital is a suitable tool for regional development.

Based upon the identified research gap, the overall purpose of the thesis is to investigate the suitability of venture capital for regional development, by studying the long-term and post-

exit outcome for venture capital funded startups. In approaching this purpose, we first need to map what happens to venture capital funded startups long-term and post-exit on a regional basis. Next, we need to understand the connection between exit route, such as foreign acquisition or local IPO, and post-exit development of startups on a regional level. Furthermore, we need to understand what drives exit decisions for venture capital funded startups. Finally, we need to understand the chain of events that lead to exits, the events that occur as a results of exits, and what these events mean for regional development.

The purpose of this thesis is approached by answering three sequential research questions:

RQ1: What are exit patterns for venture capital funded startups on a regional level?

RQ2: What is a likely causal chain of events that lead to, and occur as a consequence of, exits of venture capital funded startups?

RQ3: What are key consequences of exits of venture capital funded startups for regional development?

To answer the three research questions, I conducted four studies on startup exits. The first study, '*Migration patterns of venture capital funded startups*', explored quantitatively startups exits in five regions: San Francisco Bay Area encompassing Silicon Valley, Colorado, North Carolina, Israel and Sweden. The purpose was to investigate how exit patterns for VC-funded startups across the five regions, the extent to which regions retain startups in their region and which factors are associated with ownership transitions to other regions. Exit patterns examined included survival ratios, exit routes, exit transactions amounts and ownership transitions within and to other regions.

The second study, '*Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy?*', quantitatively tracked the pre- and post-exit growth of venture capital funded startups founded 1992 – 2010 in Sweden. The sample in this second study was smaller and limited to one region compared to the first study, while covering a longer time period post-exit. The purpose was to investigate the relationship between pre-exit performance, exit route and post-exit performance in terms of turnover, employment, growth, intellectual property and finally post-exit continuation or discontinuation for venture capital funded startups.

The third study, '*Venture capitalist's exit choice: Deciding the fate of successful startups*', examined qualitatively how venture capitalists make exit choices for startups. Assuming that exit route matters for the long-term post-exit development of startups, it is important to understand how venture capitalists make exit decisions. Aspect of decision making investigated included if venture capitalists were sole decision makers, which factors they consider, these factors relative importance in the decision and any observable biases that influenced the decision making.

The final fourth study, '*Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths*', mapped qualitatively the post-exit behavior of entrepreneurs, business angels, venture capitalists and key employees in startups dependent on the financial exit success. The purpose was to explore systemic recycling mechanisms caused by startup

exits, through tracking the role transitions of the four participatory agents, entrepreneurs, business angels, venture capitalists and key employees. As startup exits may be catalysts of reorganization and relocation for startups, one way to understand the dynamics is through the participating people leaving the startup for new engagements.

The remainder of the thesis is structured as follows. First, I will review the relevant literature for the thesis, including chosen definitions and terminology. Next, I will go over the methodologies used in the two quantitative and two qualitative studies. The studies and appended papers for each of the four studies will then be summarized with conclusions. Following this, the results of the studies will be discussed in relation to theory and the three research questions of this thesis. Finally, I conclude by revisiting the purpose, with implications for scholars and practitioners, and outline a continued research agenda.

2 Literature Review

Firstly, I begin the literature review section by explaining chosen definitions and terminology, to be clear about the meaning of the terms I use, and also serve as an introduction to the literature review. Secondly, I review literature in the intersection between venture capital, entrepreneurship and regional development research streams, due to the cross-disciplinary nature of startup exit research.

2.1 Chosen definitions

2.1.1 Definition of startup

Startup has become a common term for an entrepreneurial venture in anything from business press to popular TV shows, due to practitioners globally using the term every day. The term startup is increasingly used by academics, however often in referring to the startup phase of a new entrepreneurial firm's development which carries a slightly different meaning. Since this research studies a practitioner phenomenon, I elect to use the practitioner term startup, as it carries a specific meaning. The most commonly used definition of a startup is stated below, as popularized by Blank & Dorf in the *Startup Owner's Manual* (2012):

'A startup is a temporary organization in search of a scalable, repeatable, profitable business model. At the outset, the startup business model is a canvas covered with ideas and guesses, but it has not customers and minimal customer knowledge'. (Blank & Dorf, 2012).

A startup differentiates itself from a generic new firm in being specifically explorative and growth oriented, starting with a limited resource base. A generic new firm does not have these requirements; it can use a proven business model for offering a generic product or service, be satisfied with not growing and start with a considerable resource base if it is a spin-off or joint venture originating from an established firm. Startups thereby constitute a subset of new firms with specific characteristics, compared to most other firms studied within entrepreneurship.

2.1.2 Definition of equity funded startup

Leibenstein (1968) distinguishes between entrepreneurship as a type of management working with established conditions and defined markets, and high impact entrepreneurship working with Knightian (1921) uncertainty and resulting in Schumpeterian (1934) impact. Acs (2008) elaborates that high impact entrepreneurs found and manage *leveraged startups* which make use of external assets, such as investors, to allow their firms to grow faster and go after larger business opportunities that ordinary small businesses cannot due to lack of resources. Among these external resources leveraged, external equity funding is the most common external resource both used and prescribed for faster growth. In short, it means bringing in funding from private and institutional investors in return for equity in the firm. The additional capital allows the startup to evolve and grow faster than cash flow generated organically from sales

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and operations would allow. Examples of equity investors are business angels, crowdfunding, family offices, venture capitalist funds, corporate venture capitalists and private equity funds (Block et al, 2018).

Equity investors' capital, however, come with obligations and limitations for entrepreneurs. With an extended ownership group including multiple stakeholders, agency changes and priorities may diverge. It is therefore common practice in equity funded startups, that bring in professional investors, to have a shareholder's agreement, which aligns interests among the shareholders and puts procedures in place to control shareholders, board and management. Common procedures include restrictions and regulations for trading of shares in the startup, so called drag-along and tag-along clauses, designed to facilitate that all shareholders sell their shares at the same time. One example of how these clauses are used, is to force minority shareholders to sell their shares, in the event that a majority of shareholders wish to sell the firm, and the acquiring firm makes the purchase of all outstanding shares a condition for completing the transaction (Cumming, 2008).

2.1.3 Definition of venture capital funded startup

A venture capital funded startup is a startup that has received investment(s) from a formal venture capital fund. The *formal* distinction is important, as the definition of what is venture capital has, and still is, debated with different definitions historically used in Europe and the USA (Lerner et al, 2009). This thesis uses the more narrow USA definition of formal venture capital, as a traditional limited lifetime fund operated by general partners with financing from limited partners. This definition excludes for instance family offices, which may call themselves venture capitalists, but as they lack limited partners and a limited time fund structure do not fit the definition. The distinction matters, as the financial structure of the venture capitalist influences their working methods, such as investment and divestment processes. A family office is likely to have different investment criteria, process, horizon and priorities than a formal venture capital fund. Studies have shown that exit patterns of venture capitalists are distinctly different from other private equity investors, for example private equity investors are considerably more likely to exit by IPO than venture capitalists are (Lerner et al, 2012).

Venture capital funding is often prescribed as the most effective form of equity funding in accelerating startups' growth (Kortum & Lerner, 2001). The popularity of prescribing venture capital may however in part be due to it being the most researched form of equity financing, as we have more data and studies on venture capital than alternative equity funding sources, and we know in comparison much less about the alternatives (Cumming & Johan, 2017).

2.1.4 Definition of a startup exit

Scholars refer to several different types of exits in the context of new firms, so next it is important to explain the different types of exits, their meaning and interrelation.

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Terminology:	Subject:	Meaning:
Financial exit	Investor	An owner of equity sells their equity stake
Entrepreneurial exit	Entrepreneur	Entrepreneur leaves the firm they founded
Firm exit	Firm	Firm is liquidated or goes bankrupt
Regional exit	Firm	Firm relocates their operations to another region
Startup exit	Firm	Firm is sold or taken public providing a joint financial exit opportunity for all shareholders

Startup exit is not a new term. When practitioners globally talk about exits, they most commonly refer to a *startup exit* that facilitate *financial exits* for all shareholders. However, in academia the term *startup exit* is not commonly used, in comparison to the more generic *financial exit* and *entrepreneurial exit* and *firm exit*. *Startup exit* however constitutes a specific key mechanisms by itself. The motivation for a *startup exit* is often the requirement for a *financial exit* by equity investors in the firm. Individual equity investors may attain a *financial exit* by selling their individual shares to another investor. However, equity funded startups often restrict the trading of shares by individual investors through the shareholders agreement, aligning the interest of the shareholders for all of them to sell their shares jointly. The *startup exit* is the event where all shareholders have the opportunity for a joint *financial exit*, usually through the sale of the entire firm, referred to as Merger & Acquisition (M&A), or an Initial Public Offering (IPO) when the firm is listed on a stock exchange.

Startup exits may act as a catalyst for the other types of exits. An acquisition of a startup is the most common startup exit route, facilitating a *financial exit* for all shareholders. Founders may leave their firm in the years following an acquisition, facilitating an *entrepreneurial exit*. Furthermore, is it not unheard of for the acquiring parent firm to relocate and consolidate the operations of their new subsidiary to existing business units, for economies of scale, synergies and reducing cost. The relocation of operations of the subsidiary to another region would then facilitate a *regional exit* of the subsidiary or even a *firm exit* if the subsidiary is closed down.

2.2 Venture capital literature related to startup exits

Venture capital helps fill the early stage equity gap for small firms with high growth potential, thereby enabling the startup to grow (Florida & Kenney, 1988). In the last two decades, the role of the venture capitalist (VC) has been emphasized as the enabler and accelerator of entrepreneurial economic growth (Gompers et al., 2010: Lerner, 2009; Lerner et al., 2012). Venture capitalism has spread worldwide with the expectation that VCs will be a generalized driver of economic growth and innovation (Kortum & Lerner, 2001). The ability to make a

profitable exit lies at the heart of venture capital investing (Sahlman, 1990; Gompers, 1995; Gompers & Lerner, 1999).

The venture capital exit is more than realizing investment value; it is the process by which the efforts of VCs and entrepreneurs are transformed into a new entity (Bygrave et al, 1994). The exit timing for the VCs should optimally be 'when the projected marginal value added as a result of the VC's efforts, at any given measurement interval, is less than the projected cost of these efforts' (Cumming & MacIntosh, 2003, p. 6). Several studies show that the average holding period for a VC to own an equity stake in a startup before exiting is five years (Sahlman, 1990; Cochrane, 2005).

There are five types of venture capital exits, listed here in argued order of preference for the VC (MacIntosh, 1997): (a) an IPO, in which a significant portion of the firm is sold into the public market; (b) an acquisition exit; that is, through M&A, in which a third party buys the entire firm; (c) a secondary sale, in which only the VC sells its shares to a third party, which is usually less desirable and profitable; (d) a buyback, or a management buyout (MBO), in which the managers of the entrepreneurial firm repurchases the VC's shares, which is also less desirable and profitable; and (e) a write-off, in which the VC walks away from the investment, usually due to bankruptcy or the firm closing down.

The most profitable exits are IPOs and M&As (Cumming & MacIntosh, 2003; Lerner et al., 2012; Bienz & Leite, 2008). A study of venture capital exits during 1995-2005 in North America and Western Europe showed that M&As dominate, with 78.3 percent compared to only 3.5 percent as IPOs (Lerner et al, 2009). This is despite the fact that IPOs historically provided a 22 percent price valuation premium over M&As (Brau et al, 2003). Although trade M&As may result in a lower value, they do provide immediate, full liquidity to investors, which is usually not the case in an IPO, in which major shareholders are blocked from selling shares during a lock-in period following a listing (De Clerq et al, 2006).

Firm-specific and macroeconomic factors are linked to exit choice. Larger, dominant, and high-tech-based firms are more inclined towards IPOs, while service firms, firms with high debt, and firms in leveraged industries and industries with few actors are more M&A inclined. In addition, a positive stock exchange trend and lower rates favor IPOs, while the opposite favors M&As (Brau et al, 2003, Poulsen & Stegemoller, 2008, Bayar & Chemmanur, 2011). Institutional factors enable exits, as countries with stable financial and legal systems are more favorable for IPOs (Cumming et al, 2006).

Management and ownership also influence exits. Companies that need less oversight and have a stronger track record are predisposed to IPOs, while companies that require more controls are predisposed to M&As (Bienz & Leite, 2008). Established VC firms prefer M&As, while younger VC firms are more open to IPOs, especially if an IPO coincides with their fund raising (Gompers, 1996). Entrepreneurs are generally biased towards IPOs (Schwienbacher, 2008), which is one reason VCs often ensure contractual control of the exit choice (Cumming, 2008; Kaplan & Strömberg, 2003). Thus, the VC normally pre-plans the exit route at the time of the initial investment (Cumming & Johan, 2008).

Although we can expect VCs' overall exit preferences to be similar internationally, prior studies show that specific exit patterns differ between countries and regions due to legal and institutional factors (Cumming & MacIntosh, 2003), availability of alternative exit routes such as small-cap stock exchanges (Rindermann, 2003), and the possibly divergent exit preferences of the owners (Schwienbacher, 2008). The importance of exit routes for the development of venture capital markets is well known (Mason & Harrison, 1999). The creation of stock markets for smaller growth companies are an important mechanism for a well-functioning venture capital market and something that policy makers have tried to stimulate (Isaksson, 2006).

As accounted for, venture capital theory focuses on profits for investors and therefore venture capital scholars' interest tends to end with the financial exit. Thus, we know little about post-exit developments of venture capital funded startups, and whether the type of exit affects a venture's growth and staying-power in the region. From a regional development and public investor perspective, these are important questions to ask. There is need for a systematic understanding of how venture capital and the type of exits affects pre- and post-exit development of startups, with an empirical grounding in more regions than Silicon Valley.

2.3 Entrepreneurship and regional development literature related to startup exits

While venture capital research has been concerned mostly with value creation for investors, the intersection of entrepreneurship and regional development research has focused on economic impact generated by new firms, primarily in terms of growth and employment (Leibenstein, 1968; Baumol, 1996; Audretsch et al, 2006; Shane 2008, 2009). As entrepreneurship and regional development theory tend to intertwine on the subject of economic impact, and especially so on the subject of startup exits, the literature review of entrepreneurship and regional development theory will be done combined.

Entrepreneurs, and the startups they create, play the economic role of transformational agents (Schumpeter, 1934), vehicles of knowledge dissipation and innovation (Acs et al, 2013), and net job providers (Birch, 1979, 1987; Kane, 2010). In the last decades, research has increasingly focused on leveraged startups, which leverage external assets to accelerate growth, and especially leveraging through venture capital (Acs, 2008).

Venture capital has been portrayed as the engine behind the fast growth of startups (Gompers et al., 2010; Lerner et al., 2012). Studies show that venture capital funded startups grow faster (Puri & Zarutskie, 2012) and are more innovative (Kortum & Lerner, 2001; Hellmann & Puri, 2002) than non-venture capital funded startups. However, it is unclear to what degree the leveraging effect is due to VCs' selection bias (Sørensen, 2007), the invested capital itself (Wiltbank et al, 2015), the VC's networking effect (Hochberg et al, 2007) or the VC's governance influence (Hochberg, 2011).

Boulevard of Broken Dreams by Lerner (2009) popularized the notion of public investments into private venture capital for driving innovation and growth, while warning against the potential disruptive interference of government and such policies should thus be with no strings attached. High-tech startups, and new technology-based firms (NTBFs), accelerated by venture capital funding, became recurring for public policy aiming to drive economic growth and innovation in the last decades (Storey & Tether, 1998; OECD, 2001, 2010a, 2010b, 2010c; World Economic Forum, 2009, 2011).

However, the success of startups is highly skewed, with a small number of firms, such as Apple, Google, and Facebook, mostly tied to Silicon Valley, that generate a disproportionate amount of the economic impact in the U.S. (Saxenian, 1996; Shane, 2008). This is also the case internationally, as a World Economic Forum (WEF) report states that the top one percent of early-stage firms contributed 44 percent of the total revenues and 40 percent of total jobs, while the top five percent contributed 72 percent of total revenues and 67 percent of total jobs (WEF, 2011). The crucial importance of the 'best' firms has motivated a focus on High Growth Firms (HGFs) in economic growth policy (Delmar et al, 2003; Davidsson & Henrekson, 2002; Mason & Brown, 2013; Brown et al., 2014). The most common definition of an HGF is 'Enterprises with average annualized growth in employees or turnover greater than 20% per annum, over a three-year period, and with more than 10 employees in the beginning of the observation period, should be considered as high growth enterprises' (OECD, 2010a, p. 16).

Since most of the famous success cases in Silicon Valley exited through IPOs (Shane, 2009), the question of the importance of the exit route arises, as most startups exit by acquisition (Cuming & MacIntosh, 2003; Lerner, 2009; Lerner et al., 2012). Do acquisitions lead to growth and an economic impact, as IPOs seem to do, and to what extent do acquired firms grow outside of Silicon Valley? Startups that go public in their region of origin may generate more economic growth and other positive regional externalities, implying that IPOs should be preferable to acquisitions from a regional development perspective (Mason & Brown, 2013).

Venture migration is a topic gaining interest (Anokhin, 2013). A case study in the U.K. observed a 'sell-out mentality' among HGFs, which, coupled with foreign acquisitions, lead to startups disappearing abroad (Brown et al., 2017). A recent study of software startups in Ireland came to similar conclusions, as foreign acquisitions on average led to a loss of firms, employment, and growth for the region of origin (Hogan et al., 2018). If the acquired firms are linked to local businesses, then the economic loss for the region of origin may increase further (Stam, 2007).

Case studies in Canada (Carpentier & Suret, 2014) and Israel (Rosenberg, 2002) observe patterns of foreign-acquired high-tech firms stagnating as R&D and production satellites, as the acquirer transfers the management, finance, and sales functions to head offices elsewhere. An Economist article reported similar observations, with Israeli entrepreneurs deciding to 'cash in with early exits' rather than grow their startups into large companies (Ryder, 2014). Large corporations often use acquisitions as a primary source for new technology and

products, and the associated IP and talent to defend and develop these assets further (Granstrand & Sjölander, 1990).

Acquisitions may lead to the relocation of intellectual assets and human capital, as utilizing IP often requires the presence of the engineers who are familiar with the technology, and consolidating these assets in one location for synergy makes sense (Makinen et al, 2012; Chatterji & Patro, 2014; Sawicki, 2014). Acquisitions often historically led to a transfer of employment and growth from peripheral regions to central regions (Leigh & North, 1978; Bhagat et al, 1990; Turok & Richardson, 2010; Ashcroft et al, 1994).

However, it is an oversimplification to say that foreign acquisitions are always detrimental to regional development. A post-exit study of Scottish startups included examples of both accelerated growth and closures of acquired startups (Mason & Harrison, 2006), so the circumstances of the acquisition and acquired firm arguably determine the long-term outcomes of these individual cases. Foreign ownership may be beneficial if the parent organization helps the startup to overcome barriers to growth and to prosper (Davenport, 2009; Hopkins & Richmond, 2014, Dahlstrand, 2017). Furthermore, exits may allow the entrepreneurs and investors of the original startup to explore new opportunities (Stuart & Sorenson, 2003), as they found and fund new startups, referred to as 'entrepreneurial recycling' (Mason & Harrison, 2006).

In summary, venture capital theory primarily focuses on value creation for investors, with economic impact for the surrounding environment as a secondary or even neglected effect of the value creation. Exit routes are thereby financial decisions based on assessments of profit maximization. From a regional development perspective, IPOs is often argued to generate more long-term economic impact and positive externalities for the surrounding region than acquisitions. However, IPOs have traditionally only been realistic for a few top-performing startups, so the most common profitable exit for venture capitalists has always been the M&A. In this context of IPOs being unrealistic for most startups, policy options on exits have been limited to considering the comparative benefits and risks of domestic versus foreign acquisitions.

Due to the lack of understanding of what happens post-exit to startups, and Lerner's (2009) warning against government interference, most governments have elected to be exit agnostic in their policies. However, before exit-centric policy could be considered we need for systematic knowledge about how startups perform post-exit, and how this relates to their exit route.

3 Methodology

3.1 Research design

For the first study, *Migration patterns of venture capital funded startups,* and second study, *Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy?,* the methodological approach needed to be quantitative, as our interest is in generalizable trends in populations and correlations to measurable variables. The third study, *Venture capitalist's exit choice: Deciding the fate of successful startups,* and fourth study, *Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths,* could be approached both a qualitatively and quantitatively. However, due to the limited amount of prior studies on these topics and limited data access, qualitative methodology were chosen to first understand the subject matter through interviews. Based on these results, hypotheses can be formulated and tested in future quantitative studies. From here onwards, for the sake of brevity, we will refer to the four studies as the *Migration (*first study), *Growth* (second study), *VC Choice* (third study) and *Ecosystem* (fourth study) studies.

3.2 Quantitative methods in Migration and Growth studies

3.2.1 Data sources, sample and collection

The Migration study required extensive longitudinal data on venture capital funded startups in several countries. Despite the growth of online information and commercial databases, the limited reporting requirements for small firms make it a challenging task for researchers in most countries to track privately-held firms (Cumming & Johan, 2017). After conducting a search of available databases, it became clear that VentureSource offered the best international cross-region comparable dataset on venture capital funded startups and exits. Other databases I evaluated, such as Crunchbase, PitchBook and CB Insights, had good coverage for the USA but not as good international coverage for the 1990-2000s. ¨

The five regions were selected to be comparable in population and GDP, have a reputation for commercializing research and host established startup and venture capital communities, while representing variety in terms of geography, culture and local industry clusters. The five selected regions were Colorado, North Carolina, Israel, Sweden and San Francisco Bay Area encompassing Silicon Valley.

Although VentureSource was the best alternative, it contained far from complete and comparable records. VentureSource aggregates data from several sources, with limited coherent terminology and flaws in reporting. Over a period of two years, we conducted considerable data cleanup and repairs filling in the holes in primarily classification of exits, acquiring firms and location of acquiring firms. The end result was our own custom built relational database, searchable by either firm name or investment round, comprising 10.593 firms. This custom database was the data source for the Migration and Growth studies.

The Growth study required additional financial data on the firms, not contained in VentureSource, such as turnover, number of employers, profits and R&D expenditure. For this reason, I decided to limit the Growth study to Sweden. In Sweden, all limited companies are required by law to submit an annual report, which is available in a public database. A second custom database was thereby created and filled over a period of a year with additional financials for all Swedish startups from annual reports. As the annual reports contained additional written information for the startup related to exits, such as if patents were sold or exclusive licensed, this additional information was collected. When the information in the annual reports had gaps or was hard to interpret, we collected additional data from the Swedish Tax Agency and Swedish Companies Registration Office to substantiate our records. The Growth study used both custom databases, to track Swedish venture capital funded startups from founding until exit and after exit for as long as the firms was traceable.

3.2.2 Data analysis and limitations

From the databases, we excluded startups that were not funded by formal venture capital funds and firms that did not meet the startup definition. Not all investors in a venture capital database meet the criteria for being a formal venture capital fund, as they are business angels, family offices and general private equity firms that may co-invest with venture capital funds or may just have the wrong label in the database. Furthermore, as venture capitalists are opportunists, they may invest in spin-offs and mature companies that do not meet our startup definition (Gompers et al, 2019; Berglund, 2011; Harrison, Mason and Smith, 2015).

In the Migration study, we began with descriptive statistics to map out the commonalities and differences in the exit patterns for the five regions. After illustrating generalizable patterns across the regions, we used regression test to show correlations between exits and region, industry and valuation with varying degree of statistical significance.

In the Growth study, we analyzed the data in five steps. In the first step, we established the pre-exit performance of all startups one year before exit and ranked exit routes based on the pre-exit performance. In the second step, we mapped the degree to which the exited startups continued operations post-exit, either in their existing format or a new one. In the third step, we established the post-exit performance of startups still in operation three years post-exit, and ranked post-exit performance of the startups related to exit route. In the fourth step, we examined the startups which met the HGF definition pre- and post-exit. In the final fifth step, we investigated if the startups that discontinued operations post-exit were the best or worst performing startups. Due to the skewed, non-Gaussian distribution of performance in the sample, we use an omnibus Wilcoxon one-way median analysis to test the differences in the medians between several groups. If the null hypothesis was rejected, we also conducted statistical multiple comparison analysis using the Wilcoxon test for each pair. For the HGF comparison, we use a Chi-Square Cramer's V test.

The methodology used for both studies should have a sufficient degree of construct validity. The samples represent our best effort to in achieving as complete as possible coverage for the

venture capital funded startups in the regions during the selected time periods, and constitute several years of work in validating and complementing the data by hand. It is possible we missed some startups despite our best efforts, however the statistical significance in many of our tests would suggest our coverage was sufficient for statistical testing purposes. As we use data collected directly from the firms, there should also be a sufficient degree of internal validity and objectivity. The methodology used in the Migration study would further be highly repeatable and transferable for future studies in other geographies. The methodology used in the Growth study would practically be less transferable for practical reasons, as access to annual reports is usually more restricted in other countries than Sweden.

The most important limitation in the Migration study is the study the assumption that transfer of ownership leads to long-term relocation of startup operations. However, the Growth study in part addresses this limitation, by substantiating this assumption as real in the context of Sweden. The most important limitation in the Growth study is that we do not know what happened with the discontinued acquired startups that are consolidated and integrated into the parent firm. Since the consolidated startups are intermingled with the parent firm after integration, we cannot know what actual growth and impact the former startup had post-exit. Thus, we can only base our conclusions and what we see and not what we cannot see. Tracking the acquired startups post-consolidation would require a different research design and methodology.

3.3 Qualitative methods in VC Choice and Ecosystem studies

3.3.1 Data sources, sample and collection

Due to the lack of prior studies on the VC Choice and Ecosystem studies, regarding venture capitalists' decision making on startup exits and the influence of startup exits on the career paths of participatory agents in an entrepreneurial ecosystem, I decided to use qualitative methods to build an understanding of the subject matters. As I expected heterogeneity within the sample, and it was unclear what variables would be important in the studies, it would have been presumptuous and premature to go for a quantitative method with hypothesis testing. I further decided to limit both studies to the Swedish entrepreneurial ecosystem. As local conditions could be an influence in both studies, I thought it prudent to conduct the qualitative studies within the confines of one ecosystem.

There is ambiguity as to 'where an ecosystem starts and where it ends' (Ahokangas et al, 2018). It may be therefore be contentious to refer to the Swedish entrepreneurial ecosystem, as Sweden is a national level rather than regional or metropolitan where entrepreneurial ecosystems are often expected to operate (Audretsch & Belitski, 2017). However, I adopt the socio-cultural perspective that the shared community marks the boundaries of the ecosystem (O'Connor et al, 2018; Acs et al, 2017). In the case of Sweden, the community of startup professionals refers to itself as the 'Swedish' startup community. Business angels and venture

capitalists invest across all hubs, while entrepreneurs and employees may transfer between the hubs when engaging in new ventures, with a transit time between the major startup hubs in the ecosystem of two to four hours (Eriksson & Rataj, 2019).

The Swedish entrepreneurial ecosystem is one of the older established ecosystems outside of the USA. The first Swedish venture capital firm was established in 1973 and the entrepreneurial ecosystem has since evolved through four decades of startup activity to become relatively stable and mature (Lerner & Tåg, 2013; Karaomerlioglu & Jacobsson, 2000; Isaksson, 1998). Startups with well-known brands which originate from Sweden are for example Skype, Klarna, Spotify, Mojang with MineCraft and King with Candy Crush. Sweden provides a European baseline for future comparisons to other ecosystems, being successful enough to merit investigation while smaller in scale and thereby easier to relate to than Silicon Valley.

For the VC Exit Choice study, the sample was limited to twelve Swedish venture capitalists. Previous qualitative studies have yielded interesting findings with interviews with only twelve venture capitalists (Berglund, 2011). The sampling criteria were that they (a) were traditional venture capitalists, in the sense that they invested other peoples' money and had limited partners they were responsible to, (b) had experience from multiple exits and were familiar with the exit choice decision-making context and (c) were Swedish. Within these criteria, I sampled for variety in experience, from less than two to more than twenty-five years as venture capitalists, and variety in industry focus, from generalist to healthcare and ICT.

For the Ecosystem study, the sampling criteria was that they were veterans of the ecosystem, with at least fifteen years actively working in the ecosystem with insight into how participants in startups continued their careers post-exit. Respondents were sampled through snowball networking (Noy, 2008), starting with the people who had spent the longest time in the ecosystem and ensuring diversity in background among respondents in terms of distribution geographically across all the three largest hubs as well as variety in present role and background. Final sample consisted of seventeen respondents, comprised of nine venture capitalists, four executives from incubators and four business angels. Three of the seventeen respondents were women. No entrepreneurs were among the final respondents. Entrepreneurs interviewed within the study expressed that they had primarily experienced their own journeys and had limited insight into the transition patterns for the other participatory agents, and were therefore excluded from the sample.

Data collection in both studies was through recorded structure interviews, as differences in framing of questions could affect outcome (Tversky & Kahneman, 1992). Deviation from the protocol was only to ask follow-up questions, if an interviewee answer was vague or unusual and warranted further explanation (Brinkmann, 2014). The role of the interviewer was to ask questions, guide the interviewee through the protocol and make observations. Interviewees are offered anonymity to facilitate their honest participation (Opdenakker, 2006). In terms of interview questions, both studies had a somewhat novel approach tailored to their purposes.

In the case of the venture capitalist study, the interviewer guided the interviewees through the steps of the structured decision making process. We need to go beyond heuristics, which constitute black box solutions simplifying a more complex set of assessments and incorporating several biases specific for certain context, and thereby make generalization and comparisons over a larger population problematic (Bingham & Eisenhardt, 2011). Instead, we need to deconstruct the decision making process into steps, to isolate the individual factors considered, ascertain their relative importance and identify the influence of underlying biases in deciding on startup exit.

Furthermore, by conducting the decision making in steps, we can vary the context to consider in each step and thereby see which factors are context dependent. By refraining from providing the interviewee with which factors to consider, we minimizing the risk of confirmation bias of the interviewer influencing the interview. This approach is similar to talk-aloud protocol, a version of think-aloud protocol (Van Someren et al, 1994), in that we ask respondents to make decisions and explain their reasoning, with the relaxed requirement that we do not require respondents to speak continuously and they are allowed breaks to think.

In the case of the ecosystem study, the interviewer asked interviewees to individually map the expected post-exit behavior of four participatory actors, based on five different levels of financial exit success. The four participatory actors were nascent entrepreneurs, business angels, venture capitalists and startup employees. The five levels of financial exit success were formulated as industry practice Cash-on-Cash Multiples (Gompers et al, 2019). This would enables us to aggregate and quantify the veterans' expectations of "how things usually go", based on having seen dozens of startups from founding to exit and the continued post-exit career of the agents.

Respondents were asked to distribute hundred percent probability between their choices for each agent in each scenario. The percentages were not used for statistical analysis, as the sample was too small to allow for this, but rather as a method for assigning level of importance, clarifying contrast and establishing trends in answers across respondents. If the respondents irrespective of each other mapped approximately the same post-exit behavior of the agents, the pattern should be representative of their shared view of the ecosystem mechanics. The purpose was to unveil the perceived relation between increasing level of returns and agent role transitions, to investigate the cyclical recycling mechanics of an entrepreneurial ecosystem.

In both studies, white boards were used to facilitate data collection more effectively by writing down respondents' answers using visualization to capture the systemic patterns (Eppler & Platts, 2009). Visualizing for the respondents what they answered in the sequential questions allowed the respondents to consider and compare their answers and adjust their answers until their believed their final coherent answers were correct. The white board answers were always photographed at the conclusion of the interviews and was additional input into the data analysis. Finally, body language and pauses were observed and recorded as input in the venture capitalist interview study.

3.3.2 Data analysis and limitations

Data collected in the interviews was compared across the interviewees, to understand the degree of convergence or divergence in the data. Answers with a high degree of convergence form a baseline for proposed descriptive models and hypotheses for future quantitative testing. Diverging answers need to be analyzed with the background of interviewee and context that the questions were asked in mind, to understand why the answers diverge. In the VC Exit Choice study, the result should be a proposed descriptive decision-making model that may be tested in a future quantitative study. In the Ecosystem study, the results should be a post-exit career model and ecosystem dynamics model, which may be tested in a future quantitative studies.

Both studies should have a sufficient degree of construct validity, as attention was given to prior theory in constructing the research questions and interview protocol. The interviewees were representative for their populations and with a high degree of convergence in their answers the results should hold a sufficient degree of validity for qualitative findings. Future studies should be able to reproduce comparable results using the same methodologies, making the studies repeatable and transferable. The protocols were designed to minimize risks for the interviewer to influence the findings and ensure a sufficient degree of objectivity, and are publicized with the articles for use in future studies.

The most important limitation of the VC Exit Choice study is the limited sample and that the findings are presently specific for Swedish venture capitalists. Future studies will need to test if the model is generalizable for an international population of venture capitalists. The same limitations are relevant for the Ecosystem study. However, the Ecosystem study has the additional limitation that it maps expected behavior rather than actual behavior. A quantitative testing of the ecosystem models should take test against actual behavior, although this is likely to be an extensive and prolonged process requiring tracking of thousands of individuals of at least a decade. Simulations may prove a more accessible research path forward.

4 Summarized Papers

4.1 Paper 1: Migration patterns of venture capital funded startups

The purpose of this first paper is to study migration of VC-funded startups across five regions, the extent to which regions retain startups in their region and which factors are associated with ownership transitions to other regions. The premise for the study is the realization that how venture capital (VC) investors in a startup choose to exit their investment, such as by a merger and acquisition (M&A) or initial public listing (IPO), may determine the long-term growth trajectory and even the regional outmigration of startups. Another part of the premise is investigate if exit patterns may explain part of Silicon Valley's success and why other regions find it so difficult to replicate.

The five region investigated were San Francisco encompassing Silicon Valley, Colorado, North Carolina, Israel and Sweden. 10.593 startups, founded 1992-2011, were analyzed through descriptive statistics and regression tests. Exit patterns examined included survival ratios, exit routes, exit transactions amounts and ownership transitions to other regions. Results were discussed by contrasting venture capital with regional development theory, to understand the startup exit phenomenon from the perspectives of different stakeholders.

We found that exit patterns were generalizable on a region level for venture capital funded startups, with M&As as the dominant exit route. To the degree IPOs occur, they were rare and most often occur in life science related industries. Differences between regions were mainly in founding rates, exit transaction amounts and ownership migration. We found that in Silicon Valley over 50 percent of successful startups, representing almost 60 percent of the exit value, are likely to stay within the region when VCs exit. In contrast, across the other four, smaller but still representative innovative regions, less than a third of successful startups, representing only 15 percent of the total reported values, were likely to remain owned within the regions they originated after the VCs exit.

Conclusions were that exit patterns are important and may in part explain Silicon Valley's success. The most valuable startups are founded and exit locally in Silicon Valley or are acquired by Silicon Valley incumbents from other regions. In the other regions, the most valuable startups exit to other regions and only a small portion of the value of the startups remains owned in the region of origin for the startup. This concentration to Silicon Valley is the strongest within the traditional Silicon Valley industries, however the trend of ownership concentration is evident across all industries, effectively forming an advantage which begets further advantage resembling self-reinforcing Matthew effect. It will be close to impossible for other regions to replicate the success of Silicon Valley, if their most valuable startups consistently relocate from their region and specifically to Silicon Valley.

Main theoretical contributions to venture capital theory is that our results of M&As dominating exit returns, contradict the often cited belief in venture capital theory of IPOs as

'the gold standard of exits' (Lerner et al, 2012, p.201). Furthermore, this dominance of M&As motivates a reinterpretation of the role venture capitalists play in the global economy. Venture capitalists play a more important role as sourcing agents for incumbents, revitalizing existing industry clusters, than as midwives of new public companies and new industry clusters.

Contributions to regional development theory is that the interdependence between regions and entrepreneurial ecosystems, as evident in our results of exit patterns, are underestimated in present theory. We propose that Silicon Valley, and the other regions studied, could be seen as a network of nodes organized as a supply chain. The specialization of Silicon Valley has expanded from industry clustering, to a specialization of financing and commercializing future technologies. Other regions effectively serve as supply hubs, incubating and cultivating promising startups, from which their best startups are later sourced for integrating into the technology commercialization machinery comprised of Silicon Valley incumbents.

4.2 Paper 2: Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy?

The first paper on startup migration in five regions, revealed the dominance of acquisitions as an exit route and the concentration of ownership of the most valuable startups to the technology clusters in Silicon Valley. However, the economic impact is dependent on the key assumption that ownership matters to the long-term spatial organization of operations for former startups. Are acquired startups in particular consolidated over time to the region where the parent corporation is located, effectively migrating the value they represent and generate away from the region of origin of the startup?

The purpose of this second paper is to investigate if and how exit routes of venture capital financed startups matter from a regional development perspective, i.e. to what extent firms stay and grow post-exit dependent upon exit. The practical intent is to better understand the consequences of existing venture capital policy and substantiate arguments for policy to become more exit-centric. The empirical research question was: *How do venture capital funded startups perform post-exit related to exit route?*

To answer the question, we used annual reports to conduct a nation-wide exploration of the post-exit performance of venture capital funded startups. Our sample consists of 273 venture capital funded startups founded in Sweden 1992-2010 and exited by Initial Public Offering (IPO) and Mergers and Acquisitions (M&As) in 2002-2017. In exit routes, we distinguished between IPOs on larger regulated stock exchanges and smaller Multilateral Trading Facilities (MTFs) and between domestic and foreign acquisitions. Performance variables measured were absolute and relative growth of turnover and employees, with indicators for high-growth firm (HGF), inorganic growth (IG) and intellectual property (IP) to provide explanatory input.

We found that the pre-exit performance of the startups directly related to exit route. The top three percent startups exit by IPO on large stock exchanges. Among the remaining startups, the best performers go first to foreign acquirers, then domestic acquirers and last list themselves on small stock exchanges (MTFs). However, the different exit routes lead to divergent post-exit growth trajectories. IPOs, both on large and small stock exchanges, resulted in the strongest post-exit performance. Foreign and domestic acquired startups experienced a reduction in relative growth as subsidiaries post-exit, a reduction in employees and as well as a reduction in development and ownership of intellectual property (IP). Finally, approximately half of the acquired startups, both domestic and foreign, were closed down post-exit. This finding supports the assumption in the first study, that acquired startups are consolidated over time to the region where the parent corporation is located.

Main theoretical contribution was evidence that exit route directly influenced long-term economic impact. Regional economic policy for startups thereby should be exit cognizant and exit-centric. MTFs offers a promising lower threshold exit route for startups going public, while the startups that exit by IPO on MTF had the largest relative growth post-exit. This makes MTFs relevant to consider for future exit-centric policy.

4.3 Paper 3: Venture capitalist's exit choice: Deciding the fate of successful startups

As the previous two papers revealed the importance of exit route for long-term economic impact, the question rose of who decides on exit route for a startup and on what basis. Previous studies have indicated that venture capitalists often decide on exit, plan for the exit from the initial investment and usually ensure contractual control over the exit decision (Cummings, 2008).However, it remains unclear on what basis the exit decision is made.

Therefore, the third paper examined *how venture capitalists (VCs) choose exit route for startups, which factors they consider and these factors relative importance*. Qualitative structured interviews were conducted with VCs, stepping through their preferences in deciding between Initial Public Offerings (IPO) and mergers and acquisitions (M&As), as well as domestic and foreign exits. The VCs identified the risks and uncertainties they associated with each exit route and the rewards required to compensate for these risks and uncertainties. Biases in decision making were observed and inquired about. Findings were that the factors considered by the VCs are uniform, but the perceived importance of these factors strongly diverged.

The VCs perceived themselves to be sole deciders of exit route, overriding entrepreneurs if required. VCs had preference for exit by M&A and aversion to IPOs, due to the uncertainty associated with the IPO's lockup period. The magnitude of the IPO aversion was dependent on individual VCs familiarity with IPOs, loss of control issues and loss aversion. An empirically derived descriptive model was proposed for how VCs make exit choice, which could be validated in the future with statistical testing.

Results offer an explanation to the over-representation of M&As as exit route. Furthermore, the relatively low threshold to foreign acquisitions offer an explanation for the high number of foreign acquisitions in Sweden and that bulk of the most valuable startups exit by foreign acquisition. Implications for policy was that the VC's sole deciding power, strong M&A preference, low threshold to foreign M&As and aversion to IPOs may be counterproductive to policies for regional growth. Implications for practitioners was that VC's IPO aversion may be limiting earnings for all startup shareholders.

4.4 Paper 4: Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths

The previous three papers have found that regions other than Silicon Valley (San Francisco Bay Area) should be prepared for the likely outcome that the most valuable startups in their entrepreneurial ecosystems will be acquired and migrate from their regions long-term. This realization highlights the crucial importance of post-exit recycling of capital and talent within the ecosystem. An entrepreneurial ecosystem may thrive even though the majority of their successful startups leave, provided that the majority of the profits and experience startup professionals return to the ecosystem to found, finance and support new startups.
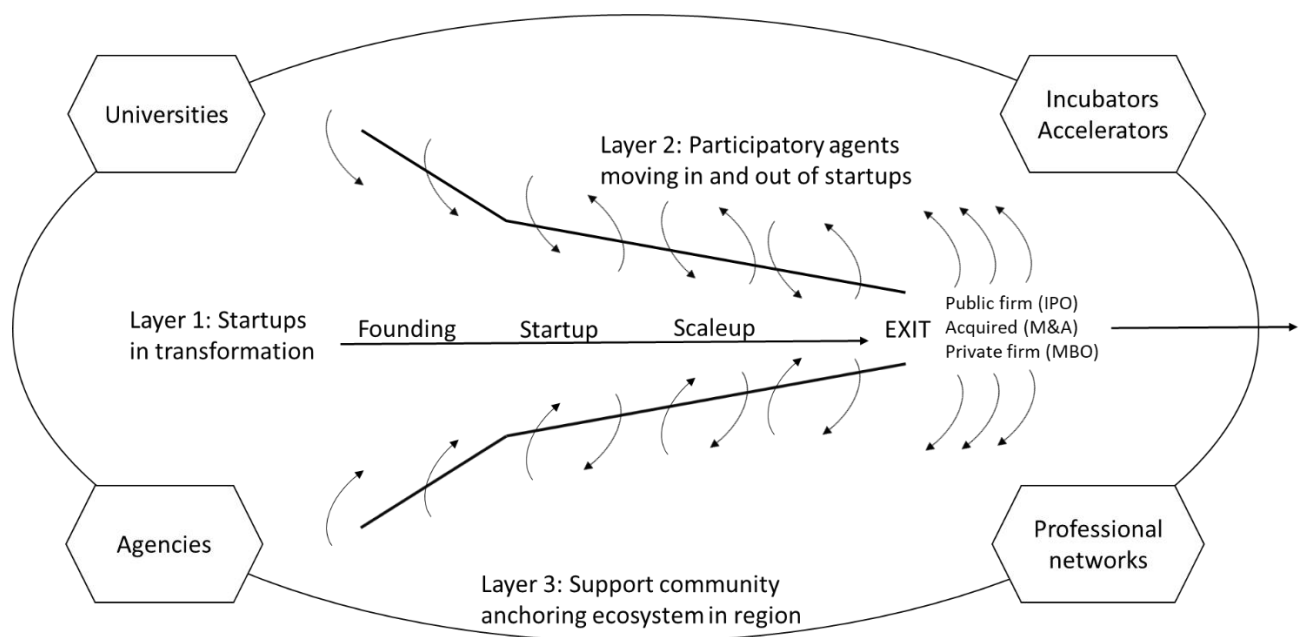
Figure 1: Entrepreneurial Ecosystem (EE) as a circular three layer system

The fourth paper conceptualizes entrepreneurial ecosystems (EEs) as a circular three layer system with startup exits driving its evolution, as seen above in Figure 1. The core of the ecosystem are startup firms (layer 1). Surrounding them is a community of four active types of agents who participate in developing the startups: entrepreneurs, business angels, venture capitalists and key employees (layer 2). The outermost layer is a broader support community, consisting of the regional workforce and the institutions such as universities, agencies,

incubators/accelerators and professional networks that sustain and anchor the ecosystem in the surrounding region (layer 3).

The engine of the ecosystem are the startups in conjunction with their directly participating agents. The study examine how successful exits, or lack of them, shapes the evolution trajectory of the ecosystem via the transitions it triggers into, away from, and across participatory roles. The empirical data served to substantiate and illustrate the concept of EEs as a circular three layer system with startup exits driving its evolution over time. The repopulation of an EE from within is primarily done by employees becoming entrepreneurs and entrepreneurs becoming angels and to a lesser degree VCs. However, with a minimum level of profitable exits, the EE would instead stagnate and eventually depopulate, as all but the most stubborn entrepreneurs and employees are expected to leave the EE.

However, the expected post-exit transitions for VCs are less stable, with a binary split between grow (3x-100x exits) or leave (failure-1.5x exits) and little middle ground of continuing with the same fund (1.5x-3x). Maintaining a stable and sustainable VC community in an EE may therefore be challenging given the grow-or-perish dynamics of VC investing. These dynamics could in part explain the early stage funding gap and that EEs have been struggling with (Murphy & Edwards, 2003; Barr et al, 2009; Duruflé et al, 2017). If early stage venture capitalists are prone to transition, if unsuccessful by closing down and if successful by transitioning to later stages, there would need to be a consistent inflow of early stage VCs to fill the gap of those transitioning out. Furthermore, if the inflow of new VCs is proportional to the success of the EE, then the inflow of new early stage VCs would mainly occur if the EE was already in a growth trajectory. Policies aimed at establishing early stage venture capitalists in EEs may only offer temporary solutions to early stage funding gaps.

This reflects broader theoretical insights that track records of success over time build a reputation of success and a halo effect on an institutional level (Sine et al, 2003) via the signaling effects of liquidity events (Sorenson and Stuart, 2003). With a growing reputation, an increase in inflow of talent and investments would logically follow and the pattern for the non-nascent agents would likely follow similar patterns. In summary, our results enable us to postulate that successful exits shape the evolution trajectory of the EE via the transitions it triggers into, away from, and across participatory roles in the EE. Policy implications were significant; growing entrepreneurial ecosystems requires successful exits. Without successful exits, it is only a matter of time until ecosystems stagnate and depopulate.

5 Discussion

5.1 What are exit patterns for venture capital funded startups on a regional level?

The Migration study of five regions showed the dominance of acquisitions as an exit route, and how the most valuable startups migrated in ownership towards Silicon Valley. The VC Choice study supports this pattern of value migration, as Swedish venture capitalists prioritize profit maximization in deciding on exit, with a preference for acquisitions and a low threshold to foreign acquisition which they expect to provide higher exit valuations. The results are in line with previous studies regarding the acquisition bias of VCs (Lerner et al, 2009; Cummings, 2008). However, the value migration specifically to Silicon Valley has not been accounted for in literature before.

The Growth study further substantiate these results, by revealing the how the bulk of the best performing startups, which should be the most valuable, are acquired by firms from outside of Sweden. The Growth study also revealed that approximately half of the acquired startups were consolidated within a couple of years post-exit. The remaining startups, now subsidiaries, experienced a reduction in relative growth, employees and intellectual property (IP) after exit.

These results are supported by both historical studies on industrial era acquisitions and consolidation (Leigh & North, 1978; Bhagat et al, 1990; Turok & Richardson, 2010; Ashcroft et al, 1994) and modern studies on startup acquisition and consolidation (Brown et al., 2017; Hogan et al., 2018; Carpentier & Suret, 2014). There is a variation in the sample, so there are acquisitions that experience an increase in growth post-exit as some previous studies have indicated (Davenport, 2009; Hopkins & Richmond, 2014, Dahlstrand, 2017), however, the consolidation effects seem to dominate over the growth effects post-exit. Nevertheless, the correlation between higher performance and foreign acquisition, and the correlation of reduced relative post-exit performance and acquisitions, are novel empirical findings. Together with the exit patterns and value migration insights, they expand our system level understanding of what leads to acquisitions and what the consequences of acquisitions are.

There were, of course, factors which introduced variation in the overall exit patterns. Startups in life science, biotech, pharma and cleantech were considerably more likely to exit by IPO than other startups. Additionally, the availability of low thresholds stock exchanges in Sweden (MTFs) in the Growth study, was a popular exit route for the startups with lower performance, but potential future growth. Startups which exiting by IPO experienced stronger post-exit growth and higher likelihood of continued operations, compared to acquired startups. These results are supported by previous studies that have proposed that IPOs are a preferable exit route for regional growth (Mason & Brown, 2013).

In the VC Choice study, VCs explained the IPO bias in certain industries with the longer development cycle and thus higher capital requirements to reach break-even. These startup are

thus harder to find acquirers for and more logical to instead recapitalize through an IPO. VCs also assigned a sentimental value to owning shares in quote *'save the world from disease and pollution'* types of startups, making them well suited for taking public.

The presence of business angel investors reduced the likelihood of an acquisition by a firm in another region, as seen in the Migration study. This suggests either a selection bias among business angels, in that startups they invest in are more prone to local exits, or that business angels influence the exit decisions to a greater extent than anticipated and reported by VCs in the VC Choice study. The mitigating influence of industry, low threshold stock exchanges and business angel investments on exit route patterns, are novel insights previously not mention in the literature.

In the fourth study, we did not distinguish between exit routes, but instead examine how different levels of financial exit success drive the post-exit role transition of the agents in an entrepreneurial ecosystem (EE). An important finding of the study was that a minimum level of profitable exits were required to sustain and grow any EE dependent on equity investors. On a system level, EEs thereby require a minimum level of profitable exits, locals exit and recycling mechanisms for sustainable long-term growth. However, the minimum level of profitability required for continued investments was considerably higher for VCs than business agents (BAs). An EE reliant on primarily VCs, with a limited BA community, is thereby more vulnerable and less resilient than an EE with a larger BA community and a smaller VC community.

5.2 What is a likely causal chain of events that lead to, and occur as a consequence of, exits of venture capital funded startups?

Combining the findings from the four studies with theory, I construct a likely causal chain of events for startup exits. The proposed chain of events serve three purposes. First, it illustrates how the decisions made in each step leads to the conditions in the following step, until the final outcome is reached. Secondly, it allows us to analyze and substantiate the patterns and influencing factors in each step. Third, it allows us to consider which factors could be influenced by stakeholders to provide an alternative final outcome.

The proposed main chain of events starts by setting the preconditions for startup exits and continues by triggering the startup exit process, to the condition which decide exit route, and ends with the post-exit consequences of different exit routes. In each step of the chain of events, I also discuss likely conditions for deviations. The proposed chain of events is presented below:

1. **Startup exit preconditions**

    Founders invite venture capitalists to invest in their startup. As part of the investment terms, venture capitalists are promised an exit within a certain timeframe and given

contractual control over the exit decision (VC Choice study; Cumming, 2008). Venture capitalists often have an exit strategy formulated for the startup from the point of their initial investment (Cumming & Johan, 2017).

Deviations: It is rare, but not unheard of, that founders can avoid giving contractual control of the exit to venture capitalists. If business angels also invest in the startup, it may influence the exclusive contractual control venture capitalists often have.

2. Triggering startup exit process

If the startup is successful enough to survive to become an attractive exit opportunity, a startup exit process will eventually be initiated. The trigger may be an outside bid to acquire the startup or a shareholder initiating the process from the inside. As the venture capitalists has contractual control, they effectively control the exit process (VC Choice study; Cumming, 2008).

Deviations: If venture capitalist do not have contractual control, a shareholder majority will make the exit decision as agreed upon in the shareholders agreement. Furthermore, if the startup manages to survive, but fails to present an attractive exit opportunity, venture capitalists may exit by management buy-out (MBO), where the startup is sold back to the founders, or by closing down or liquidating the startup.

3. Deciding startup exit route

The exit route is decided by the venture capitalist based on the highest expected profit, taking into account the expected exit valuation of the startup in different exit route and the risks and uncertainties associated with each exit route (VC Choice study). There is a bias in this decision making towards acquisition exits (Cumming, 2008; VC Choice study), with a low threshold to selling the startup to acquirers in other regions and in comparison high threshold to taking a startup public due to uncertainties associated with the lock-in period (VC Choice study).

The characteristics of a startup also influences the exit route. The largest, highest performing and most valuable startups are mostly acquired by firms in other regions, with a smaller fraction go public on large stock exchanges (Migration and Growth studies). The remaining startups are acquired locally or, if available in their region, go public on local low threshold stock exchanges (Migration and Growth studies). Industry also influences exit route, with startups in life science, biotech, pharma and cleantech, more likely to exit by going public (Migration and VC Choice studies).

Deviations: In Silicon Valley, the most valuable startups go public or are acquired locally and the less valuable are acquired by firms in other regions (Migration study).

4. Post-exit consequences, by exit route

Acquired startups, both local and out of region acquisitions, are to a large extent consolidated and absorbed by their parent firms (Growth study). If the parent firm is based in another region, the consequence is that the former startup is consolidated to another region, while a local acquisition entails a local consolidation within the region. The remaining acquired startups, fully owned subsidiaries, experience a relative reduction in growth, employees and ownership of intellectual property post-exit as subsidiaries of larger firms (Growth study). Startups that go public, on large or small stock exchanges, experience a continued post-exit growth, compared to the acquired startups that continue as subsidiaries (Growth Study).

Deviations: There is a high variation among startups divided by exit route. Although the post-exit growth patterns are statistically significant, individual firms may deviate from the pattern. Furthermore, as the post-exit growth patterns are based on the Growth study in Sweden, we have yet to substantiate the post-exit growth pattern by exit route in other regions.

Next, I analyze each event in the chain, to consider which variables could be influenced for a different final outcome. The entire chain is initiated by the founders accepting venture capital investments, with the conditional exit and contractual exit control. If founders were to finance the development of their startup without external equity funding, by bootstrapping and relying on customer revenues and loans, there would be no external requirement for an exit. Founders would under these circumstances experience a slower development of their startup, but be in sole ownership and control of their startup. A study comparing growth of new firms with and without equity investments found that startups with equity investments grew faster, but due to the equity dilution of ownership, founders of both types of firms ended up with similar profit after exit in the end (Wiltbank et al, 2015). We need to remember that venture capital is not a requirement to successfully grow a startup; it accelerates growth but at a price for founders.

A middle ground for founders could be to rely on other external equity financing than venture capital, such as business angel, family offices and crowdfunding. These equity investors require an eventual financial exit, but may be more flexible on the circumstances for the exit. Venture capitalists invest other people's money, sourcing capital from limited partners with a limited lifetime fund and thereby need to ensure they can exit and liquidate their fund in time. These other equity investors invest their own money, so they can afford to be more flexible regarding the time frame in which the exit is done, the format of the exit and not demand sole contractual control of the exit. For founders, these equity investors may not match venture capitalists in amount of capital they can invest, but they can invest enough and demand less.

Due to the lack of research on divestments and exit done by business angels, family offices and crowdfunding, we can only speculate in that these investors have a different exit behavior than venture capitalists. However, as they invest their own money, rather than other people's, and thereby have more flexibility, it is feasible that they would act differently. This

proposition is supported by the fact that startups with both venture capital and business angel investments were more likely to exit locally, as seen in this thesis (Migration study).

There are examples of shrewd founders that receive venture capital investments, but avoid giving away contractual exit control. However, there is little research on how they accomplish this feat, and one can only speculate that it is due to exceptional expertise and bargaining position. Once founders have accepted venture capital investments, and the associated contractual exit control, founders primarily influence the exit of the startup by influencing the performance of the startup. The better the startup performs and grows, the more likely founders are to be replaced as CEO (Wasserman, 2003) and the higher is the likelihood of an exit of choice for the venture capitalist. However, if the startup is unsuccessful, founders are likely to see their startup liquidated, so their fortunes are linked to the success of the startup.

Once the exit process has been initiated, the exit route is dependent on firm characteristics and local conditions. Certain industries are more prone for exit by IPO (Migration and VC Choice studies) and local IPO conditions matter, such as in Sweden where MTFs are more frequent. For the highest performing startups, the choice is between an outbound acquisition or IPO on a large stock exchange. For the startups with lower performance, the choice is between a local acquisition or IPO on a small stock exchange if available. In Silicon Valley, the conditions are reversed for acquisitions, with the highest performing startups exiting locally. The options for influencing exit routes through policy are however limited this late in chain of events. Regions could bolster the accessibility of local stock exchanges and encourage local acquisitions through matchmaking (Growth study).

After the startup exit event, the growth trajectories of the former startups is to a degree set. Public companies are expected to a large extent continue to grow, while among acquired startups different degrees of consolidation will take place (Growth study). A deciding factor will be to what extent, and how fast, consolidation to other regions will take place for those startups acquired by outside incumbents. Local anchoring strategies and local cluster synergies may mitigate the migration pull to other regions (Mason & Brown, 2013). However, the earlier in a chain of events an intervention is made, the easier it is to influence to later consequences. After the exit event has occurred, policy options are more limited.

5.3 What are key consequences of exits of venture capital funded startups for regional development?

This thesis finds reason to reinterpret the role venture capitalists play in our economy. Contemporary narratives often frame venture capitalists as facilitators of accelerated growth for startups and midwifes of new public companies such as Google and Facebook (Florida & Kenney, 1988; Gompers et al, 2010; Lerner et al, 2012). However, the significant dominance of acquisition exits, relative rarity of IPOs and priming of venture capital funded startups towards acquisition stand in stark contrast to this narrative. The economic role venture capitalists play is thus primarily as a sourcing mechanism for incumbents, injecting them with

new products, technology, IP and talent packaged as startups, rather than facilitating the emergence of new public companies.

Implications of this reframing, is that venture capitalists are more important in revitalizing the competitiveness of existing industry clusters, than in birthing new industry clusters. For regions that wish to grow new industry clusters, using venture capital as a tool for financing and accelerating the growth of their startups may thus yield different results and unintended consequences than hoped for.

With this reframing in mind, and going back to the thesis question and purpose of this thesis, regions may wish to reconsider current policies that use venture capital as a tool for regional development. The policies of the last decades with regions trying to replicate the Silicon Valley model of venture capital accelerating startups, have clearly not yielded the intended long-term results. As this thesis demonstrates, exit patterns for venture capital funded startups favor Silicon Valley - even in regions other than Silicon Valley (Migration study). Venture capital is a market economy mechanism which accelerates growth of portfolio companies, but there are long-term consequences that manifest when employing the model in regions other than Silicon Valley, as this thesis demonstrates.

Policy makers should approach venture capital policies with due caution. As we live in a market economy, venture capitalism should be allowed to operate freely. Venture capital scholars have warned against governments tampering with venture capitalists business models and decision making, as it can lead to disrupting market forces (Lerner, 2009). However, in some regions, such as in Europe, a considerable part of the financing of venture capital comes from public sources (Höppner, 2015). Policy makers should consider if these massive capital allocations to private venture capital funds is in the interest of regional development, and if that capital could be allocated for greater effect in through alternative funding mechanisms.

Examples of alternatives are other equity investors such as business angels, family offices and crowdfunding, and non-equity solutions such as loans. In this thesis, business angel co-investing with venture capital increased the likelihood of a local exit (Migration study). Business angels were also expected to be more resilient in continuing to invest over time than venture capitalists (Ecosystem study). Family offices and crowdfunding, should arguable have more in common with business angels than venture capitalists. More research is needed on other forms of equity financing and loans offered to startups. Focus should be on how different financing solutions influence the long-term development of firms, rather than short-term growth and profitability.

Finally, there is a tendency in theory to overgeneralize venture capitalist behavior, while there evidently is heterogeneity (VC Choice study). Certain subgroups within venture capitalists, for instance corporate venture capitalists and government venture capitalists, may have different exit preferences such as favoring local exits, than typical private venture capital funds. Future studies should explore the variation among different types of venture capitalists in exit preferences and behavior. With better understanding, policies can be designed for greater effect. Until then, policy makers are cautioned not to double down on past policies.

6 Conclusions

6.1 Implications for scholars

The purpose of this thesis is to investigate the suitability of venture capital for regional development, by studying the long-term and post-exit outcome for venture capital funded startups. I find that although venture capital funding accelerates startups in the short-term, it also primes them for acquisitions. These acquisitions lead to various degrees of post-exit consolidation of the former startups, as they are absorbed by the acquiring incumbents. For most regions other than Silicon Valley, this post-exit consolidation leads to a considerable migration of the operations of the former startups from their regions of origin to other regions.

This thesis makes a theoretical contribution by bringing transparency to previous unexamined startup exit patterns of venture capital funded startups, thereby contributing individually to, and bridging between, venture capital, entrepreneurship and regional development theory. Generalizable pattern are identified across five entrepreneurial regions, while unveiling the unique competitive advantage that Silicon Valley has in acquiring the most valuable startups on a global basis. Furthermore, I explain the chain of events likely to occur following a venture capitalist's investment in a startup, as well as the long-term consequences and end outcome stakeholders can expect.

I find reason to reinterpret the role venture capitalists play in our economy. Venture capitalists are often depicted as facilitators of accelerated growth for startups and midwifes of new public (Florida & Kenney, 1988; Gompers et al, 2010; Lerner et al, 2012). However, the significant dominance of acquisition exits, relative rarity of IPOs and priming of venture capital funded startups towards acquisition stand in stark contrast to this narrative. Venture capitalists play a more important role as sourcing mechanism for incumbents, injecting them with new products, technology, IP and talent packaged as startups, rather than facilitating the emergence of new public companies. The dependence on incumbents that can acquire their portfolio startups, makes venture capitalists primarily a mechanism for revitalizing existing industry clusters, than giving birth to new industry clusters where there are no incumbents yet.

6.2 Implications for practitioners

As venture capitalists usually have extensive control rights, including contractual exit control, they effectively hold the remaining shareholders and stakeholders of the startup hostage. The venture capitalists decides the exit route, and thereby post-exit format and growth trajectory of the startup, but also the profit for all shareholders that sell their shares at the same time as the venture capitalist. Entrepreneurs and other stakeholders in startups should be cognizant of the likely long-term consequences of venture capital funding, which in the past have been far from transparent.

For policy makers, this thesis may be a rude awakening in unveiling both unexpected and unintended consequences of policies using venture capital for regional development. Policy makers should consider if their present policies for regional growth are the most efficient means of achieving their goals. If in doubt, they should map the exit patterns of their region. If their exit patterns are not to their liking, or not in alignment with their policies, policy makers should consider going back to the drawing board and rethink their policies taking the specific exit patterns of their region into account.

A problem for policy makers may be that, although our understanding of the long-term consequences of venture capital funding of startups may be lacking, the long-term consequences of other alternative funding sources such as business angels, family offices and crowdfunding, are also uncertain. These alternative funding sources may yield different long-term growth trajectories, but we do not know and it requires study. Most startups will use a mix of funding sources, which makes untangling causality challenging to say the least. Future research will be needed to bring clarity to the alternatives to venture capital funding.

Finally, policy should take a longer time perspective on startup and ecosystem development. As discussed in this thesis, venture capital has a short to mid-term accelerating effect on startups, while long-term priming them for acquisition. From a five to ten year perspective, promoting the use of venture capital may thus be a productive approach to stimulating growth. However from a twenty to thirty year perspective, this approach may also results in most of these firms no longer found operating in their region of origin. The complexity of growing regional economies and entrepreneurial ecosystems needs to be understood in this longer time perspective, which should to be reflected in present policies and future research studies.

6.3 Future research

This thesis demonstrates the importance of cross-disciplinary and mixed methods research on a system level to understand long-term consequences of policies. Furthermore, the importance of exits in determining the growth trajectory and final outcome for startups should now be clear. Further research into exits and related topics is needed. As an example, the low threshold stock exchanges (MTFs) which were unique to Sweden, offer an interesting new avenue of research of how new exit avenues may facilitate increased long-term growth.

Research on venture capitalist has so far neglected to recognize the heterogeneity among venture capitalists. Although a pattern for venture capital exits was statistically verified in the quantitative studies, the VC Choice study also revealed a variation among the venture capitalists. Future studies should investigate how diverse the population of venture capitalists is, and if there are distinct subgroups in the population that act differently and create different value. One interesting avenue is to investigate if there are commonalities among the few venture capitalists that take startups public with some regularity. If so, they could be a subgroup which could potentially be supported in policies aimed at creating more public companies.

Entrepreneurial finance has in the past been more focused on supply side than demand side problems. The challenges entrepreneurs face has a greater depth than just finding capital. All types of funding come with an agenda and strings attached that influence firm development. Research is needed on how different financing solutions influence the long-term development of firms. In this long-term context, other equity funding sources that venture capitalist, such as business angels, family offices and crowdfunding, warrant more future research.

Finally, this thesis has demonstrated the importance of industry to exits and by extension entrepreneurial ecosystems and cluster dynamics. Future research should explore how entrepreneurial ecosystems and clusters have different growth trajectories based on the industries that consist of. For instance, are life science cluster more resilient and grow faster than enterprise software clusters, gaming clusters or consumer electronics cluster.

Future research into regional growth and entrepreneurial ecosystems need to be cognizant of the complexity in clusters blending inherently different industry mechanics, the long-term dynamics of regions and ecosystems that that may require decades of data to study and the interdependence of regions that highlight the need for international and interregional studies.

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Paper I

MIGRATION PATTERNS OF VENTURE CAPITAL FUNDED STARTUPS

Per Hulthén & Gregory Graff

Abstract

This study examines migration patterns of venture capital funded (VC) startups from different regions and what may explain them. A realization has emerged, that how VC investors in a startup choose to exit their investment, such as by a merger and acquisition (M&A) or initial public listing (IPO), may determine the long-term growth trajectory and regional outmigration of startups. We compare exit patterns for VC-funded startups across five regions: San Francisco encompassing Silicon Valley, Colorado, North Carolina, Israel and Sweden. 10.593 startups, founded 1992-2011, are analyzed through descriptive statistics and regression tests. Exit patterns examined include survival ratios, exit routes, exit transactions amounts and ownership transitions to other regions. Results are discussed by contrasting venture capital with regional development theory.

Conclusions are that regional exit patterns are dominated by acquisitions, which aggregated constitute a likely ownership concentration of the most valuable startups to Silicon Valley. In the other four regions, only a small portion of the value of the startups remain owned in their regions. Results indicate that, provided startups survive, their life cycles are determined by industry affiliation, financing and ownership structure, which are interrelated. Implications are that regional policies to support VC-funded startups should be aligned with regional exit patterns and industry clusters, to be effective. Contributions to venture capital theory is a transparency of previously unpublished exit patterns and a reframing of venture capitalists as sourcing agents for revitalizing incumbents. Contribution to regional development theory is the emerging interconnectedness of regions constituting a value chain, with Silicon Valley as a primary harvesting hub. Recommendations for future research are outlined.

Keywords: startups, exit, venture capital, regional development, acquisition, policy.

1. Introduction

The importance of entrepreneurship for economic growth is well established (Leibenstein, 1968; Baumol, 1996; Audretsch et al, 2006). Entrepreneurs, and the startups they create, play the economic role of transformational agents (Schumpeter, 1934), vehicles of knowledge dissipation and innovation (Acs et al, 2013) and net job providers (Birch, 1979, 1987). Yet, the success and thus the impact of entrepreneurs is anything but certain. At each phase in the startup lifecycle the probabilities of failure, versus mere survival, versus success are highly skewed and few manage the entire journey to become large corporations (Shane, 2000, 2008). A key mechanism in facilitating the growth of startups has been the leveraging of external financial assets in the form of equity-based investments (Acs, 2008), with venture capital (VC) funds often cited as the most effective investment (Lerner, 2009; Lerner et al., 2012).

It is also well established that the regional economic environment influences the rate of entrepreneurship, with some regions experiencing agglomeration effects of innovative entrepreneurs (Saxenien, 1996; Porter & Stern, 2001) as well as more dynamic entrepreneurial ecosystems (Isenberg, 2010; Feld, 2012, Acs et al, 2017). Silicon Valley and the startups that have originated there have set global precedent for how a regional cluster that enjoys economies of agglomeration in the creation of new startups can drive economic growth (Florida & Kenney, 1988; Gompers et al, 2010). Inspired by Silicon Valley's success stories, other regions and national governments have poured public and private financing into VC funds, combined with a host of other strategies to support the creation and growth of startups, with the hope of realizing similar outcomes (Storey & Tether, 1998; Lerner, 2009; Lerner et al., 2012; OECD, 2001, 2010b; WEF, 2009, 2011).

However, as most of these efforts have had limited success in replicating Silicon Valley's success (Nightingale & Coad, 2013; Rosenberg, 2002). Israel has boasted the highest levels of startups and venture capital investments per capita, but has yet to see new large companies emerge domestically (Senor & Singer, 2009). In Europe, numerous startups emerge, but few grow into large corporations (Duruflé et al, 2017). It is becoming apparent that stimulating the founding of startups and providing adequate financial capital is not enough, whether startups remain long-term in their regions of origin and grow post-exit is equally important (Wennberg & Mason, 2018). Anecdotal evidence of startups leaving their region of origin after being acquired (Mason & Harrison, 2006; Mason & Brown, 2013; Carpentier & Suret, 2014), is cause for a growing concern that the problem may be startup migrating away from their regions of origin, thereby draining regions of the startups they created and nurtured.

A realization has emerged that how VC investors in a startup choose to exit their investment, such as by a merger and acquisition (M&A) or initial public listing (IPO), may determine the long-term growth trajectory and even the regional outmigration of the startup. A startup that remains within its region of origin after exit would remain part of, and reinforce, the growth of the local innovation ecosystem and overall economy, creating new opportunities for new startup activities. Such exit patterns would thereby tend to contribute to a virtuous self-reinforcing cycle. This would suggest that a major reason for the success of Silicon Valley may have been its ability to retain or even to attract successful startups after exit, at least as important

as its ability to create and finance startups in the first place. Other regions may fail to grow because they are unable to retain their own startups and take advantage of the post-exit dynamics. This study therefore asks the research questions: *what are migration patterns of VC-funded startups from different regions and what may explain them?*

We seek to answer these questions by investigating exit patterns for VC-funded startups in five representative regional economies that are comparable in population and economic activity: the San Francisco Bay Area encompassing Silicon Valley, the states of Colorado and North Carolina, and the countries of Israel and Sweden. By exit patterns we refer to the overall rates of survival and successful exit, as well as the chosen exit routes taken, such as M&A or IPO, the exit transaction amounts, and the transition of ownership upon exit to other geographical areas. To investigate exit patterns, the fate of 10,593 startups, founded from 1992 to 2011 are analyzed. The results are discussed by contrasting venture capital (Kortum & Lerner, 2001; Lerner, 2009; Gompers et al., 2010) with regional development (Saxenien, 1996; Porter & Stern, 2001; Mason & Brown, 2013), to understand the startups' exit phenomenon from the perspectives of different stakeholders.

We identify the primary exit patterns for venture capital funded startups in the five regions, with M&As as the dominant exit route. To the degree that IPOs occur, they are less frequent and somewhat more likely to occur in life science related industries. These observations contrast with the often-quoted sentiment that 'IPOs are the golden standard' of venture capital (Lerner et al, 2012, p.201). Differences between regions are observed in founding rates, exit transaction amounts, and transfer of controlling ownership out of the region. We find that in Silicon Valley over 50 percent of successful startups, representing almost 60 percent of the exit value, are likely to stay within Silicon Valley when VCs exit. In contrast, across the other four, smaller—but still representative—innovative regions, less than a third of successful startups, representing only 15 percent of the total reported values, are likely to remain owned within the region in which they originated after the VCs exit. For example, of the 420 firms started in Israel from 1992 to 2010 that later made successful exits, 280 (or 67 percent) were acquired by firms or listed on stock exchanges located outside of Israel. Based on disclosures of amounts paid, the startups acquired or listed abroad represented $13.9 billion (or 96 percent) of the total $14.5 billion of all disclosed Israeli exits.

Conclusions are that regional exit patterns are dominated by acquisitions, which aggregated constitute a likely ownership concentration of the most valuable startups to Silicon Valley. In the other four regions, only a small portion of the value of the startups remain owned in their regions. Results indicate that, provided startups survive, their life cycles are determined by industry affiliation, financing and ownership structure, which are interrelated. Implications are that unless regional policies to support VC-funded startups are aligned with regional exit patterns and industry clusters, they may be ineffective or even counterproductive.

The remainder of this paper is structured as follows. First, we review the relevant venture capital and regional development literature. Then, we explain the research design and data, before providing descriptive statistics for the geographical distribution, industry affiliation and exit outcomes of the firms. Results are then presented regarding survival and exit routes for all firms in the sample, the transaction amounts for a subset of about half of the firms in the data

set, and finally transitions of ownership upon the exits. The discussion that follows focuses on contrasting the objectives of venture capital with the objectives of regional development. Finally, policy implications are drawn and thoughts for future research shared.

2. Review of the Literature

2.1 Venture capital exits

Venture capital (VC) helps fill the early stage equity gap for small firms with high growth potential, thereby enabling the startup to grow (Florida & Kenney, 1988). In the last two decades, the role of the venture capitalist has been emphasized as an enabler and accelerator of entrepreneurial economic growth (Gompers et al., 2010: Lerner, 2009; Lerner et al., 2012). Venture capital has spread worldwide with the expectation that it would be a generalized driver of economic growth and innovation (Kortum & Lerner, 2001; Lerner, 2009; Gompers et al., 2010; Lerner et al., 2012).

Studies show that VC-funded startups grow faster (Puri & Zarutskie, 2012) and are more innovative (Kortum & Lerner, 2001; Hellmann & Puri, 2002) than new firms that do not receive venture capital. However, it is unclear if the leveraging effect is due to the invested capital itself (Wiltbank et al, 2015), the venture capitalists' selection bias (Sørensen, 2007), their networking effects (Hochberg et al, 2007), or governance influence (Hochberg, 2011).

The anticipating of making a profitable exit lies at the heart of VC investing strategy (Sahlman, 1990; Gompers, 1995; Gompers & Lerner, 1999). However, VC exits are about more than realizing investment value; the exit is a process by which the startup is transformed into a new entity (Bygrave et al, 1994). The exit timing for the VCs should optimally be "*when the projected marginal value added as a result of the VC's efforts, at any given measurement interval, is less than the projected cost of these efforts*" (Cumming & MacIntosh, 2003, pg. 6). Several studies show that the average holding period by VC funds of equity stakes in startups is five years (Sahlman, 1990; Cochrane, 2005).

Generally, there are five types of venture capital exits, listed here in presumed order of preference for the VC investor according to MacIntosh (1997): (a) an IPO, in which a significant portion of the firm is sold on the public market; (b) an acquisition exit; that is, through an M&A, in which a third party (typically operating in the same industry or market) buys the entire firm; (c) a secondary sale, in which only the VC fund sells its shares to a third party investor; (d) a buyback, or a management buyout (MBO), in which the managers of the entrepreneurial firm repurchases the VC's shares, often at a discount of the originally expected value; and (e) a write-off, in which the VC walks away from the investment, usually due to bankruptcy or the firm closing down.

The most profitable exits are IPOs and M&As (Cumming & MacIntosh, 2003; Lerner et al., 2012; Bienz & Leite, 2008). A study of venture capital exits during 1995-2005 in North America and Western Europe showed that M&As dominate, with 78.3 percent compared to

only 3.5 percent IPOs (Lerner et al, 2009). This is despite the fact that IPOs have historically provided a 22 percent price valuation premium over M&As (Brau et al, 2003). Although M&As may result in a lower value, they provide immediate, full liquidity to investors, which is usually not the case in an IPO, in which major shareholders are blocked from selling shares during a lock-in period following the initial listing (De Clerq et al, 2006).

VC exit patterns may differ between countries and regions due to legal and institutional factors (Cumming & MacIntosh, 2003), availability of exit routes such as small-cap stock exchanges (Rindermann, 2003), and the possibly divergent exit preferences of the owners (Schwienbacher, 2008). Entrepreneurs are generally biased towards IPOs (Schwienbacher, 2008), yet the venture capital investors often ensure contractual control of the exit decision (Cumming, 2008; Kaplan & Strömberg, 2003). Venture capitalists often pre-plan the exit route for the startup from the point of their initial investment (Cumming & Johan, 2008).

Most of the research literature on venture capital to date focuses on the working practices of venture capitalists, the financial performance of VC funds, and the performance of VC-funded startups up to the point of exit. What happens to after exit is often outside the interest and scope of studies on venture capital. We thereby have a limited knowledge about what happens to VC-funded startups post-exit and the long-term effects of VC-funding that occur after the venture capitalists have exited. For answers to these questions, we need to look to the regional development literature.

2.2 Regional development perspectives on venture capital exits

While venture capital research has been concerned mostly with value creation for investors, other scholars have explored the intersection of entrepreneurship and regional economic development. The vital role of entrepreneurs, and economic impact generated by new firms, has been established in innovation, growth and employment (Schumpeter, 1934; Leibenstein, 1968; Baumol, 1996; Audretsch et al, 2006). In recent decades, entrepreneurship studies have focused on leveraged firms that generate greater economic impact, and specifically to VC-funding of firms, as one of the most efficient form of leveraging (Acs, 2009).

As entrepreneurship mostly operates on a regional basis (Audretsch & Feldman 1996; Isenberg 2010; Feld, 2012), regional economic environment have a profound influence on both the rate of startup activity and the success of startups (Marshall, 1986; Krugman, 1991). This extends the traditional economics of agglomeration to activities of knowledge creation and innovation, arguing that a critical mass of research institutions, corporate R&D, and tech startups within a "technology cluster" or "entrepreneurial ecosystem" not only drives economic development within that region, but that such clusters themselves are crucial engines of growth for the economy overall (Savenien, 1996; Porter & Stern, 2001; Acs et al, 2013).

Success among startups is highly skewed, with a small number of successful firms such as Apple, Google, and Facebook in the generating a disproportionate amount of the economic impact in the United States (Shane, 2008). The same seems to hold true internationally, with the World Economic Forum reporting that, in a multi-country study, the top one percent of early-stage firms contributed 44 percent of the total revenues and 40 percent of total jobs, while

the top five percent contributed 72 percent of total revenues and 67 percent of total jobs (WEF, 2011). However, even though most of the most notable successes in Silicon Valley exited via IPOs (Shane, 2009), most startups are observed to exit by merger or acquisition, (Cuming & MacIntosh, 2003; Lerner, 2009; Lerner et al., 2012), thus raising the question of the importance of exit route and post-exit ownership for long-term growth. Changes in ownership of firms, may also change the priorities, resources and agency within these firms.

Some scholars argue that foreign ownership may be beneficial, allowing for a matching up of startups with the best parent organizations available globally to help them overcome barriers to growth (Davenport, 2009; Hopkins & Richmond, 2014, Dahlstrand, 2017). Other scholars argue that startups that exit by going public generate more economic growth and positive regional externalities than startups that exit by acquisition (Mason & Brown, 2013). From a regional perspective, the extent to which startups remain and grow within their region of origin is a crucial factor for that region's long-term economic development (Wennberg & Mason, 2018).To the degree exit patterns for VC-funded startups have been studied quantitatively, it has often been on a continental level for the USA and Western Europe (Lerner et al, 2009), with any interest in the post-exit development of these startups.

Empirical studies on the post-exit growth of startups consists primarily of case studies on acquisitions. A post-exit study of Scottish startups includes examples of foreign acquisitions resulting in both accelerated growth and closures of startups (Mason & Harrison, 2006). A case study in the UK observed a 'sell-out mentality' among startups which, coupled with foreign acquisitions, lead to startups disappearing abroad (Brown et al., 2017). Studies in Ireland, Sweden, and New Zealand all come to similar conclusions, with foreign acquisitions led to a long-term loss of local firms and employment (Hogan et al., 2018; Hulthen et al, 2019; Scott-Kennel, 2013). Studies in Canada (Carpentier & Suret, 2014) and Israel (Rosenberg, 2002) found indications of high-tech firms stagnating after being acquired by foreign owners to become R&D and production satellites, as the acquirer consolidated management, finance, and sales functions to other regions. Within the United States, regions outside of Silicon Valley and other major coastal hubs pursuing innovation led economic development policies tend to experience an outmigration of technology startups, undermining the regional development impact of those policies (Zhao et al, 2015).

Large corporations often use acquisitions as a source of new technologies and products, as well as the associated intellectual property and talent needed to defend and develop these new assets further (Granstrand & Sjölander, 1990). Acquisitions may lead to the relocation of intellectual and human capital, as utilizing IP often requires the presence of those scientists or engineers who are familiar with the inner workings of the technology and consolidating these assets at one location for synergy often makes economic or strategic sense (Makinen et al, 2012; Chatterji & Patro, 2014; Sawicki, 2014). Historically, acquisitions have often led to a transfer of employment and growth from peripheral regions to central regions (Leigh & North, 1978; Bhagat et al, 1990; Turok & Richardson, 2010; Ashcroft et al, 1994).

To summarize, if ownership of a startup transitions to an entity located in another region, it may have three possible negative consequences. First, given that the profits of a firm belong to the owners of that firm, the profits generated by the startup may also leave the region.

Second, acquired firms may be consolidated by the parent firm to another region, especially when geographically removed from the parent firms (Brown et al., 2017; Hogan et al., 2018; Hulthen et al, 2019; Scott-Kennel, 2013; Leigh & North, 1978; Bhagat et al, 1990; Turok & Richardson, 2010; Ashcroft et al, 1994). Third, acquired startups may stagnate, if the parent firm concentrates resources to other locations and business units (Carpentier & Suret, 2014; Hulthen et al, 2019; Makinen et al, 2012; Chatterji & Patro, 2014; Sawicki, 2014).

In answering the research question of this study, it is thereby important to not only consider the (i) general exit patterns such as founding and survival ratios, but also (ii) clustering within certain industries for regional specialization, (iii) exit routes and (iv) ownership transitions to other regions, as well as (v) transaction amounts due to the disproportionate economic impact of the most successful companies, and value is the best proxy we have for success.

3. Methodology

3.1 Research design

To answer the research question, we conduct this study in nine steps. First, we assemble a representative sample of VC-funded startups from regions selected for degrees of variety. Second, we illustrate the geography and industry distribution of the firms in the sample, to ensure the sample covers enough variety for the results may be generalizable. Third, we establish exit outcome for all sampled firms by region, which provides the basis for analysis.

Fourth, we examine survival and exit routes of sampled firms by industry, to investigate the influence of industry on exit route. Fifth, we examine transaction amounts for exits by region, to investigate differences in regional exit amounts. Sixth, locations of acquirers and stock exchanges are examined, to understand how ownership of startups transition at the exit. Seventh, we use regression tests to identify which variables drive likely post-exit relocation of startups. Eighth, we discuss results with implications for theory. Ninth, we conclude by answering the research questions and outlining recommendations for future research.

Up until the sixth step, we only use descriptive statistics, so the limitations of the study reside in the sample of 10,593 VC-funded startups founded in five regions over twenty years. Within these restrictions, results should be robust and generalizable. In the seventh step, we use theory to formulate assumptions regarding likelihood of relocation based on exit route. Furthermore, we use logit regression test to identify drivers of likely relocation. The results of this seventh step are statistically significance, but rest on the assumptions being true. The robustness of the seventh step is therefore open for interpretation, until more research has been conducted upon the causality between exit routes and relocation.

3.2 Sampling method

The five regions in our sample were selected to be comparable in population and GDP, to have a reputation for commercializing research, and to have established startup and venture capital communities. The regions were also chosen to represent variety in terms of industry, geography

and culture. The five selected regions were Colorado, North Carolina, Israel, Sweden and San Francisco Bay Area, encompassing Silicon Valley. The five regions are show below in Table 1 with comparative statistics.

Table 1. Five regions for which startups and exits are compared

Country/Region	Population (2010)	GDP (2010)	GDP *per capita* (2010)	VC-funded startups (1992-2011)
San Francisco Bay area[1]	6.2 million	$498 billion	$80,322	6,938
Colorado	5.1 million	$253 billion	$49,254	629
North Carolina	9.5 million	$425 billion	$44,736	434
Israel	7.6 million	$234 billion	$30,642	1,388
Sweden	9.3 million	$488 billion	$52,076	1,204

Data sources: U.S. Census Bureau; U.S. Bureau of Economic Analysis; World Bank

Silicon Valley and Israel were obvious regions to include, due to their frequent mention in theory. To provide contrast to Silicon Valley, we included Colorado and North Carolina. Both had distinctly differently industry clusters from Silicon Valley, with the biotech and agricultural (agtech) clusters in Colorado and the famous research triangle in North Carolina. Sweden was elected as the final region, to provide a European reference point and also being the second most innovative national economy according the 2019 Global Innovation Index (WIPO 2019).

The study required extensive longitudinal data on venture capital funded startups in USA, Israel and Sweden. Despite the growth of online information and commercial databases, the limited reporting requirements for small firms make it a challenging task for researchers in most countries to track privately-held firms (Cumming & Johan, 2017). After conducting an evaluation of available databases, it became clear that VentureSource offered the best international cross-region comparable dataset on VC- funded startups and exits. Other databases, such as Crunchbase, PitchBook and CB Insights, had insufficient coverage outside of the USA for the time period 1990-2000.

From VentureSource we extracted all companies that meet three criteria: (a) a main address within one of these five regions, (b) a founding year from 1992[2] to 2011, and (c) at least one investment received from a venture capital type source according to VentureSource's deal categorizations. The data obtained for each startup include all recorded financial transactions

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[1] Data for San Francisco Bay Area as defined by combining the San Francisco-Oakland-Hayward Metropolitan Statistical Area (MSA) and the San Jose-Sunnyvale-Santa Clara MSA, encompassing the following seven counties: Alameda, Contra Costa, San Francisco, San Mateo, Marin, Santa Clara, and San Benito.

[2] Prior to 1992, data reporting in VentureSource for Israel and Sweden is incomplete.

through 2017, allowing for a window of at least six years after founding for even the youngest cohort of startups in the sample to observe investments received and exit outcomes. This twenty year time frame for company starts and twenty-six year time frame for exits encompass an historical window during which venture capital matured as a funding mechanism for high tech startups globally, spanning several business cycles, and thus including a range of varying economic conditions.

Although VentureSource was the best alternative, it was contained far from complete and comparable records. VentureSource aggregates data from several sources, with limited coherent terminology and flaws in reporting. Venture Source classifications of venture capital had some inconsistencies, which led to some transactions and investors being reclassified. There has been historical differences in terminology and definitions between the USA and Europe for venture capital and private equity (PE) (Lerner et al., 2009). To be consistent, we therefore used the more strict USA definition of venture capital of formal venture capital funds investing in startups, to isolate the VC phenomenon we studied.

After considerable data cleaning and classification of exits, as well as extraction of names and locations of acquiring firms or listing stock exchanges, we developed a relational database, including firm data and deal data, consisting of multiple investment rounds as well as exit transactions for each firm, for 10,593 VC-funded startups. Of these, 6,938 (66 percent of the total) originated in the San Francisco Bay area, 629 (6 percent) in Colorado, 434 (4 percent) in North Carolina, 1,388 (13 percent) in Israel, and 1,204 (11 percent) in Sweden.

3.3 Geographical distribution of sample

Plotting the startups on a density map provides visual representation of the proximity and concentration of these five regions, as can be seen below in Figures 1.a-f. The traditional heart of Silicon Valley includes the cities of Cupertino, Mountain View, Palo Alto, Redwood City, San Mateo, Santa Clara, Sunnyvale, and the larger city of San Jose. The city of San Francisco itself, as well as other cities ringing the San Francisco Bay, over time become a part of the region's entrepreneurial ecosystem (Figure 1.a). Startups in Colorado (Figure 1.b) are clustered in metro Denver with the surrounding R&D intensive university towns of Boulder, Golden, Fort Collins and Colorado Spring. Similarly, startups in North Carolina (Figure 1.c) are clustered in proximity to the famous Research Triangle in the cities of Raleigh, Durham, and Chapel Hill, also home to major research universities.

Startups in Israel (Figure 1.d) tend to cluster around metro Tel Aviv. Due to the small geographic size of Israel, even those located elsewhere in the country are within relatively close proximity. In Sweden, startups cluster in and around the three metro areas of Stockholm, Gothenburg and Malmö/Lund (Figure 1.e). These metro clusters are to a degree geographically separated, however with a transit time between hubs of only 2-4 hours and a shared community of entrepreneurs, venture capitalists and business angels, they form a cohesive national ecosystem (Eriksson & Rataj, 2019). The clustering around universities, research centers, and industry clusters in all five regions is consistent with expectations of regional embeddedness (Dahl & Sorenson 2012; Klepper & Sleeper, 2005; Saxenien, 1996).
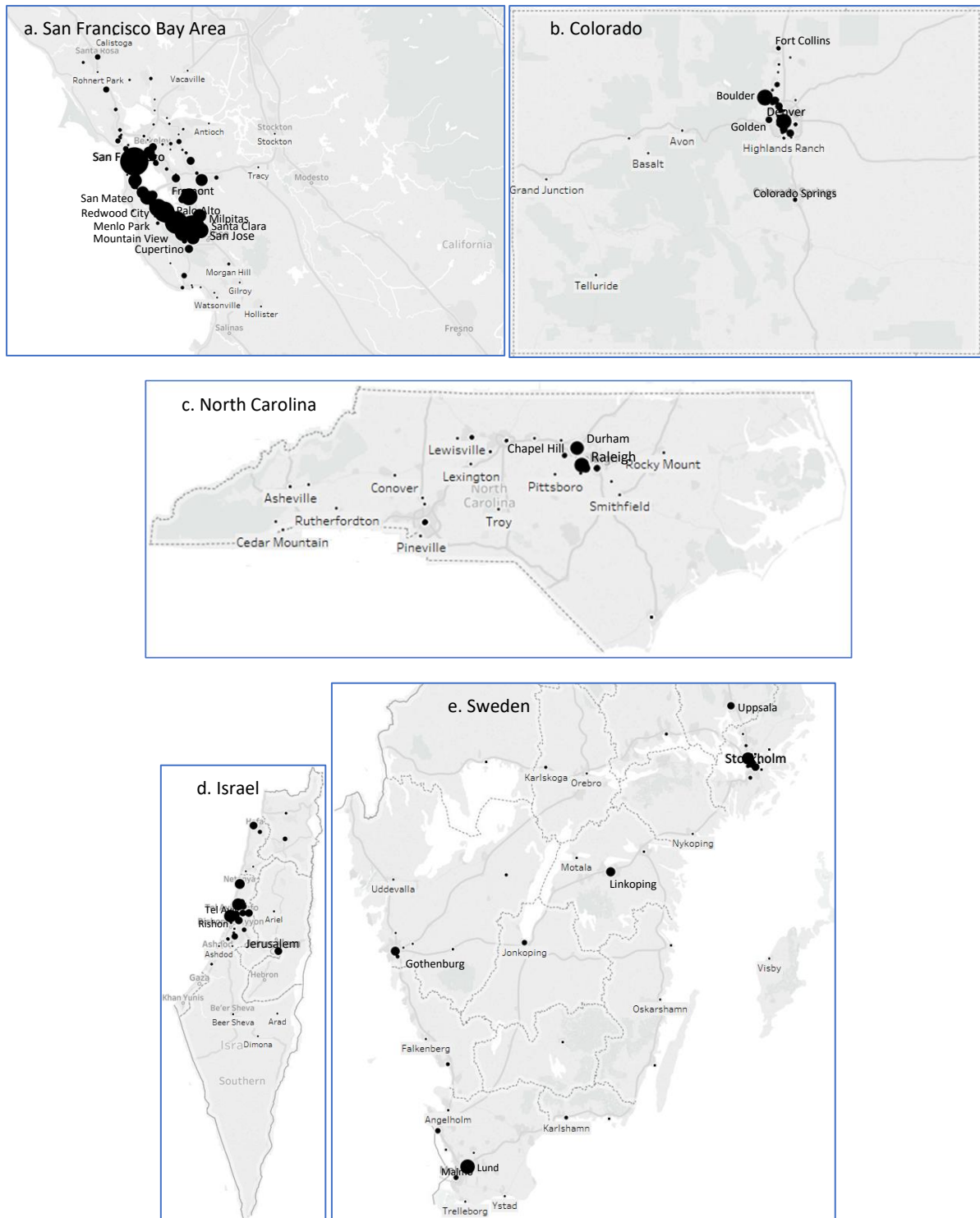
Figure 1. Density map of startup companies in five regions: a. the San Francisco Bay Area encompassing with Silicon Valley; b. Colorado; c. North Carolina; d. Israel; and e. Sweden.

3.4 Industry distribution of sample

Table 2. Industry categories for startups, based on VentureSource classification

BUSINESS & FINANCIAL SERVICES	Business Support Services
	Information Services
	Financial Institutions and Services
	Wholesale Trade and Shipping
CONSUMER GOODS & SERVICES	Food and Beverage
	Household and Office Goods
	Personal Goods
	Retailers
	Travel and Leisure
ONLINE SERVICES & CONTENT	Media and Content
	Consumer Information Services
HEALTHCARE, PHARMACEUTICALS, & BIOTECH	Biopharmaceuticals
	Healthcare Services
	Medical Devices and Equipment
	Medical Software and Information Services
INDUSTRIAL GOODS & MATERIALS	Vehicles and Parts
	Aerospace and Defense
	Agriculture and Forestry
	Construction and Manufacturing
	Machinery and Industrial Goods
	Materials and Chemicals
	Non-Renewable Energy
	Renewable Energy
	Utilities
ELECTRONICS, COMPUTERS, & SEMICONDUCTORS	Communications and Networking
	Electronics
	Computer Hardware
	Semiconductors
SOFTWARE	(note that medical software and IT is listed under HEALTH, PHARMACEUTICALS , & BIOTECH)

The selection of the sample was not constrained by industry nor field of technology and can thus be considered representative of all industry affiliations of VC-funded startups across the regions. Startups in the sample span seven major industry categories and more than two dozen sub-categories, according to VentureSource industry codes, seen above in Table 2.

More than half of the startups in the sample (58 percent) were in the information technology (IT) and computing industry sectors typically associated with Silicon Valley, as can be seen in Table 3: 17 percent are in electronics, computers, and semiconductors; 29 percent in software; and 12 percent in online services and content. Other significant industry categories represented were healthcare and biotechnology (17 percent) and business and financial services (16 percent). Smaller shares are in the industrial goods and materials category—including

advanced manufacturing, agtech, energy, and "cleantech" (5 percent)—and in consumer goods and services (4 percent).

Table 3. Startups in the sample by industry category, with percentages of total by region

Industry	Silicon Valley	Colorado	North Carolina	Israel	Sweden	Total
Business & Financial Services	1,215	122	77	84	187	1,685
	18%	*19%*	*18%*	*6%*	*16%*	*16%*
Consumer Products & Services	262	44	14	13	73	406
	4%	*7%*	*3%*	*1%*	*6%*	*4%*
Online Services & Content	970	54	24	87	130	1,265
	14%	*9%*	*6%*	*6%*	*11%*	*12%*
Health, Pharma, & Biotech	938	113	157	364	252	1,824
	14%	*18%*	*36%*	*26%*	*21%*	*17%*
Industrial Goods & Materials	236	51	31	109	117	544
	3%	*8%*	*7%*	*8%*	*10%*	*5%*
Electronics, Computers, & Semiconductors	1,194	87	41	319	178	1,819
	17%	*14%*	*9%*	*23%*	*15%*	*17%*
Software	2,122	158	90	407	265	3,042
	31%	*25%*	*21%*	*29%*	*22%*	*29%*
Total	6,938	629	434	1,388	1,204	10,593
	100%	*100%*	*100%*	*100%*	*100%*	*100%*

In absolute terms, Silicon Valley accounts for the lion's share of startups across all industry categories. Given that Silicon Valley represented two thirds of the total sample, it should influence the distribution of the total sample. In Silicon Valley, the percentage of firms in software and online were higher than in the other four regions, while in North Carolina and to a lesser extent in Israel the percentage of firms in healthcare and biotech were higher than in the other regions. Yet, the distribution of startups by industry categories was not dissimilar across the five regions. Regional specialization was evident only to a limited extent.

3.5 Exit outcomes of sample

For each startup in the sample, operating status was determined as of the end of 2017, as can be seen below in Table 4. If a startup had experienced a successful exit event, the type of exit was categorized, and the date of exit was recorded. We distinguished between exits by initial public offering (IPO), where the startup became a publicly traded company, mergers and acquisitions (M&A) where the startup was purchased by another firm operating in the same industry or market, and other buy-outs (OBO) were ownership of the startup changed financially but not to another firm operating in the same industry, for example through a management buyout or private equity buyout. The reason for this distinction was that different types of owners likely have different agendas for their ownership of firms, and thereby should result in different development trajectories for the startups. Of the total 10,593 firms, 710 (7

percent of all startups in the sample) exited via IPO, 3,331 (31 percent) exited via M&A, and 306 (3 percent) exited via OBO.

Table 4. Fate of startups, with percentages of total by region

	Silicon Valley	Colorado	North Carolina	Israel	Sweden	Total
Exited by IPO	459	31	36	79	105	710
	7%	*5%*	*8%*	*6%*	*9%*	*7%*
Exited by M&A	2,472	210	126	281	242	3,331
	36%	*33%*	*29%*	*20%*	*20%*	*31%*
Exited by OBO	110	22	14	50	110	306
	2%	*3%*	*3%*	*4%*	*9%*	*3%*
Total successful exits	3,041	263	176	410	457	4,347
	44%	*42%*	*41%*	*30%*	*38%*	*41%*
Reported closed	1,309	115	81	359	226	2,090
	19%	*18%*	*19%*	*26%*	*19%*	*20%*
95% prob. closed	1,533	147	110	446	384	2,620
	22%	*23%*	*25%*	*32%*	*32%*	*25%*
Total presumed closures	2,842	262	191	805	610	4,710
	41%	*42%*	*44%*	*58%*	*51%*	*44%*
No exit or closure by 2017	1,055	104	67	173	137	1,536
	15%	*17%*	*15%*	*12%*	*11%*	*15%*
Total	6,938	629	434	1,388	1,204	10,593
	100%	*100%*	*100%*	*100%*	*100%*	*100%*

The other possible outcomes for startups is, of course, closure. A bankruptcy or other similar terminal event was recorded in the VentureSource data for 2,090 (20 percent) of the startups in the sample. For the remaining 4,156 startups, we noted that many had fallen silent, with no active transactions recorded in the data for many years, even if no bankruptcy was indicated in VentureSource. Further exploration of these startups often found their websites nonexistent, with only historical records in publicly accessible business listings.

A simple probabilistic model was developed using those firms known to have closed and for which the date of their last investment deal before closure was recorded. 95 percent of firms that had reported their closure or bankruptcy did so within four years after their last reported investment round. This rule was applied to the remaining 4,156 startups in the sample, using the date of the last known investment that each had received, to estimate that 2,620 of the silent startups had likely gone out of business by 2017. Thus, we estimate that just 1,536 of the firms in the sample were still active, privately-held, venture-backed companies as of the end of 2017. The probability distribution of firm closures can be seen below in Figure 2.
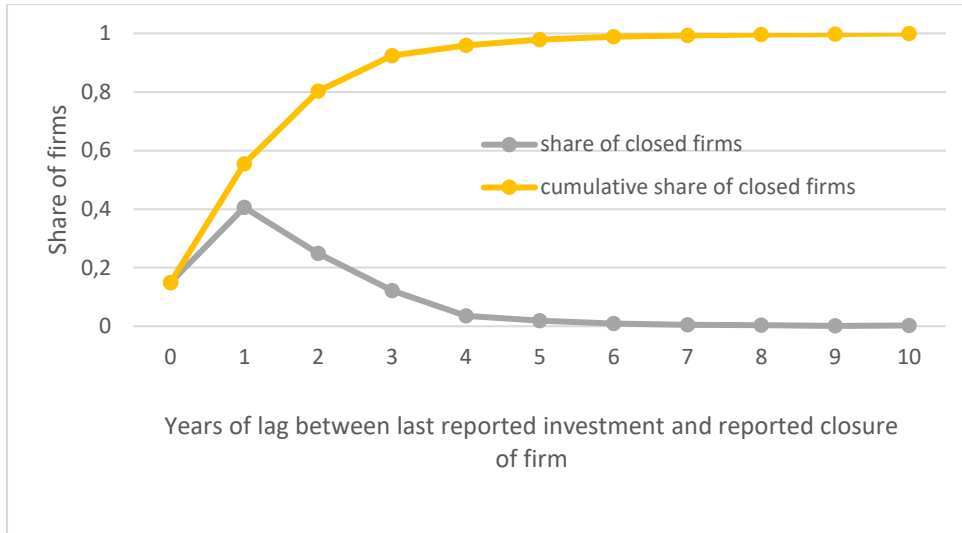
Figure 2. Probability distribution and cumulative distribution of firm closures as a function of lag since last reported investment, among firms for which both dates are known

The overall sample reflects rapid growth in the rate of new starts during the 1990s, with the peak year of starts in 1999, followed by the bursting of the tech bubble and peak year of exits both in reported and estimated closures in 2000 as seen below in Figure 3. The cumulative tally of new entrants net of exits and closures each year is the number of currently operating firms as plotted by the line in. The number of currently operating companies turned downward only for a few years following 2000 but returned to steady growth after 2003.
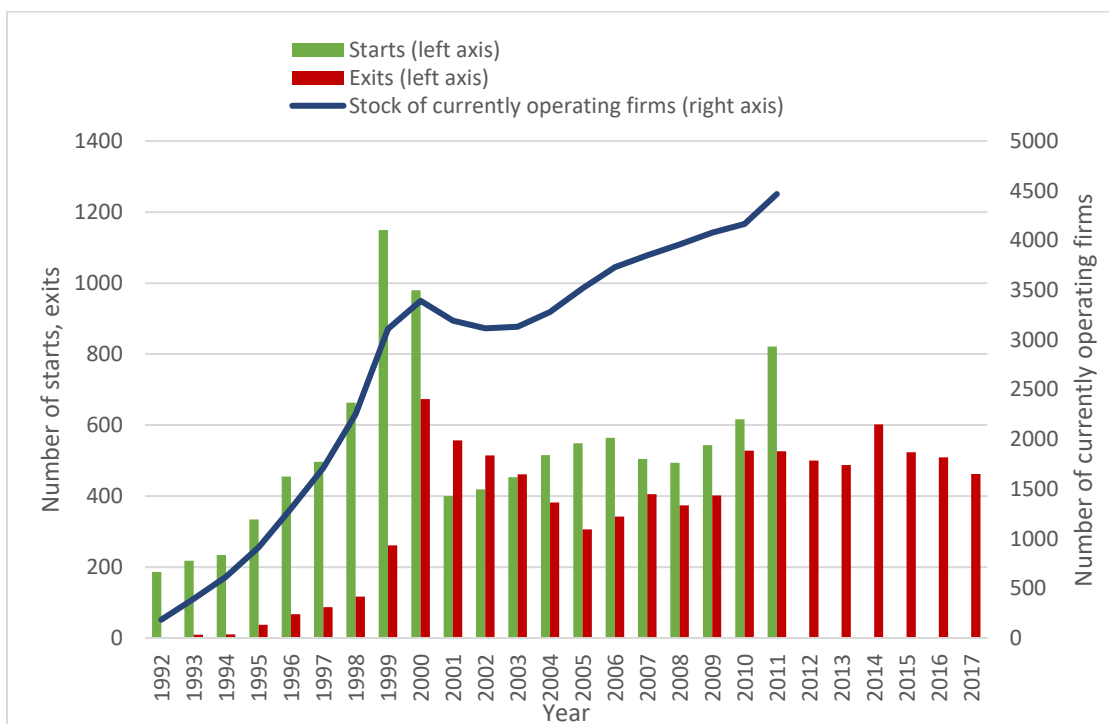
Figure 3. Annual starts, exits, and currently operating firms.

4. Results

4.1 Survival and exits by industry

Startups exhibited variable degrees of survival across different industry categories (Table 5). Across industries, approximately 40 percent of the startups survived to reach a successful exit in the form of an IPO, M&A or OBO. The notable exception was Industrial Goods, were only 18 percent of the startups survived to accomplish a successful exit.

Table 5. Fate of startups, with percentages of total by industry category

	Bus. & Fin.	Cons.	Online	Health Pharma Biotech	Indust. Goods	Elect., Comp. & Semi.	Soft-ware	Total
Exited by IPO	77	21	38	256	30	160	125	710
	5%	*5%*	*3%*	*14%*	*6%*	*9%*	4%	*7%*
Exited by M&A	521	93	411	397	54	636	1216	3,331
	31%	23%	32%	22%	10%	35%	40%	*31%*
Exited by OBO	83	21	23	62	12	84	109	306
	5%	5%	2%	3%	2%	5%	4%	*3%*
Total successful exits	681	135	472	715	96	880	1450	4,347
	40%	33%	37%	39%	18%	48%	48%	41%
Reported closed	341	70	248	297	68	453	608	2,090
	20%	17%	20%	16%	13%	25%	20%	20%
95% prob. closed	365	118	373	484	262	354	659	2,620
	22%	29%	29%	27%	48%	19%	22%	25%
Total presumed closures	706	188	621	781	330	807	1267	4,710
	42%	46%	49%	43%	61%	44%	42%	44%
No exit or closure by 2017	298	83	172	328	118	132	325	1,536
	18%	20%	14%	18%	22%	7%	11%	15%
Total	1,685	406	1,265	1,824	544	1,819	3,042	10,593
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

IT related industries—including online services and content, electronics, computers, and semiconductors, as well as software—had a preference for M&A exits, with 31 to 40 percent of startups eventually merged or acquired, compared to just 5 to 9 percent resulting in IPO exits. Health, pharma and biotech startups were more likely to exit by IPO, with just 22 percent resulting in an M&A compared to 14 percent exiting via IPO. OBO exits were rare in all industries, in the range of 2 to 5 percent of firms.

4.2 Exit transaction amounts

For half of the successful exits in the sample (51 percent), an exit transaction amount was reported for the exits in VentureSource, as can be seen below in Table 6. Disclosure was highest among IPOs (85 percent), lower among M&As (46 percent) and lowest among OBOs (23%). The disclosure coverage ratios were similar across all five regions. Transaction amounts

reported in local currencies (Israeli shekels, Swedish krona, etc.) were converted to U.S. dollars using the average exchange rate for the month of the reported exit transaction. Exit amounts were otherwise left in nominal terms, not adjusted for inflation or purchasing power parity.

Table 6. Numbers and disclosed amounts of successful exits, by exit type

	exits by IPO	exits by M&A	exits by OBO	Total
Total successful exits	710	3,331	306	4,347
Exits with amount disclosed	602	1,529	70	2,201
Exits with amounts disclosed as percent of total successful exits	*85%*	*46%*	*23%*	*51%*
Sum of disclosed amounts	$48,831,683,816	$242,805,336,184	$4,554,132,951	$296,191,152,951
Mean	$81,115,754	$158,800,089	$65,059,042	$134,571,174
Median	$56,125,000	$47,000,000	$6,250,000	$49,000,000
Max	$6,840,000,000	$19,000,000,000	$800,000,000	$19,000,000,000
top 10	$11,296,680,000	$54,975,000,000	$3,715,890,000	$59,740,000,000

The sum of all disclosed exit amounts were $296 billion. The vast majority, $243 billion (82 percent) were from M&A exits. IPOs accounted for $49 billion (16 percent) and OBOs accounted for only $3.7 billion (2 percent) of total disclosed exit amounts. The ordinal distribution of exit amounts, as seen below in Figure 4.a-b, reveal the considerably extent of skewness in exit amounts, with a few extreme exit amounts and a very long tail.

It is important to note the comparatively higher exit amounts of M&As compared to IPOs in Table 6 and Figure 4.a and b. M&As had higher maximum exit amounts ($19B vs $7B), higher mean exit amount ($158M vs $81M) and only slightly lower median exit amounts ($47M vs $56M) compared to IPOs. The higher values of M&A exits contradict the often cited belief in IPOs as 'the gold standard of exits' (Lerner et al, 2012, p.201). M&As appear to constitute the bulk of revenues for venture capital, both in frequency of exits and in cumulative exit amounts.

b.
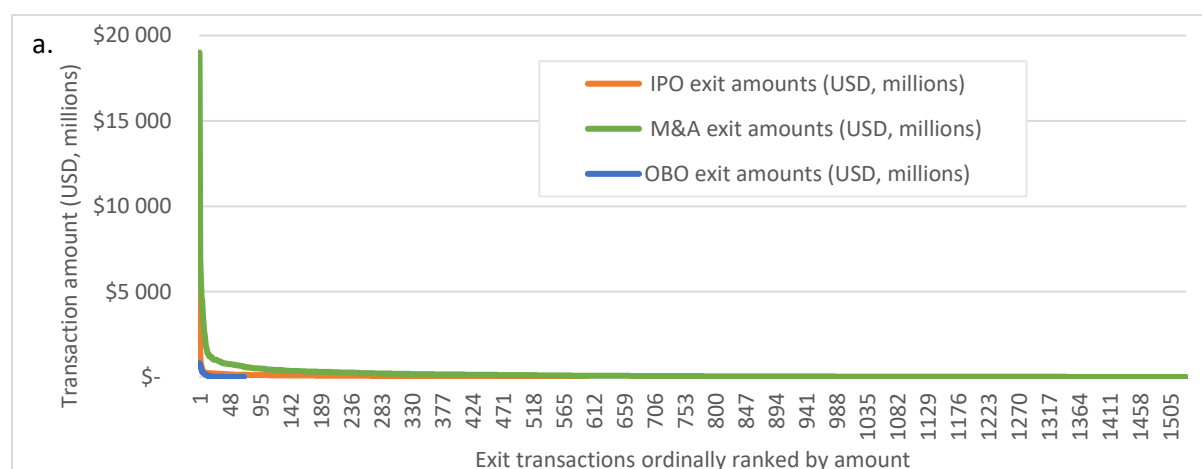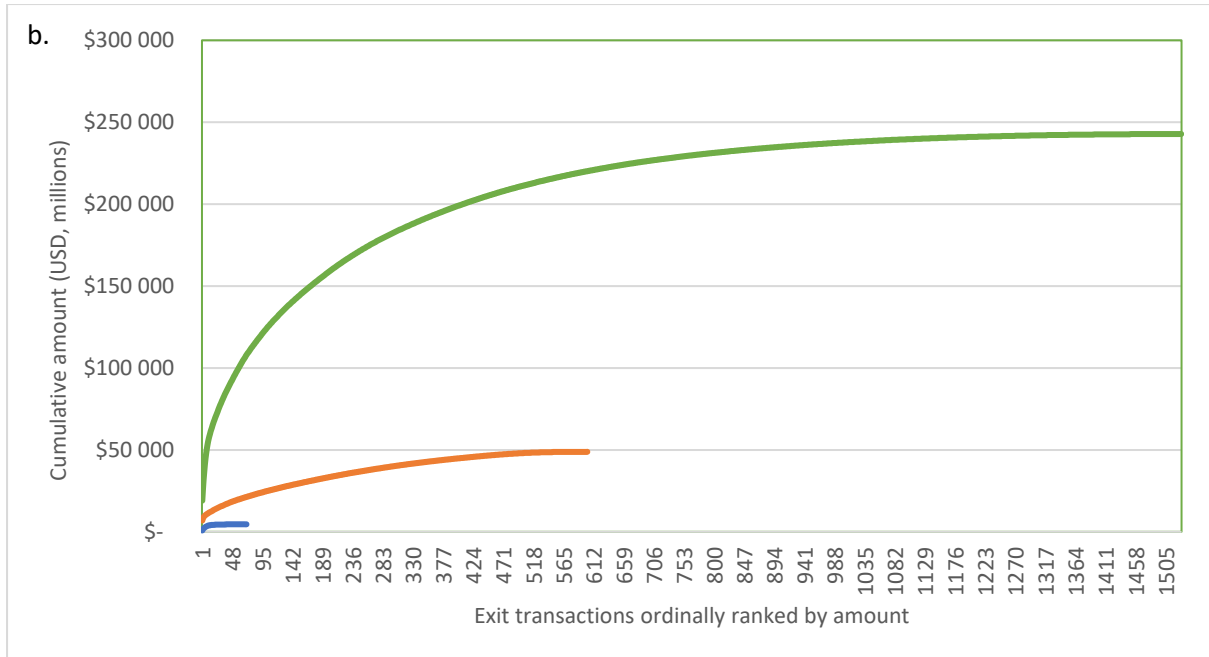
Figure 4. a. Ordinal distribution of exit transaction amounts; and b. cumulative exit transaction amounts for IPOs, M&As, and OBOs.

4.3 Transitions of ownership

From the VentureSource data, for 98 percent of the successful exits in the sample, it is possible to identify the geographic location of the exchange on which the startup is listed or of the acquiring firm that takes over financial control of the startup. For 698 the 710 IPOs, the stock exchange on which the company listed is identified, for 3,315 of the 3,331 M&As, the location of the headquarters of the company that acquires the startup is identified, and for 230 of the 306 OBOs, the location of the entity that took ownership and/or financial control of the startup is identified.

From these data, we construct an indicator of whether ownership or effective financial decision-making authority for a startup shifts out of its home region upon exit, and, if so, to where. Moreover, while actual post-exit relocations of startups are not systematically reported in the VentureSource data, changes in ownership or financial control are likely among the most important determinants of an eventual relocation. Generally, we indicate the ownership and/or effective financial control—and therefore the likely location of the startup—to "stay" in those cases where the acquiring firm or listing exchange is located in the same region as the startup. Conversely, we indicate ownership and/or effective financial control—and therefore likely location of the startup—to "leave" in those cases where the acquiring firm or listing exchange is outside the home region of the startup. However, there are important modifications to this simple "stay" versus "leave" rule of thumb for IPOs and OBOs:

- When a startup exits via IPO on a stock exchange outside the home country, this is taken to signify a shift of effective financial control out of the home region. Such an exit is considered reasonably likely to lead to an eventual relocation of the headquarters and eventually of other operations of the resulting publicly-traded company, albeit more

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gradually than if the startup had merged with or been acquired by a foreign firm. It is therefore indicated as "leave". We base these assumptions on studies that have shown that moving corporate headquarters to the jurisdictions of the stock exchange has a positive effect on stock prices, and thereby provides an incentive for management to relocate to where the stock exchange is located over time (Pirinsky & Wang, 2006).

- If a startup exits via an IPO on a domestic stock exchange, even if the exchange is located outside the startup's home region, effective financial control of the company is considered to remain in the home region. This is applicable to startups in the three U.S. regions, for whom the domestic stock exchanges are the New York Stock Exchange and the Nasdaq, both located in New York. Since there is no tax advantage nor operational advantage from relocating closer to the listing exchange, the company is more likely to remain headquartered in its home region. It is thus indicated as a "stay".

- When a startup exits via some other buyout (OBO) transaction in which a financial entity located outside the home country takes ownership, such an exit is considered a significant shift in effective financial control out of the home region and may lead to the relocation of the startup to the country where the new owners are located. Such an exit is indicated as a "leave".

- However, if the startup exits via an OBO in which a financial entity located within the home country but outside of the home region takes ownership (again, applicable only to the U.S. regions in this study), there is not necessarily a tax advantage nor an operational advantage to relocation, and therefore the company is considered more likely to be kept in its home region. It is thus indicated as a "stay".

The numbers of startups where control remains in the home region is summarized in Table 7. Only Silicon Valley retains the lion share of startups (51 percent) and exit value ($146 billion, or 59 percent of the region's disclosed exit values). Even so, Silicon Valley generates more than $100 billion worth of exits acquired or listed outside the region, an amount that is more than twice the total value of exits disclosed from the other four regions combined. From the other four regions, control of most of the startups and their value leaves the home region. And, it can be induced, that eventually a large share of the startups from these four regions were likely to have relocated post-exit.

How does effective financial control of VC-funded startups shifts, upon exit, among the five regions? The net flow of financial control (and potential relocation) to Silicon Valley from the other four regions is perhaps the most noteworthy trend (Table 8). For both Israel and Colorado, a greater disclosed value of startups exits to owners in Silicon Valley than stays in their own home regions. North Carolina is not far behind.

Table 7. Numbers and transaction amounts of startup exits where ownership or effective financial control remains in or leaves the home region where the startup was founded and VC-funded, by home region

	SF Bay Area	Colorado	North Carolina	Israel	Sweden
Number of total successful exits	3,140	259	185	420	482
Percent of total successful exits	70%	6%	4%	9%	11%
Number with exit amounts disclosed	1,614	107	100	226	154
Percent with exit amounts disclosed	51%	41%	54%	54%	32%
Sum of exit amounts disclosed	$246,841,771,300	$14,186,095,000	$13,807,790,000	$14,551,922,307	$6,803,574,346
As percent of total exit amounts disclosed	83%	5%	5%	5%	2%
Mean of exit amounts disclosed	$152,937,900	$132,580,327	$138,077,900	$64,389,037	$44,179,054
Median of exit amounts disclosed	$59,000,000	$48,750,000	$56,300,000	$30,000,000	$8,622,916
Maximum exit amount disclosed	$19,000,000,000	$2,700,000,000	$2,450,000,000	$1,000,000,000	$872,000,000
Sum of top 10 exit amounts disclosed	$57,990,000,000	$8,753,000,000	$8,315,700,000	$4,569,000,000	$4,262,820,400
Exits where control remains in home region	1606	73	57	114	246
As percent of total successful exits	51%	28%	31%	27%	51%
Number with amounts disclosed	900	35	32	51	91
Percent with amounts disclosed	56%	48%	56%	45%	37%
Sum of amounts disclosed	$146,248,066,200	$2,014,890,000	$1,972,890,000	$591,229,192	$1,509,377,428
As percent of total amounts disclosed	59%	14%	14%	4%	22%
Exits where control leaves home region	1473	186	119	280	169
As percent of total successful exits	47%	72%	64%	67%	35%
Number with amounts disclosed	703	72	67	172	62
Percent with amounts disclosed	48%	39%	56%	61%	37%
Sum of amounts disclosed	$100,192,460,417	$12,171,205,000	$11,034,900,000	$13,919,428,115	$5,292,487,983
As percent of total amounts disclosed	41%	86%	80%	96%	78%
Number unable to be determined	61	0	9	26	67
As percent of total successful exits	2%	0%	5%	6%	14%

Table 8. Cross tabulation of shifts in ownership or effective financial control of VC-funded startups among the five case study regions, by counts of total firms and by sum of exit amounts for that subset of firms for which exit amounts were disclosed

Exit from:		from SF Bay Area	from Colorado	from N. Carolina	from Israel	from Sweden
number of successful exits overall		3,140	259	185	420	482
disclosed amounts of successful exits overall		$246,841,771,300	$14,186,095,000	$13,807,790,000	$14,551,922,307	$6,803,574,346
Exit to:						
to SF Bay Area	number	**1,606**	47	15	54	28
	sum of disclosed amounts	**$146,248,066,200**	$3,399,145,000	$1,510,120,000	$3,369,003,135	$1,765,500,000
to Colorado	number	17	**73**	2	2	2
	sum of disclosed amounts	$968,790,000	**$2,014,890,000**	$86,000,000	-	$32,173,888
to North Carolina	number	13	2	**57**	2	1
	sum of disclosed amounts	$396,910,000	$21,100,000	**$1,972,890,000**	$142,000,000	-
to Israel	number	13	-	1	**114**	-
	sum of disclosed amounts	$901,590,000	-	$16,000,000	**$591,229,192**	-
to Sweden	number	10	1	2	2	**246**
	sum of disclosed amounts	$526,250,000	-	$116,030,000	$40,000,000	**$1,509,377,428**

Sum of disclosed amounts for each pairing account for only a subset of the number of successful exits. On average, only about half of the number of successful exits disclose an amount. The bold italicized values along the diagonal are the numbers and amounts likely to remain in each region.

Table 9 .Geographic shifts in ownership or effective financial control, globally, for VC-funded firms exiting in the five regions, by counts of total firms and by sum of exit amounts for that subset of firms for which exit amounts were disclosed

Exit from:		from SF Bay Area	from Colorado	from N. Carolina	from Israel	from Sweden
number of successful exits overall		3140	259	185	420	482
disclosed amounts of successful exits overall		$246,841,771,300	$14,186,095,000	$13,807,790,000	$14,551,922,307	$6,803,574,346
Exit to:						
to United States	number	† 2703	† 236	† 149	212	81
	sum of disclosed amounts	$219,048,941,696	$11,666,095,000	$11,521,490,000	$11,971,346,045	$3,015,520,986
to SF Bay Area	number	1606	47	15	54	28
	sum of disclosed amounts	$146,248,066,200	$3,399,145,000	$1,510,120,000	$3,369,003,135	$1,765,500,000
to *other* California	number	185	8	9	15	5
	sum of disclosed amounts	$11,040,650,000	$1,756,900,000	$899,500,000	$2,271,600,000	$30,499,040
to New York	number	155	11	9	54	17
	sum of disclosed amounts	$9,009,138,996	$125,000,000	$2,320,600,000	$1,996,150,000	$104,189,329
to Massachusetts	*number*	127	10	3	10	5

The table below is rotated 90° in the source. Column headers are not printed on this page; the five data columns are shown as Col 1–Col 5. Each destination line has a "number" sub-row and a "sum of disclosed amounts" sub-row.

Destination	Measure	Col 1	Col 2	Col 3	Col 4	Col 5
to Texas	number	84	8	5	9	5
to Texas	sum of disclosed amounts	$7,894,672,000	$107,300,000	$40,680,000	$818,300,000	$98,386,259
to Washington	number	68	3	4	14	3
to Washington	sum of disclosed amounts	$5,668,892,500	$262,370,000	$471,700,000	$282,000,000	$29,000,000
to Illinois	number	57	4	-	3	2
to Illinois	sum of disclosed amounts	$5,985,202,000	$25,100,000	-	$805,750,000	-
to New Jersey	number	33	4	2	8	-
to New Jersey	sum of disclosed amounts	$9,250,520,000	$20,960,000	$110,000,000	$235,000,000	-
—	number	38	5	4	8	-
—	sum of disclosed amounts	$4,819,000,000	$2,950,000,000	$131,350,000	$162,342,910	-
to Canada	number	38	5	4	6	6
to Canada	sum of disclosed amounts	$2,783,414,474	$1,200,000,000	$128,010,000	$40,000,000	$107,000,000
to Europe	number	215	11	18	42	‡ 319
to Europe	sum of disclosed amounts	$15,402,647,063	$150,000,000	$1,339,290,000	$1,341,482,071	$3,418,187,158
to Great Britain	number	53	4	5	17	13
to Great Britain	sum of disclosed amounts	$4,717,258,445	-	$253,260,000	$417,862,081	$225,479,211
to Ireland	number	33	1	2	4	3
to Ireland	sum of disclosed amounts	$3,994,500,000	$6,000,000	$198,000,000	$400,000,000	-
to France	number	30	-	2	1	7
to France	sum of disclosed amounts	$2,133,139,672	-	-	$4,200,000	$579,833,650
to Germany	number	24	-	5	9	6
to Germany	sum of disclosed amounts	$853,841,000	-	$772,000,000	$240,565,000	-
to Norway	number	-	-	-	20	-
to Norway	sum of disclosed amounts	-	-	-	$921,522,729	-
to Asia	number	91	5	4	14	5
to Asia	sum of disclosed amounts	$6,143,480,679	$1,160,000,000	$3,000,000	$407,600,000	$35,000,000
to Japan	number	32	3	1	1	-
to Japan	sum of disclosed amounts	$3,757,045,930	$1,055,000,000	-	$212,000,000	-
to China	number	24	2	1	6	2
to China	sum of disclosed amounts	$1,177,000,000	$105,000,000	-	$121,000,000	-
to India	number	13	-	2	1	-
to India	sum of disclosed amounts	$315,800,000	-	$3,000,000	-	-
to all others	number	39	2	1	6	3
to all others	sum of disclosed amounts	$3,175,862,704	$10,000,000	$16,000,000	$159,000,000	$225,958,340

Sum of disclosed amounts account for only a subset of the number of successful exits reported in each line. On average, only about half of successful exits disclose an amount.

† Number of exits and sum of disclosed amounts to United States for the three U.S. regions are inclusive of those that remain in the home region, i.e. indicating the contribution of the region to the U.S. economy overall. ‡ Number of exits and sum of disclosed amounts to Europe for Sweden are inclusive of those remaining in Sweden, i.e. indicate the contribution of Sweden as a region to the European economy overall.

To where does ownership and financial control relocate, globally, from each of the five regions? Table 9 suggests that, even with ownership and control of such a high proportion (51 percent) of startups remaining in Silicon Valley, there are widespread economic impacts from the acquisition of Silicon Valley startups elsewhere. In fact, ownership and control of a high proportion (86 percent) of Silicon Valley startups stays within the United States. Of those, with other states/regions with major urban centers of innovation—such as the rest of California (i.e. Los Angeles, San Diego), New York, Massachusetts, and Texas—very likely to take on Silicon Valley startups upon exit. Over 200 Silicon Valley startups exited to Europe and almost 100 to Asia. The other U.S. regions of Colorado and North Carolina display similar proportions, albeit for a smaller number of startups overall. Israel retains control of a very low share of its startups. Ownership or control of over half of Israeli startups goes to the United States and about 10 percent goes to Europe. Sweden keeps a high share of its startups at home, or at least within Europe. Although, the disclosed values of Swedish startups are significantly lower than the other regions.

4.4 Factors associated with transitions of ownership

Logit regressions calculate the likelihood of other factors associated with the control of startups leaving or remaining in its home region of origin, such as age, valuation at exit, industry, and additional types of funding. As the San Francisco Bay Area constitutes two thirds of the sample and exhibits unique patterns of , we conduct separate regressions for the other four regions (Table 10) and for Silicon Valley (Table 11). The two sets of regression mirrored previous results. In the other four regions, a higher transaction amount and digital industries affiliation meant it more likely to relocate. In Silicon Valley, the more valuable the startup, and if it was in the IT, computer, or software industries, the more likely it was to stay in Silicon Valley.

An additional logit regression tests for factors associated with the likelihood of startups in the four other regions leaving to Silicon Valley (Table 12). The most valuable startups and startups in IT, computing, and software industries gravitate to Silicon Valley. Startups in health and biotech, as well as startups in which business angels had co-invested with the venture capitalists, had an increased likelihood of ownership and control remaining in their home region of origin rather than being acquired by Silicon Valley. As we saw earlier, startups in health and biotech were more likely than those in other industries to exit by IPO. The result that involvement of business angels increased the likelihood of startups remaining in their home region, raises questions regarding whether business angels have different investment and exit agendas than venture capitalists.

Table 10. Logit regression analysis for whether ownership control of firm shifts—and thus whether firm is likely to relocate—from home region post-exit, for Colorado, North Carolina, Israel, and Sweden combined

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Financial control leaves home region at exit (Yes/No)							
Age	.014*	.055***	.055***	.053***	.013	.057***	.055***	.0597***
	(.024)	(.014)	(.014)	(.014)	(.024)	(.014)	(.015)	(.015)
Exit amount (log)	1.309***				1.312***			
	(.152)				(.152)			
Exit amount is disclosed (Yes/No)		.430***	.458***	.438***		.432***	.430***	.420***
		(.117)	(.118)	(.117)		(.117)	(.117)	(.117)
Industry categories:								
Software	1.452***	.788***	.576***	.794***	1.441***	.800***	.788***	.766***
	(.257)	(.141)	(.154)	(.145)	(.257)	(.141)	(.141)	(.141)
Electronics, Computer	1.102***	.748***	.532***	.753***	1.113***	.745***	.748***	.741***
	(.251)	(.156)	(.169)	(.160)	(.251)	(.156)	(.156)	(.156)
Online Services, Content	.764*	.503**			.722*	.510**	.504**	.5044**
	(.429)	(.235)			(.431)	(.235)	(.236)	(.236)
Health, Biotech			-.330**					
			(.158)					
Business, Financial Services				.272				
				(.177)				
Additional investment types:								
Angel					.420	-.215		
					(.309)	(.183)		
Debt							-.003	
							(.182)	
Private equity								-.594**
								(.257)
Constant	-9.741***	-.682***	-.482***	-.679***	-9.805***	-.674***	-.683***	-.672***
	(1.151)	(.145)	(.147)	(.150)	(1.156)	(.145)	(.145)	(.145)
Observations	587	1,311	1,311	1,311	587	1,311	1,311	1,311
LR χ²	133.50	69.71	69.46	67.46	135.41	71.09	69.72	75.18
Pseudo R²	0.173	0.038	0.039	0.038	0.176	0.040	0.039	0.042

Standard errors in parentheses. ***Significant at 1% (P<0.01) **Significant at 5% (P<0.05) *Significant at 10% (P<0.10)

Table 11. Logit regression analysis for whether ownership control of firm shifts—and thus whether firm is likely to relocate—from home region post-exit, for Silicon Valley

Independent variables	Dependent variable: Firm is likely to leave home region post-exit (Yes/No)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	.064***	.063***	.062***	.062***	.067***	.064***	.061***	.074***
	(.014)	(.010)	(.010)	(.010)	(.014)	(.010)	(.010)	(.010)
Exit amount (log)	-.133*				-.134*			
	(.076)				(.076)			
Exit amount is disclosed (Yes/No)		-.280***	-.285***	-.290***		-.280***	-.281***	-.283***
		(.073)	(.074)	(.073)		(.073)	(.073)	(.074)
Industry categories:								
Software	.100	-.054	-.089	-.134	.096	-.054	-.046	-.038
	(.125)	(.088)	(.088)	(.091)	(.125)	(.088)	(.088)	(.088)
Electronics, Computer	-.278**	-.338***	-.372***	-.417***	-.282**	-.339***	-.336***	-.339***
	(.136)	(.104)	(.106)	(.107)	(.136)	(.104)	(.104)	(.105)
Online Services, Content	.396**	.119			.403**	.120	.125	.155
	(.186)	(.122)			(.186)	(.122)	(.122)	(.123)
Health, Biotech			-.009					
			(.121)					
Business, Financial Services				-.133				
				(.112)				
Additional investment types:								
Angel					-.240	-.023		
					(.156)	(.113)		
Debt							.121	
							(.117)	
Private equity								-1.045***
								(.192)
Constant	.369	-.275***	-.229***	-.183*	.399	-.274***	-.279***	-.302***
	(.596)	(.098)	(.090)	(.095)	(.596)	(.098)	(.098)	(.099)
Observations	1,614	3,125	3,125	3,125	1,614	3,125	3,125	3,125
LR χ²	36.83	72.05	71.10	72.51	39.20	72.09	73.11	104.69
Pseudo R²	0.017	0.017	0.016	0.017	0.018	0.017	0.017	0.024

Standard errors in parentheses.   ***Significant at 1% (P<0.01)   **Significant at 5% (P<0.05)   *Significant at 10% (P<0.10)

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Table 12. Logit regression analysis of whether ownership control of firm shifts—and thus whether the firm is likely to relocate—from home region of Colorado, North Carolina, Israel, or Sweden to Silicon Valley post-exit

Independent variables	Dependent variable: Firm is likely to relocate to SF Bay Area post-exit (Yes/No)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	-.077**	-.037	-.040*	-.045*	-.072**	-.034	-.033	-.036
	(.035)	(.023)	(.023)	(.023)	(.035)	(.023)	(.023)	(.023)
Exit amount (log)	.756***				.745***			
	(.192)				(.193)			
Exit amount is disclosed (Yes/No)		.443**	.489***	.456**		.454**	.457**	.438*
		(.179)	(.180)	(.179)		(.180)	(.179)	(.179)
Industry categories:								
Software	1.672***	1.300***	.681***	1.230***	1.693***	1.344***	1.293***	1.291***
	(.356)	(.225)	(.223)	(.233)	(.357)	(.226)	(.226)	(.226)
Electronics, Computer	1.482***	.918***	.293	.846***	1.445***	.909***	.911***	.916***
	(.360)	(.253)	(.253)	(.259)	(.362)	(.254)	(.253)	(.253)
Online Services, Content	1.733***	1.301***			1.802***	1.333***	1.284***	1.300***
	(.544)	(.333)			(.550)	(.334)	(.333)	(.333)
Health, Biotech			-.972***					
			(.336)					
Business, Financial Services				.631**				
				(.308)				
Additional investment types:								
Angel					-.980*	-.965**		
					(.547)	(.380)		
Debt							-.372	
							(.324)	
Private equity								-.257
								(.482)
Constant	-8.069***	-2.757***	-2.144***	-2.646***	-7.934***	-2.73***	-2.76***	-2.748***
	(1.530)	(.258)	(.237)	(.263)	(1.535)	(.258)	(.258)	(.258)
Observations	587	1,311	1,311	1,311	587	1,311	1,311	1,311
LR χ²	58.48	50.96	46.96	41.62	62.48	59.10	52.39	51.27
Pseudo R²	0.125	0.055	0.050	0.045	0.134	0.063	0.056	0.055

Standard errors in parentheses. ***Significant at 1% (P<0.01) **Significant at 5% (P<0.05) *Significant at 10% (P<0.10)

5. Discussion

5.1 Implications for venture capital theory

The results of this study align with previous studies on venture capital exits concerning the overrepresentation of acquisition exits (Cumming & MacIntosh, 2003; Cumming 2008; Lerner et al, 2009). However, the results showing higher transaction amounts for M&A than IPO exits, contradict and disprove the often cited belief in venture capital theory of IPOs as 'the gold standard of exits' (Lerner et al, 2012, p.201). Furthermore, as this study considers more aspects of exits than previous studies have, we can contribute to a deeper understanding of how venture capitalists operate and the role they play in the global economy.

The fact that Silicon Valley has the highest mean exit transaction amounts, and venture capitalists' goal with exits is profit maximization (Sahlman, 1990; Gompers, 1995; Gompers & Lerner, 1999), provides a plausible explanation for why the most profitable exits either occur in or to Silicon Valley. In this regard, venture capitalists function as efficient economic agents, moving assets to where they are most highly valued. Future studies should investigate why startup exits are the highest in Silicon Valley, and transaction amounts are in comparison so low in Israel and Sweden. To what degree are differences in exit amounts explained by Israeli and Swedish startups having objectively less assets and lower performance than U.S. startups at the time of exit, and may part of the explanation be diverging valuation practices among practitioners in the three countries?

The fact that the vast majority of exits are acquisitions of startups by incumbents, thus calls into question how we perceive the role of venture capitalists in our global economy. Scholars have in the past emphasized the effect of venture capital in accelerating the growth of startups and as midwives of new public companies such as Apple, Google and Facebook (Florida & Kenney, 1988; Gompers et al, 2010; Lerner et al, 2012). However, as so few new public companies emerge from startups, in comparison to how many are acquired, venture capitalists tend to play are more important role as sourcing agents for revitalizing incumbents, through the acquisition of new products, technology, IP and talent packaged as startups, than as midwives of new public companies.

The consequence of this reinterpretation of the role venture capitalists as a sourcing agent, and their efficiency in selling startups to the best paying acquirer wherever they may be, is that venture capitalists play a more important role in revitalizing existing industry clusters than building new industry clusters. They are thereby an efficient agent for turning a profit, but may not be the preferred financing source for regions that wish to retain their startups, except for Silicon Valley of course. It may be seen as ironic, that venture capitalists tend to benefit Silicon Valley the most, even when they operate in regions other than Silicon Valley.

5.2 Implications for regional development theory

For regions other than Silicon Valley, the exit patterns presented in this paper may come as a bad awakening as to the unintended consequences of venture capital funding of their startups. The degree of post-exit concentration of ownership of startups to Silicon Valley incumbents is

by itself an important result. It will be close to impossible for other regions to replicate the success of Silicon Valley, if their most valuable startups consistently relocate from their region of origin and specifically to Silicon Valley. This concentration to Silicon Valley is the strongest within the traditional Silicon Valley industries, however the trend of ownership concentration is evident across all industries, effectively forming an advantage which begets further advantage resembling self-reinforcing Matthew effect (Rigney, 2010).

Past theories have primarily viewed regional industry clusters (Saxenien, 1996; Porter & Stern, 2001) and entrepreneurial ecosystems (Isenberg, 2010; Acs et al, 2017) as self-contained systems with various degrees of synergies. Our results expand on this system view by expanding on the interconnectedness of regions and ecosystems evident in the startup exit patterns. We propose that Silicon Valley, and the other regions studied, could be seen as a network of nodes organized as a supply chain. The specialization of Silicon Valley has expanded from industry clustering, to a specialization of financing and commercializing future technologies. Other regions effectively serve as supply hubs, incubating and cultivating promising startups, from which their best startups are later sourced for integrating into the technology commercialization machinery comprised of Silicon Valley incumbents.

From a neoclassical economist perspective, market forces of maximizing utility curves drive the migration of the best startups to Silicon Valley, where their inherent potential is best developed and harvested. Venture capitalists and entrepreneurs hereby act as free economic agents to maximize their own profit, and their aggregated behavior result in an efficient market driven by competition, specialization, economies of scale and synergies. Neoclassical markets are global, aspatial and focused on net sum. Startup migration should be encouraged as it leads to higher net sum value. Regions should specialize by becoming either an efficient supply node to Silicon Valley in their core industries, or an alternative hub with a competitive advantage in industries that that Silicon Valley does not dominate.

However, for most people the world is not aspatial, and whom benefits at whose expense matters to them. For regions investing considerable efforts into cultivating the startups in their region, the net sum argument is scant consolation, when their best startups are acquired and consolidated to other regions such as Silicon Valley. The frustration in regions where the best startups transition away, may be further increased by the perceived imbalance in input and output between public and private interests. Public agencies on many levels may have contributed a considerable part of the investments facilitating the founding and support of the startup in the early stages before VC-funding (Mazzucato, 2015), and in some regions such as Israel and Sweden also contributed considerable part of the funding for VCs (Lerner, 2009). However, the profits from the sale or listing of a startups goes primarily to shareholders such as entrepreneurs, VCs and other investors. This imbalance of the public paying, while private shareholders profit, may over time undermine public support for startups and VCs.

The risk of outward migration of startups raises the importance of entrepreneurial recycling of talent and capital on a system level within regions and entrepreneurial ecosystems (Mason & Harrison, 2006; Hulthén & Dimov, 2019). If a considerable part of the successful startups in a region may not remain long-term, it should be importance that a considerable part of the profits from successful exits are reinvested into new startups and experienced entrepreneurs and

investors return to support the founding, survival and growth of new startups. If regrowth of successful startups can outweigh the outward migration of successful startups, regions and entrepreneurial ecosystems may yet grow and prosper.

6. Conclusions

This study asks the research question of what migration patterns of VC-funded startups from different regions and what may explain them. The premise for the study is the realization that how VC investors in a startup choose to exit their investment, such as by a merger and acquisition (M&A) or initial public listing (IPO), may determine the long-term growth trajectory and even the regional outmigration of startups. Another part of the premise is investigate if exit patterns may explain part of Silicon Valley's success and why other regions find it so difficult to replicate.

We find that exit patterns are generalizable on a region level for venture capital funded startups, with M&As as the dominant exit route. To the degree IPOs occur, they are rare and most often occur in life science related industries. Differences between regions are mainly in founding rates, exit transaction amounts and ownership migration. We find that in Silicon Valley over 50 percent of successful startups, representing almost 60 percent of the exit value, are likely to stay within the region when VCs exit. In contrast, across the other four, smaller but still representative innovative regions, less than a third of successful startups, representing only 15 percent of the total reported values, are likely to remain owned within the regions they originated after the VCs exit.

Conclusions are that exit patterns are important and may in part explain Silicon Valley's success. The most valuable startups are founded and exit locally in Silicon Valley or are acquired by Silicon Valley incumbents from other regions. In the other regions, the most valuable startups exit to other regions and only a small portion of the value of the startups remains owned in the region of origin for the startup. This concentration to Silicon Valley is the strongest within the traditional Silicon Valley industries, however the trend of ownership concentration is evident across all industries, effectively forming an advantage which begets further advantage resembling self-reinforcing Matthew effect (Rigney, 2010). It will be close to impossible for other regions to replicate the success of Silicon Valley, if their most valuable startups consistently relocate from their region and specifically to Silicon Valley

Implications for venture capital theory is that our results of M&As dominating exit returns, contradict the often cited belief in venture capital theory of IPOs as 'the gold standard of exits' (Lerner et al, 2012, p.201). Furthermore, this dominance of M&As motivates a reinterpretation of the role venture capitalists play in the global economy. Venture capitalists play a more important role as sourcing agents for incumbents, revitalizing existing industry clusters, than as midwives of new public companies and new industry clusters.

Implications for regional development theory is that the interdependence between regions and entrepreneurial ecosystems, as evident in our results of exit patterns, are underestimated in present theory. We propose that Silicon Valley, and the other regions studied, could be seen as

a network of nodes organized as a supply chain. The specialization of Silicon Valley has expanded from industry clustering, to a specialization of financing and commercializing future technologies. Other regions effectively serve as supply hubs, incubating and cultivating promising startups, from which their best startups are later sourced for integrating into the technology commercialization machinery comprised of Silicon Valley incumbents. The imbalances these exit patterns cause, in terms of whom pays for startups and whom profits from their exits, may undermine future policy support for startups and VCs.

Furthermore, our results highlight the critical importance of entrepreneurial recycling of talent and capital on a system level within regions and entrepreneurial ecosystems (Mason & Harrison, 2006; Hulthen & Dimov, 2019), that a considerable part of the profits from successful exits are reinvested into new startups and experienced entrepreneurs and investors return to support the founding, survival and growth of new startups. If regrowth of successful startups can outweigh the outward migration of successful startups, regions and entrepreneurial ecosystems may yet grow and prosper.

Future research is recommended into startup exit patterns and their underlying causality. Investigating the post-exit development of startups, comparing growth trajectories of startups which exited by different exit routes, will clarify the long-term economic consequences of different exit routes. Furthermore, investigating how exit route and destination is decided by venture capitalists is key to understanding why exits are dominated by acquisitions across regions. The considerable differences, in mean and median exit transaction amounts, between startups in USA, startups in Israel and startups in Sweden are also interesting to study further. Finally, entrepreneurial recycling on a system level, how profits derived from the exit and experienced entrepreneurs, investors and professionals go back to into the ecosystem to found and support new startups, constitutes an import future avenue of research.

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Paper II

GROWTH OF SWEDISH VENTURE CAPITAL FINANCED STARTUPS AFTER IPO OR ACQUISITION – THE CASE FOR EXIT-CENTRIC POLICY?

Per Hulthén, Sarah Glücksman, Mats Lundqvist & Anders Isaksson

Abstract

Venture capital is expected to accelerate startups' growth, but what happens post-exit and does exit route matter? Building on regional development and venture capital theory, Swedish venture capital funded startups are tracked on pre- and post-exit performance measures related to exit route. Startups that go public outperform acquired startups after exit, and approximately half of the acquired startups are discontinued post-exit. Implications are that policies should be exit-centric and pro-public to incentivize long-term regional growth. Additionally, Multilateral Trading Facilities offer a promising lower threshold exit route for startups going public. Future avenues of research are offered.

Introduction

Studies of entrepreneurship in the U.S. emphasize the importance of high-tech firms accelerated by venture capital as drivers of economic growth, building on the success of Silicon Valley and firms such as Apple, Amazon and Google (Florida and Kenney, 1988; Gompers, Kovner, Lerner, and Scharfstein, 2010; Lerner, Leamon, and Hardymon, 2012; OECD, 2010a). Studies in the U.S., and globally, reinforce that the most successful startups contribute a disproportionately large turnover and employment, and by extension, economic growth (Shane, 2008, 2009; WEF, 2011). Support for high-tech startups, with venture capital as a mechanism for identifying and accelerating the most promising startups, has since formed the basis for economic policy as regions attempt to replicate the success of Silicon Valley (Storey and Tether, 1998; Lerner, 2009; Lerner *et al.*, 2012; OECD, 2001 and 2010b; World Economic Forum, 2009, 2011). As an example, approximately 35 percent of the €4bn annually raised by private European venture capital funds stem from European taxpayers through their national governments or the European Investment Fund (Höppner, 2015).

However, efforts of replicating the success of Silicon Valley have had limited success (Nightingale and Coad, 2013; Rosenberg, 2002). Israel has come close, with the highest level of startups and venture capital investments per capita, but have yet to see new large companies emerge domestically from their startups (Senor and Singer, 2009). In Europe, numerous startups emerge but few grow into large corporations, referred to as 'Europe's Scale-Up Challenge' (Duruflé, Hellmann, and Wilson, 2017). Venture capitalists may accelerate startups during their involvement until the financial exit event when they sell their equity stake, but how startups perform long-term and post-exit is less known. To the extent post-exit growth of startups has been studied, indications are that different exit routes, such as going public or being acquired, lead to divergent post-exit growth trajectories for the startups (Mason and Harrison, 2006; Mason and Brown, 2013; Brown, Mawson, and Mason, 2017; Carpentier and Suret, 2014; Hogan, DeTienne, Hutson, and Smith, 2018; Xiao, 2015). The long-term impact of startups is to a large extent dependent on the subsequent performance of the startups following their exit events, so if startups remain in their regions of origin and grow post-exit constitute important policy concerns (Wennberg and Mason, 2018).

The purpose of this article is to investigate if and how exit routes of venture capital financed startups matter from a regional development perspective, i.e. to what extent firms stay and grow post-exit dependent upon exit. The practical intent is to better understand the consequences of existing venture capital policy and substantiate arguments for policy to become more exit-centric. The empirical research question is: *How do venture capital funded startups perform post-exit related to exit route?* To answer the question, we use annual reports to conduct a nation-wide exploration of the post-exit performance of venture capital funded startups. Our sample consists of 273 venture capital funded startups founded in Sweden 1992-2010 and exited by Initial Public Offering (IPO) and Mergers and Acquisitions (M&As) in 2002-2017. In exit routes, we distinguish between IPOs on larger regulated stock exchanges and smaller Multilateral Trading Facilities (MTFs) and between domestic and foreign acquisitions. Performance variables measured are absolute and relative growth of turnover and employees,

with indicators for high-growth firm (HGF), inorganic growth (IG) and intellectual property (IP) to provide explanatory input.

We find that the pre-exit performance of the startups directly relates to exit route, and exit routes lead to divergent post-exit growth trajectories. IPOs result in the strongest post-exit performance and approximately half of the acquired firms are closed down post-exit. Theoretical contributions are that exit routes directly influence long-term economic impact and policy can and should be exit-centric. The largest performance improvement post-exit is among the startups exited by IPO on MTF, making MTFs relevant to consider for future exit-centric policy. In conclusion, avenues for future research are outlined.

Theory
First, we account for venture capital exit theory, in terms of how venture capital exits work. Second, regional development oriented studies of startups and exits are accounted for.

Venture capital exits
Venture capital helps fill the early stage equity gap for small firms with high growth potential, thereby enabling the startup to grow (Florida and Kenney, 1988). In the last two decades, the role of the venture capitalist (VC) has been emphasized as the enabler and accelerator of entrepreneurial economic growth (Gompers *et al.*, 2010: Lerner, 2009; Lerner *et al.*, 2012). Venture capitalism has spread worldwide with the expectation that VCs will be a generalized driver of economic growth and innovation (Kortum and Lerner, 2001). The ability to make a profitable exit lies at the heart of venture capital investing (Sahlman, 1990; Gompers, 1995; Gompers and Lerner, 1999).

The venture capital exit is more than realizing investment value; it is the process by which the efforts of VCs and entrepreneurs are transformed into a new entity (Bygrave, Hay and Peeters, 1994). The exit timing for the VCs should optimally be '*when the projected marginal value added as a result of the VC's efforts, at any given measurement interval, is less than the projected cost of these efforts*' (Cumming and MacIntosh, 2003, p. 6). Several studies show that the average holding period for a VC to own an equity stake in a startup before exiting is five years (Sahlman, 1990; Cochrane, 2005).

There are five types of venture capital exits, listed here in argued order of preference for the VC (MacIntosh, 1997): (a) an IPO, in which a significant portion of the firm is sold into the public market; (b) an acquisition exit; that is, through M&A, in which a third party buys the entire firm; (c) a secondary sale, in which only the VC sells its shares to a third party, which is usually less desirable and profitable; (d) a buyback, or a management buyout (MBO), in which the managers of the entrepreneurial firm repurchases the VC's shares, which is also less desirable and profitable; and (e) a write-off, in which the VC walks away from the investment, usually due to bankruptcy or the firm closing down.

The most profitable exits are IPOs and M&As (Cumming and MacIntosh, 2003; Lerner *et al.*, 2012; Bienz and Leite, 2008). A study of venture capital exits during 1995-2005 in North America and Western Europe showed that M&As dominate, with 78.3 percent compared to only 3.5 percent as IPOs (Lerner, Sorensen, and Strömberg, 2009). This is despite the fact that IPOs historically provided a 22 percent price valuation premium over M&As (Brau, Francis, and Kohers, 2003). Although trade M&As may result in a lower value, they do provide immediate, full liquidity to investors, which is usually not the case in an IPO, in which major shareholders are blocked from selling shares during a lock-in period following a listing (De Clerq, Fried, Lehtonen, and Sapienza, 2006).

Firm-specific and macroeconomic factors are linked to exit choice. Larger, dominant, and high-tech-based firms are more inclined towards IPOs, while service firms, firms with high debt, and firms in leveraged industries and industries with few actors are more M&A inclined. In addition, a positive stock exchange trend and lower rates favor IPOs, while the opposite favors M&As (Brau *et al.*, 2003, Poulsen and Stegemoller, 2008, Bayar and Chemmanur, 2011). Institutional factors enable exits, as countries with stable financial and legal systems are more favorable for IPOs (Cumming, Fleming, and Schwienbacher, 2006).

Management and ownership also influence exits. Companies that need less oversight and have a stronger track record are predisposed to IPOs, while companies that require more controls are predisposed to M&As (Bienz and Leite, 2008). Established VC firms prefer M&As, while younger VC firms are more open to IPOs, especially if an IPO coincides with their fund raising (Gompers, 1996). Entrepreneurs are generally biased towards IPOs (Schwienbacher, 2008), which is one reason VCs often ensure contractual control of the exit choice (Cumming, 2008; Kaplan and Strömberg, 2003). Thus, the VC normally pre-plans the exit route at the time of the initial investment (Cumming and Johan, 2008).

Although we can expect VCs' overall exit preferences to be similar internationally, prior studies show that specific exit patterns differ between countries and regions due to legal and institutional factors (Cumming and MacIntosh, 2003), availability of alternative exit routes such as small-cap stock exchanges (Rindermann, 2003), and the possibly divergent exit preferences of the owners (Schwienbacher, 2008). The importance of exit routes for the development of venture capital markets is well known (Mason and Harrison, 1999). The creation of stock markets for smaller growth companies are an important mechanism for a well-functioning venture capital market and something that policy makers have tried to stimulate. The creation of the 'over-the-counter' market in Sweden in the early 1980s was partly an effect of changes in market regulations to increase the supply of risk capital (Isaksson, 2006).

With the implementation of the Markets in Financial Instruments Directive (MiFID) in 2007 (European Commission, 2004) the European Commission provided new harmonized regulations for investment services across the EU. One important effect of MiFID was the foundation of a new coordinated trading platform in Europe through Multilateral Trading Facilities (MTFs). Before 2007 stock markets in EU member states where often near-monopolistically owned by different national stock exchanges and with regulations that varied

from country to country (Buckle, Chen, Guo and Li, 2018). After 2007, the European stock market are more harmonized and divided into two separate markets, regulated stock markets (primary exchanges) and MTFs. MTFs have usually a lower listing threshold and fewer regulatory requirements than regulated stock exchanges.

Several studies have investigated the effects of the Financial Instruments Directive and MTFs on, for instance, its effects on market fragmentation (Pereira da Silva, 2018), liquidity (Gresse, 2014) or the price discovery process (Aitken, Harris and Sensenbrenner, 2010). With our study we will also be able to show the importance of MTFs for the venture capital market as well as for entrepreneurs and regional development.

It is important to note the historical differences in terminology and definitions between the U.S. and Europe for venture capital and private equity (PE) (Lerner *et al.*, 2009). In this article, we use the more strict definition of venture capital in the U.S. as formal venture capital funds investing in startups, to isolate the VC phenomenon we investigate. PE, in comparison, operates on a different volume and time scale than do VCs, and may invest in any type of firm, such as buy-outs, corporate spinoffs, and mature firms.

As accounted for, so far, venture capital theory focus on profits for investors. We know little about post-exit developments, and whether the type of exit affects a venture's growth or staying-power in the region. From a regional development and public investor perspective, these are relevant questions to ask. There is also need for more a systematic understanding of how venture capital and the type of exits affect pre- and post-exit development in regions other than Silicon Valley. Especially, we lack knowledge about relatively new exit routes, such as going public through the European MTFs, and how new exit routes may generate new exit behavior patterns and be useful in policy for improved regional development.

Exits and regional development
While venture capital research has been concerned mostly with value creation for investors, the intersection of entrepreneurship and regional development research has focused on economic impact generated by new firms, primarily in terms of growth and employment (Leibenstein, 1968; Baumol, 1996; Audretsch, Keilbach, and Lehmann, 2006; Shane 2008, 2009). Entrepreneurs, and the startups they create, play the economic role of transformational agents (Schumpeter, 1934), vehicles of knowledge dissipation and innovation (Acs, Audretsch, and Lehmann, 2013), and net job providers (Birch, 1979, 1987; Kane, 2010). In the last decades, research has increasingly focused on leveraged startups, which leverage external assets to accelerate growth, and especially leveraging of venture capital (Acs, 2008).

Venture capital has been portrayed as the engine behind the fast growth of startups (Gompers *et al.*, 2010; Lerner *et al.*, 2012). Studies show that venture capital funded startups grow faster (Puri and Zarutskie, 2012) and are more innovative (Kortum and Lerner, 2001; Hellmann and Puri, 2002) than non-venture capital funded startups are. However, it is unclear to what degree the leveraging effect is due to VCs' selection bias (Sørensen, 2007), the invested capital itself

(Wiltbank, Dew, and Read, 2015), the VC's networking effect (Hochberg, Ljungqvist, and Lu, 2007), or the VC's governance influence (Hochberg, 2011).

The *Boulevard of Broken Dreams* by Lerner (2009) popularized the notion of public investments into private venture capital for driving innovation and growth, while warning against the potential disruptive interference of government and such policies should thus be with no strings attached. High-tech startups, or new technology-based firms (NTBFs), accelerated by venture capital funding, became recurring for public policy aiming to drive economic growth and innovation in the last decades (Storey and Tether, 1998; OECD, 2001, 2010a, 2010b, 2010c; World Economic Forum, 2009, 2011).

However, the success of startups is highly skewed, with a small number of successful firms such as Apple, Google, and Facebook, mostly tied to Silicon Valley, that generate a disproportionate amount of the economic impact in the U.S. (Shane, 2008). This is also the case internationally, as a World Economic Forum (WEF) report states that the top one percent of early-stage firms contributed 44 percent of the total revenues and 40 percent of total jobs, while the top five percent contributed 72 percent of total revenues and 67 percent of total jobs (WEF, 2011). The crucial importance of the 'best' firms has motivated a focus on HGFs in economic growth policy (Davidsson and Henrekson, 2002; Mason and Brown, 2013; Brown *et al.*, 2014). The most common definition of an HGF is 'Enterprises with average annualized growth in employees or turnover greater than 20% per annum, over a three-year period, and with more than 10 employees in the beginning of the observation period, should be considered as high growth enterprises' (OECD, 2010a, p. 16).

Since most of the famous success cases in Silicon Valley exited through IPOs (Shane, 2009), the question of the importance of the exit route arises, as most startups exit by acquisition (Cuming and MacIntosh, 2003; Lerner, 2009; Lerner *et al.*, 2012). Do acquisitions lead to growth and an economic impact, as IPOs seem to do, and to what extent do acquired firms grow outside of Silicon Valley? Startups that go public in their region of origin may generate more economic growth and other positive regional externalities, implying that IPOs should be preferable to acquisitions from a regional development perspective (Mason and Brown, 2013).

Venture migration is a topic gaining interest (Anokhin, 2013). A case study in the U.K. observed a 'sell-out mentality' among HGFs, which, coupled with foreign acquisitions, lead to startups disappearing abroad (Brown *et al.*, 2017). A recent study of software startups in Ireland came to similar conclusions, as foreign acquisitions on average led to a loss of firms, employment, and growth for the region of origin (Hogan *et al.*, 2018). If the acquired firms are linked to local businesses, then the economic loss for the region of origin may increase further (Stam, 2007).

Case studies in Canada (Carpentier and Suret, 2014) and Israel (Rosenberg, 2002) observe patterns of foreign-acquired high-tech firms stagnating as R&D and production satellites, as the acquirer transfers the management, finance, and sales functions to head offices elsewhere. An Economist article reported similar observations, with Israeli entrepreneurs deciding to 'cash

in with early exits' rather than grow their startups into large companies (Ryder, 2014). Large corporations often use acquisitions as a primary source for new technology and products, and the associated IP and talent to defend and develop these assets further (Granstrand and Sjölander, 1990).

Acquisitions often lead to the relocation of intellectual assets and human capital, as utilizing IP often requires the presence of the engineers who are familiar with the technology, and consolidating these assets in one location for synergy makes sense (Makinen, Haber, and Raymundo, 2012; Chatterji and Patro, 2014; Sawicki, 2014). Acquisitions often historically led to a transfer of employment and growth from peripheral regions to central regions (Leigh and North, 1978; Bhagat, Shleifer, Vishny, Jarrel, and Summers, 1990; Turok and Richardson, 2010; Ashcroft, Coppins, and Raeside, 1994).

However, it is an oversimplification to say that foreign acquisitions are always detrimental to regional development. A post-exit study of Scottish startups included examples of both accelerated growth and closures of acquired startups (Mason and Harrison, 2006), so the circumstances of the acquisition and acquired firm arguably determine the long-term outcomes of these individual cases. Foreign ownership may be beneficial if the parent organization helps the startup to overcome barriers to growth and to prosper (Davenport, 2009; Hopkins and Richmond, 2014, Dahlstrand, 2017). Furthermore, exits may allow the entrepreneurs and investors of the original startup to explore new opportunities (Stuart and Sorenson, 2003), as they found and fund new startups, referred to as 'entrepreneurial recycling' (Mason and Harrison, 2006).

In summary, venture capital theory primarily focus on value creation for investors, with economic impact for the surrounding environment as a secondary effect of the value creation. Exit routes are thereby financial decisions based on assessments of profit maximization. From a regional development perspective, IPOs is often argued to generate more long-term economic impact and positive externalities for the surrounding region than acquisitions. However, IPOs have traditionally only been a realistic for a few top-performing startups, so the most common profitable exit for venture capitalists has always been the M&A. In this context of IPOs being unrealistic for most startups, policy options on exits have been limited to considering the comparative benefits and risks of domestic versus foreign acquisitions. Due to the lack of understanding of what happens post-exit to startups, and Lerner's (2009) warning against government interference, most governments have elected to be exit agnostic in their policies.

The recent availability of MTFs may change this dynamic. MTFs could potentially offer the benefits of IPOs, with a lower listing threshold more realistic to meet for a many startups. However, before exit-centric policy could be considered we need for systematic knowledge about how startups perform post-exit, and how this relates to their exit route.

Method

To answer the research question, we track a nation-wide sample of venture capital funded startups in Sweden, founded over twenty years, until exit and for as long as our data allows post-exit. First, we describe the sample selection, followed by data collection and variables, the stages of data analysis and finally the limitations of the method.

Sampling

This study examines data on Swedish venture capital funded startups founded in 1992-2010 and that exited by IPO and M&A in 2002-2017. Sweden's entrepreneurial ecosystem evolved through four decades of startup activity to become relatively stable and mature (Lerner and Tåg, 2013; Karaomerlioglu and Jacobsson, 2000; Isaksson, 1998; Avdeitchikova, 2009). Although Sweden is a relatively small country, several successful startups were founded in Sweden and become well-known international companies, for example, Skype, Spotify, Klarna, iZettle, and King. Thus, Sweden offers an alternative baseline to previous U.S.-focused studies and reflects the European context and dynamics of a smaller export-oriented country. Sweden furthermore offers a unique advantage in public access to annual reports for private firms, allowing us to track the startups in terms of sales, employment, and growth, as well as inorganic growth (IG) and intellectual property (IP).

The original source for our sample is Dow Jones' database VentureSource. Established in 1987, Venture Source collects data on firms that obtained PE and venture capital financing. Our initial sample consisted of 1,314 startups founded in Sweden between 1992 and 2010 and received venture capital and/or PE funding. From the initial sample, we selected only startups that completed an IPO or M&A during 2002-2017. As VCs on average own stakes in startups for five years (Sahlman, 1990; Cochrane, 2005), this exit time window should allow the startups in our sample time to exit with several years post-exit for us to map their development. We focus on these exists because they represent the bulk of exits and are the most successful exits for VCs (Cumming and MacIntosh, 2003). We distinguish between IPOs in regulated stock exchanges and MTFs, as their requirements for listing are inherently different, and should thus attract different startups. Thus, we label the exit routes as IPO regulated, IPO MTF, M&A foreign, and M&A domestic.

From the sample, we excluded startups that exited by MBO, liquidation, bankruptcy, or that were still ongoing and not yet exited. Additionally, we excluded corporate spinoffs due to our focus on startups. In theory, VCs invest in startups. However, as VCs are opportunistic, they may in practice invest in divisions of companies that are spun out of established corporations (Parhankangas and Lindholm-Dahlstrand, 2012). If we included these corporate spinoffs, the sample would not be representative of startups, but instead represent any type of VC investment. Finally, we excluded all startups that received only PE funding and never received any venture capital due to the research focus on venture capital funded startups. We build on venture capital theory and our policy focus is on venture capital. PE firms, business angels, and VCs may all invest in startups, but their processes for how they invest in, work with, and exit from startups differ considerably (Gompers, Gornall, Kaplan and Strebulaev, 2019; Berglund,

2011; Harrison, Mason and Smith, 2015). Previous exit studies found that PE firms are five times more likely to take a firm public than are VCs (Lerner *et al.*, 2009). This filtering process left a final sample of 273 startups.

Data collection and variables
Despite the growth of online information and commercial databases, the limited reporting requirements for small firms make it a challenging task for researchers in most countries to track privately-held firms (Cumming and Johan, 2017). However, in Sweden, all limited companies are required by law to submit an annual report, which is available in a public database. We downloaded the public annual reports for the relevant period for our 273 startups to compile a longitudinal data set of their development until exit and post-exit for as long as possible. When the information in the annual reports had gaps or was hard to interpret, we assembled complementary information from company websites and newspaper articles.

An important aspect was to establish the post-exit degree and form of survival of the firms, which we refer to as *continuation*. We recorded startups as discontinued when they ceased to exist as independent firms or ceased to have any operations. When we could not obtain information on continuation from annual reports, we collected data from the Swedish Tax Agency (Skatteverket) or the Swedish Companies Registration Office (Bolagsverket). With this approach, we first established a pattern of what happened to the startups in the period until exit, and second, a pattern of what happened to the startups post-exit.

In formulating a research question that included performance, we needed to define the important aspects of performance in this context and how to measure these aspects. The traditional performance metrics for firm analysis are sales, employment, and profitability. However, as startups by their very nature change over time, long-term growth is crucial. As high growth is multidimensional in nature, we needed to consider growth indicators (e.g., employment or sales), growth over time (e.g., absolute or relative growth), the sample period, and the processes by which the firm achieved growth, whether organically or by acquisition (Delmar, Davidsson, and Gartner, 2003).

The number of employees and total sales are the two most common growth indicators in the literature (Daunfeldt, Elert, and Johansson, 2014; Pergelova and Angulo-Ruiz, 2014). Employment and sales growth tend to correlate moderately (Shepherd and Wiklund, 2009), regardless of which of these growth indicators a study uses (Daunfeldt *et al.*, 2014). Using absolute measures of firm growth lead to a bias toward large firms, while relative growth measures lead to a bias toward small firms (Daunfeldt, Johansson, and Halvarsson, 2015).

Few previous studies could separate acquired growth from organic growth due to the difficulty in distinguishing between growth processes in the data (Daunfeldt, Halvarsson, and Mihaescu, 2015). Since they represent two very different growth modes, studies benefit from analyzing them separately (McKelvie and Wiklund, 2010). Our approach was to search the annual reports for the terms 'acquisition' and 'goodwill.' If we found these words, then we read the annual

reports in detail to determine if an acquisition of another firm occurred, which we would consider 'inorganic growth' (IG). If this was the case, then we added a dummy-variable indicator of IG to the startup. If there were no indicators for IG, we assumed that the growth of the startup was organic.

Furthermore, as the best startups have a disproportionate economic impact (Shane, 2008, 2009; WEF, 2011), we are also interested in tracking the best startups in the sample. As HGFs emerged as a focus for economic growth policy (Davidsson and Henrekson, 2002; Mason and Brown, 2013; Brown *et al.*, 2014), we used HGFs as a proxy indicator to track the best startups. Previous HGF studies usually measure growth in three- or four-year periods (Henrekson and Johansson, 2010). We studied both the size differences between certain points in time and the development between and outside of these two points in time. The starting point in our study was the year of exit and the end point was the latest available annual report. We studied all of the years between these points as well as five years before exit to address the irregularity of growth over time. If a startup met the OECD's HGF criteria (OECD, 2010a), then we added a HGF proxy indicator to the startup.

Finally, studies long ago established the importance of new technology for economic growth (Abramovitz, 1956; Solow, 1957). Startups in particular are recognized as vehicles of knowledge dissemination and innovation (Acs *et al.*, 2013; Kortum and Lerner, 2001). A study of startup performance should thus also include an indicator for the IP developed by the startup. For IP, we read the annual reports for signs that the startup develops and exports high-tech products and services.

If we determined that the startups develop their own IP pre-exit, then we added a pre-exit IP indicator (dummy variable) to the startup. We further noted if the startup continued or stopped developing their own IP post-exit, such as patents being sold/transferred to an acquirer or technology being licensed exclusively to another corporation, in which case, we show that with a second, post-exit IP indicator (dummy variable).

In summary, we used the following variables to study performance: (a) absolute sales, employees, and profit; (b) the growth of sales and employees; (c) an indicator for HGF; (d) an indicator for IG; and (e) an indicator for IP. In addition, the post-exit continuation of the startup is an important variable itself. Table 1 below summarizes the variables.

Table 1. Variable summary

Variable	Description
Employees pre-exit	The average number of employees the year prior to exit
Employees post-exit	The average number of employees three years post-exit
Sales (MSEK) pre-exit	Sales in million SEK the year prior to exit
Sales (MSEK) post-exit	Sales in million SEK three years post exit
HGF pre-exit	Categorized as a high growth firm prior to exit (0=no; 1 = yes)
HGF post-exit	Categorized as a high growth firm post-exit (0=no; 1 = yes)
Inorganic growth pre-exit	Indicator of IG during any year prior to exit (0=no; 1= yes)
Inorganic growth post-exit	Indicator of IG during any year post-exit (0=no; 1= yes)
IP pre-exit	IP in the company the year prior to exit (0=no IP; 1=IP exist)
IP post-exit	IP in the company in the last available annual report (0=no IP; 1=IP exist)
Exit year	Year of exit (M&A or IPO)
Founding year	Year of founding
Age at exit	Years from founding to exit

Table 2 below provides the descriptive statistics for the entire sample, one year before exit and three years post-exit for each firm. The exited startups have a skewed distribution in terms of performance. A few firms have extremely high performance, while many firms have comparatively lower performance, effectively forming a long tail pattern. Due to the non-Gaussian skewed distribution in the sample, we decided to use non-parametric statistical testing in this study.

Table 2: Descriptive statistics for sample firms, one year pre-exit and three years post-exit

Variable	N	Minimum	Maximum	Mean	Std. deviation	Skewness
Founding year	273	1992	2010	2001	4.41	0.046
Exit year	273	2002	2017	2010	4.46	-0.081
Age at exit	273	1	23	9.05	4.29	0.582
Pre-exit statistics						
Employees	273	0.00	426.00	26.17	40.73	5.035
Sales (TSEK)	273	0.00	1396400.00	45243.32	114300.87	7.563
IP pre	273	0.00	1.00	0.90	0.29	-2.773
HGF pre	273	0.00	1.00	0.20	0.39	1.526
Inorganic pre	273	0.00	1.00	0.19	0.39	1.555

Post-exit statistics						
Employees	174	0.00	2770.00	46.75	216.87	11.701
Sales (TSEK)	174	0.00	3456696.00	95472.18	326875.27	8.290
IP post	268	0.00	1.00	0.56	0.50	-0.257
HGF post	267	0.00	1.00	0.09	0.29	2.884
Inorganic post	266	0.00	1.00	0.16	0.36	1.887

Stages of analysis

We analyzed the data in five steps. In the first step, we established the pre-exit performance of all startups one year before exit. We then established a pre-exit baseline for later post-exit comparisons. Furthermore, we ranked the exit routes based on the pre-exit performance of the startups in each exit route to determine if there is a connection between pre-exit performance and exit route. In the second step, we mapped the post-exit continuation of exited startups to clarify the degree to which the exited startups continued operations post-exit, either in their existing format or a new one. This allows us to visualize what happens to the startups post-exit on an aggregate system level

In the third step, we established the post-exit performance of startups still in operation three years post-exit. We compare the pre- and post-exit variables to establish the growth of the startups over the four years. Furthermore, we rank exit routes based on the post-exit performance of the startups in each to determine if there is a connection between post-exit performance and exit route. Due to the skewed, non-Gaussian distribution of performance in the sample, we use an omnibus Wilcoxon one-way median analysis to test the differences in the medians between several groups. If we reject the null hypothesis, then we conducted a further statistical multiple comparison analysis using the Wilcoxon test for each pair.

In the fourth step, we examined the characteristics of the startups that meet the HGF definition pre- and post-exit to investigate the similarities, dissimilarities, and overlap between HGFs pre- and post-exit. In the final fifth step, we investigated the pre-exit characteristics of the startups that discontinued operations post-exit to determine whether the best or worst performing startups discontinued operations.

Limitations of method

As with any study, this study is subject to several limitations. As for limitations in the sample, the 273 startups in our sample represent the national population of venture capital funded startups in Sweden during an extended period, and the data are from VentureSource as it offered the best coverage of the population for the sample period, compared to alternatives such as Invest Europe's database and CrunchBase. It is naturally possible that VentureSource missed venture capital funded startups in Sweden; however, we included only startups that exited through IPOs and M&As, which are the most successful exits. Thus, our subpopulation is of

most interest to VentureSource and their customers, and arguably, this part of VentureSource's database should be the most complete.

Extending the exit window to earlier than 2002 would have included additional startups in the sample, but with less public data available for these additional startups, which would reduce the overall data quality. Prior to the 2000s the Swedish startup ecosystem was in its infancy, with institutions still developing (Isaksson, 2006). Extending the exit window to later than 2017 would likewise include more exits, but postponed the completion of the study.

We excluded startups that were not funded by traditional venture capital. VentureSource, like many similar databases, mixes venture capital and PE funded startups. This is due both to the fluid and ambiguous line between venture capital and PE, and that VentureSource has no incentive to ensure correct labels for these investors since this is more of academic interest than of practical interest. Excluding PE funded startups with no venture capital removed some of the largest and fastest growing startups pre- and post-exit. However, including these startups would distort the exit and post-exit findings of this study, which focuses on venture capital, as well as its relevance for public policy and public investments.

As for limitations in data collection and analysis, the most important limitation is that we do not know what happened with the discontinued acquired startups that are consolidated and integrated into the parent organization. The fact that the acquired startups that continue and are discontinued post-exit are indistinguishable in performance pre-exit, indicate that pre-exit performance is not the dominant factor for which acquired startups are discontinued post-exit. Since the consolidated startups are intermingled with the parent firm after integration, we cannot know what actual growth and impact the former startup had post-exit. Thus, we can only base our conclusions and what we see and not what we cannot see. Tracking the acquired startups post-exit would likely require a different research design and methodology.

Findings and Analysis

Descriptive statistics is displayed to show patterns and highlight trends in the data. When appropriate, statistical hypothesis tests (e.g. Wilcoxon signed rank tests or Pearson's Chi-square Test) is used to confirm the significance of the patterns. Summarized data tables are available in appendices 1-2.

Exit routes and pre-exit performance

Our study reveals exit patterns considerably different from previous exit studies, with 3 percent IPOs on regulated stock exchanges, 28 percent IPOs on MTFs, 43 percent foreign M&As, and 26 percent domestic M&As. The largest previous venture capital exit study, covered exits for 1995-2005 on a global scale (Lerner *et al.*, 2009). Filtering out the failures from Lerner *et al.*'s 2009 study, the adjusted values were 4.3 percent IPOs versus 95.6 percent M&As. As the sample used in their study was a global sample and collected before 2007, Lerner et al. (2009)

was not able to separate between IPOs on regular stock exchanges and MTFs. Still, the 32 percent IPOs, regulated stock exchanges and MTFs combined, are a remarkable and new insight, specific for Europe in the last decade (2007-2017).

A major difference between startups that exit by IPOs on a regulated stock exchange and startups that exit by other routes becomes apparent in Table 3. The extreme values reported for IPO align with previous studies; that is, the best firms represent a disproportionately large amount of the economic impact (Shane, 2008; WEF, 2011). Furthermore, it is interesting that firms that exit by foreign M&As are approximately double in size, sales, and employees compared to firms that exit by domestic M&As and IPO MTF. This suggests that approximately the top half of the startups, which did not qualify for a regulated IPO exit, instead exited by foreign M&A. The age at exit, similarly 8-11 years from founding between the two exit groups, cannot account for this difference in performance. Finally, almost none of the firms were profitable at their time of exit.

Table 3: Pre-exit statistics for exited firms one year before exit, sorted by exit route

Exit route		Sales (mSEK)	Employees	Profit (mSEK)	Age at exit (years)
IPO regulated	Mean	381	77	-1	10.9
	Median	145	60	16	10.5
	St.dev	459	65	69	4.0
IPO MTF	Mean	19	17	-12	9.3
	Median	2	8	-4	8.0
	St.dev	43	26	18	4.5
M&A foreign	Mean	53	34	-4	9.4
	Median	25	22	-1	9.0
	St.dev	74	49	22	4.1
M&A domestic	Mean	23	18	-7	8.0
	Median	7	12	-2	7.0
	St.dev	33	23	18	4.2

On pre-exit performance related to exit route, we see that the best-performing startups exited in the following order: (1) IPO regulated, (2) M&A foreign, (3) M&A domestic, and (4) IPO MTF. Table 4 below shows the results from the omnibus Wilcoxon one-way analysis and the Wilcoxon test of each pair. The omnibus Wilcoxon one-way test reveals a significant difference among the exit route medians for both sales and employees pre-exit. The pairwise Wilcoxon multiple comparison reveals significant differences between all exit route groups in sales pre-exit, while for employees, we could not verify the differences statistically between IPO regulated and M&A foreign, and between IPO MTF and M&A domestic.

Table 4: Wilcoxon tests of pre- and post-exit performance of startups by exit route

Growth variable	Pre or post exit	Exit Route	Companies (N)	Median (MSEK)	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference	Wilcoxon pair (p-value)
Sales	Pre exit	IPO regulated	8	145	<0.0001*	IR - IM	143	0.0022*
		IPO MTF	78	2		IR - MF	120	0.0307*
		M&A foreign	118	25		IR - MD	138	0.0063*
		M&A domestic	69	7		IM - MF	-23	<0.0001*
						IM - MD	-5	0.0067*
						MF - MD	18	0.0014*
	Post exit	IPO regulated	4	565	0.0017*	IR - IM	551	0.0041*
		IPO MTF	39	14		IR - MF	535	0.0099*
		M&A foreign	84	30		IR - MD	555	0.0032*
		M&A domestic	47	10		IM - MF	-16	0.1041
						IM - MD	4	0.3879
						MF - MD	20	0.0116*

Growth variable	Pre or post exit	Exit Route	Companies (N)	Median	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference	Wilcoxon pair (p-value)
Employees	Pre exit	IPO regulated	8	60	<0.0001*	IR - IM	52	0.0053*
		IPO MTF	78	8		IR - MF	38	0.0977
		M&A foreign	118	22		IR - MD	48	0.0091*
		M&A domestic	69	12		IM - MF	-14	<0.0001*
						IM - MD	-4	0.3758
						MF - MD	10	0.0001*
	Post exit	IPO regulated	4	171	0.0004*	IR - IM	159	0.0152*
		IPO MTF	39	12		IR - MF	156	0.0111*
		M&A foreign	84	15		IR - MD	167	0.0041*
		M&A domestic	47	4		IM - MF	-3	0.5381
						IM - MD	8	0.0016*
						MF - MD	11	0.0048*

* $p = 0.05$
** IR - IPO regulated; IM - IPO MTF; MF - M&A foreign; MD - M&A domestic

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The HGF indicators are in line with the pre-exit performance ranking, in that the exit routes of the best performing startups also had the most HGFs, with 50 percent of the firms going public on regular stock exchanges and 31 percent of foreign acquired firms qualified as HGFs. We find relatively low indicators for IG, and the 15-25 percent for all exit routes further substantiate that the growth was mostly organic rather than through acquisitions. There was a high degree of pre-exit IP indicated for firms in all exit routes, of 87-100 percent, which aligns with our expectations of VCs investing in startups with IP and facilitating the development of IP.

Post-exit continuation

As Figure 1 below shows, there is a high level of discontinuation among foreign and domestically acquired startups post-exit, in stark contrast to the continuation of listed startups. Only about half of the acquired firms remained after a few years. In comparison, 75 percent of the public firms remained on their original stock exchange, with the remaining 25 percent primarily being acquired or transitioning from listing on an MTF to a regulated stock exchange.

Sample	Exit route	Specific exit route	Post-exit status

273
Sample

86 (32%)*
IPO

8 (9%)**
IPO regulated

6 (75%)**
Remain listed on regulated exchange

2 (25%)**
Acquired by foreign company

(100%)

78 (91%)**
IPO MTF

8 (10%)**
Moved to regulated IPO

55 (70%)**
Remain listed on MTF

1 (1%)**
Acquired by domestic company

3 (4%)**
Acquired by foreign company

9 (11%)**
Liquidation/bankruptcy

2 (3%)**
MBO

(100%)

187 (68%)*
M&A

69 (37%)**
M&A domestic

31 (45%)**
Independent subsidy

32 (46%)**
Emptied or no longer registered

5 (7%)**
Liquidation/bankruptcy

1 (1%)**
MBO

(100%)

118 (63%)**
M&A foreign

63 (53%)**
Independent subsidy

52 (44%)**
Emptied or no longer registered

2 (2%)**
Liquidation/bankruptcy

1 (1%)**
MBO

(100%)

*= percentage of total sample
** = percentage of overall exit route (IPO or M&A)
*** = percentage of specific exit route (IPO regulated/MTF or M&A foreign/domestic)

Figure 1: Startups' post-exit continuation patterns by exit route

Three-year post-exit performance

As Table 5 shows, there is a considerable variation in post-exit growth among continuing firms. Startups that exited by IPO on a regulated stock exchange had the highest absolute and relative growth post-exit. Interestingly, startups that exited by IPO on MTF went from being the worst performers pre-exit, to outgrow foreign acquired firms post-exit in relative growth and outgrowing domestically acquired firms in both absolute and relative terms. Foreign acquired firms outgrew domestic acquired firms post-exit in every aspect.

Table 5: Sales and employees of exited startups, one year pre-exit and three years post-exit

Exit route		Sales			Employees			Sales/Employee	
		Pre exit (mSEK)	Post exit (mSEK)	Increase (%)	Pre exit	Post exit	Increase (%)	Pre-exit (mSEK)	Pos-exit (mSEK)
IPO regulated	Mean	381	1 168	206%	77	249	225%	5.0	4.7
	Median	145	565	289%	60	171	185%	2.4	3.3
	St.dev	459	1 361		65	239			
IPO MTF	Mean	19	42	113%	17	36	109%	1.1	1.2
	Median	2	14	515%	8	12	50%	0.3	1.2
	St.dev	43	59		26	53			
M&A foreign	Mean	53	102	94%	34	59	76%	1.6	1.7
	Median	25	30	22%	22	15	-32%	1.1	2.0
	St.dev	74	265		49	33			
M&A domestic	Mean	23	38	65%	18	16	-7%	1.3	2.3
	Median	7	10	44%	12	4	-67%	0.6	2.5
	St.dev	33	59		23	33			

However, the rank according to mean *relative* growth post-exit is: (1) IPO regulated, (2) IPO MTF, (3) M&A foreign, and (4) M&A domestic. The closest groups were IPO MTF and M&A foreign due to the high variation among the groups. The Wilcoxon tests as seen below in Table 6 confirm that the *relative* growth for the two groups are dissimilar, with statistical significance for both sales (p=0.0425) and employees (p=0.0014).

Table 6: Wilcoxon signed rank tests of growth in sales and employees by exit route

Growth variable	Absolute or relative values	Exit Route	Companies (N)	Median (MSEK)	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference (MSEK)	Wilcoxon each pair (p-value)
Sales growth	Absolute	IPO Reg	4	211	0.0119*	IR - IM	207	0.0054*
		IPO MTF	39	4		IR - MF	206	0.0071*
		M&A Foreign	84	5		IR - MD	211	0.0027*
		M&A Domestic	47	0		IM - MF	-1	0.4883
						IM - MD	4	0.0320*
						MF - MD	5	0.5647

Growth variable	Absolute or relative values	Exit Route	Companies (N)	Median	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference	Wilcoxon each pair (p-value)
Employee growth	Absolute	IPO Reg	4	64	0.0002*	IR - IM	60	0.0065*
		IPO MTF	39	4		IR - MF	67	0.0064*
		M&A Foreign	84	-3		IR - MD	66	0.0036*
		M&A Domestic	47	-2		IM - MF	7	0.0064*
						IM - MD	6	0.0002*
						MF - MD	-1	0.9598

Growth variable	Absolute or relative values	Exit Route	Companies (N)***	Median	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference	Wilcoxon each pair (p-value)
Sales growth	Relative	IPO Reg	4	262%	0.0637	IR - IM	1.56	0.6396
		IPO MTF	18	106%		IR - MF	2.37	0.1318
		M&A Foreign	66	25%		IR - MD	2.63	0.0818
		M&A Domestic	25	-1%		IM - MF	0.81	0.0425*
						IM - MD	1.07	0.0332*
						MF - MD	0.26	0.7185

Growth variable	Absolute or relative values	Exit Route	Companies (N)***	Median	Omnibus: Wilcoxon one-way test (p-value)	Route pairs**	Median difference	Wilcoxon each pair (p-value)
Employee growth	Relative	IPO Reg	4	130%	0.0012*	IR - IM	0.73	0.3489
		IPO MTF	18	57%		IR - MF	1.47	0.0189*
		M&A Foreign	66	-17%		IR - MD	1.63	0.0207*
		M&A Domestic	25	-33%		IM - MF	0.74	0.0014*
						IM - MD	0.9	0.0039*
						MF - MD	0.16	0.9147

* p = 0.05
** IR - IPO regulated; IM -IPO MTF; MF -M&A foreign; MD -M&A Domestic
*** Companies with 0 sales or less than 10 employees pre exit have been removed from the sample

We find a distinct difference in employee growth between the public and acquired firms post-exit. Among the acquired firms, there is a reduction in median employees among foreign acquired firms, and in both the mean and median among the domestically acquired firms post-exit. Coupled with the sharp increase in sales/employees, this indicates a shift in focus from growth to profitability for most acquired firms post-exit. It is feasible that becoming a subsidiary of a larger corporate structure imposes a prioritization of profit over growth.

Table 7: Cross tabulation of HGFs, pre- and post-exit, using Chi-Square and Cramer's V

Exit		HGF pre-exit		HGF post-exit	
		0	1	0	1
IPO-MTF	Actual	70	8	69	8
	Expected	62,6	15,4	70,1	6,9
	% of expected	12%	-48%	-2%	16%
IPO-REG	Actual	4	4	5	3
	Expected	6,4	1,6	7,3	0,7
	% of actual	-38%	150%	-32%	329%
M&A-FOR	Actual	82	36	103	12
	Expected	94,9	23,1	104,7	10,3
	% of actual	-14%	56%	-2%	16%
M&A-DOM	Count	63	6	66	1
	Expected Count	55,4	13,6	61,0	6,0
	% of actual	14%	-56%	8%	-83%
Pearson Chi-Square		22,965	p = 0,000	13,030	p = 0,005
Cramer's V		0,290	p = 0,000	0,221	p = 0,005

The indicators for HGF, IG, and IP substantiate the growth patterns, as Table 7 shows. IPO MTFs were the only exit route to maintain the same percentage of HGFs post-exit, now on par with foreign M&As, having dropped from 31 to 10 percent. Indicators for IG increase post-exit for IPOs, which is not surprising since they can acquire firms more easily with listed shares. Finally, the IP indicator percentages are more than halved for both foreign and domestic M&As, suggesting that these subsidiaries of large firms not only grow more slowly, but also stop developing new technology with continued development and associated assets transferred to the parent firm.

Table 8: Pre- and post-exit levels of HGFs, IG, and IP by exit route.

Exit route	HGF		IG		IP	
	Pre-exit	Post-exit	Pre-exit	Post-exit	Pre-exit	Post-exit
IPO regulated	50%	38%	25%	38%	100%	88%
IPO MTF	10%	10%	21%	22%	96%	96%
M&A foreign	31%	10%	20%	11%	88%	41%
M&A domestic	9%	1%	16%	13%	87%	33%

We conducted a Chi-Square test of HGFs, pre- and post-exit, to test the association between the distribution of HGFs and exit route, as seen in Table 8. The Chi-Square test shows a significant association between the distribution of HGFs and exit route; p=0.000 for pre-exit and p=0.005 for post exit. The strength of the association, measured with Cramer's V, are also adequately

high (0.290 pre-exit and 0.221 post-exit). The tests confirm that IPOs, both on regulated stock exchanges and MTFs, had more than expected HGFs post-exit, while M&As, both foreign and domestic, had fewer than expected HGFs post-exit.

Characteristics of HGF startups

We found that HGFs represented approximately half of the total sales and employees of all startups in the sample, both pre- and post-exit. HGFs were thereby a useful proxy to identify the best startups in the sample. Thus, an interesting follow-up question was whether the HGFs pre- and post-exit were the same firms. As Table 9 indicates, the overlap between HGFs pre- and post-exit was 15 percent, meaning only 15 percent of the startups meeting the HGF criteria were HGFs both pre- and post.exit.

Table 9: HGFs pre- and post-exit with overlap by exit route.

Exit Route	HGFs pre-exit	HGFs post-exit	HGFs overlap*	HGFs overlap* (%)
IPO regulated	4	3	2	50%
IPO MTF	8	8	1	13%
M&A foreign	36	12	4	11%
M&A domestic	6	1	1	17%
Total	54	24	8	15%

 * Firms categorized as HGFs pre-exit that are categorized as HGFs post-exit as well.

Since 78 percent of the HGFs pre-exit were acquired, and half of the acquired firms were discontinued post-exit, one part of the explanation may be that some discontinued firms were former HGFs. Another part of the explanation may be tied to industry. Of the pre-exit HGFs, 48 percent were in software and digital services, while 9 percent were in pharma, biotech, and medtech. However, among post-exit HGFs, 21 percent were in software and digital services, while 29 percent were in pharma, biotech, and medtech. A plausible explanation could be that firms in different industries enter growth phases in different stages of their life cycles. Software firms with lower entry barriers grow fast early, while biopharmaceuticals need more time to enter the market before they can grow.

Characteristics of discontinued startups

Approximately half of the acquired firms remained as subsidiaries after a few years, as seen in Figure 1. Focusing on the discontinued firms, we examined whether they are the best or worst performers among the acquired startups. We compared the pre-exit performance variables for the discontinued firms with those for all acquired firms. Furthermore, we controlled for age at exit, since it is likely that a startup acquired at an earlier age has fewer sales and employees than an older startup does. We find that the discontinued firms were neither the best nor the

worst performing, and they were indistinguishable from the larger sample of acquired firms in terms of performance. Based on the indicators we have, it does not appear that the post-exit performance of the discontinued firms would have been different from the acquired firms that continued operations.

On our final step, we mapped the progression at which the firms were discontinued. Among the foreign acquired startups (n=118), 15 percent (18) of the startups were discontinued after three years, and another 31 percent (36) at the end of 2017. The trend was similar among domestic acquired startups (n=69), with 20 percent (14) of discontinued after three years and 34 percent (24) at the end of 2017.

Discussion
To investigate to what extent firms stay and grow post-exit dependent upon exit, we will first compare Swedish exit patterns with international comparisons. Secondly, we discuss the novel finding that firms doing IPO exit through MTF have significantly higher firm performance than acquired firms. Thirdly, other firm indicators relevant for regional development, such as HGFs are scrutinized. Finally, exit-centric policy implications are discussed.

We found that the top performing ventures, both pre- and post-exit, were startups that exited by IPO on regulated stock exchanges. These startups constitute the top three percent of the exited startups, a proportion that aligns with prior international studies (Cumming and MacIntosh, 2003; Lerner *et al.*, 2012). In the remaining sample, the best performing startups pre-exit primarily exited by foreign acquisition. Among the lower half of the sample, the startups that exited by domestic acquisition outperformed pre-exit the startups that exited by IPO on MTF. This pre-exit performance ranking indicate that MTF exits are a last resort, or even a dumping ground, for startups good enough to survive to exit but lacking the performance to attract acquirers.

It is therefore remarkable to find that the startups exiting by IPO MTF had higher relative growth, and often a higher absolute post-exit growth rate than the acquired firms. 28 percent of the firms exited by IPOs on MTF and would not have met threshold for an IPO on a regular stock exchange. Without the MTF option, they would arguably have been acquired or closed down instead and generated considerably less economic impact. The high ratio of MTF exits has been previously overlooked in research and is by itself a novel finding. Combined with the strong post-exit performance of startups going public by MTF, superior to most acquisitions, MTFs constitute a promising exit route for increased economic impact in regional development.

The finding that approximately half of the acquired startups were discontinued post-exit, provides part of the answer to why so few new large corporations are perceived to emerge from startups. These discontinuation results align with the findings from Ireland of foreign acquisitions leading to discontinuation (Hogan *et al.*, 2018). However, that domestic acquisitions have an even higher degree of discontinuation than foreign acquisitions is a finding worthy of more international comparison, although in line with historical studies on domestic

post-acquisition consolidations (Leigh and North, 1978; Bhagat *et al.*, 1990; Turok and Richardson, 1991; Ashcroft *et al.*, 1994). We should note that discontinued startups largely imply that any inherent growth potential of the former startup is channeled into the acquiring company, fueling growth and innovation in incumbents. Not being able to track any consolidated growth impact of this transfer to the acquirers is a limitation of this study.

Furthermore, the general trend of IP indicators decreasing among the acquired firms post-exit, coupled with the gradual increase in discontinuation over time, supports the notion that assets are consolidated increasingly over time and transferred from subsidiaries to the parent company. The reduction in employees further suggests a shift in focus from growth to profitability after acquisition. The question of geography and domestic interests thereby become more pressing. If the startup's potential growth manifests primarily through the acquiring corporations, it will of course matter if the acquiring firm is local or foreign.

From a domestic policy perspective, the results of this study indicate higher relative post-exit growth if startups exit through IPOs, both on regulated stock exchanges and on MTFs, rather than by acquisition. Warnings to governments not to interfere with private investors or disturb private market behavior (Lerner, 2009) need to be seen in this new light. Judging from the current study, these warnings are not sensitive to regional development perspectives. However, from a regional development perspective IPOs (including the MTF option) should be preferable to domestic acquisitions, which, in turn, most likely imply more consolidated growth domestically than foreign acquisitions do.

The findings are in line with the view that venture capital steers startups towards acquisitions (Cumming, 2008). Combining the finding that (a) most of the best performing startups exit by foreign acquisitions with the finding that (b) approximately half of the acquired startups are consolidated post-exit and (c) the remaining acquired firms show slower growth, suggest that the growth accelerating effects of venture capital are short- to mid-term, and not necessarily long-term and post-exit. Venture capital may thereby be most beneficial for regions hosting a large local community of potential acquirers. This would explain why studies on venture capital in Silicon Valley, which has a large local community of acquiring corporations, show such promising results. Policy makers in regions without these conditions may thereby need to make a hard choice between trying to influence exit behavior, looking for alternative means for venture capital to accelerate startup growth, or continuing with the present course with the knowledge that the exit outcomes are sub-optimal for them.

Additionally, we find that HGFs represent half of the total sales and employees of the sample firms pre- and post-exit. However, the pre- and post-exit HGFs are different firms with only a 15 percent overlap. An explanation for this small overlap could be that the pre-exit HGFs are mostly software startups that find it easy to scale early, while the post-exit HGFs are more often biotech firms, which take a longer time to market but have higher growth upon market entry. Furthermore, we find a decline in IP development and a reduction in employees among the acquired firms that became subsidiaries, which indicates a shift in focus from growth to profitability, in contrast to higher growth and IP development among public firms.

It can be argued that incentivizing retained growth, such as by showing a preference for IPOs over acquisitions, is not currently a policy option in use, at least not in the European context. In addition, entrepreneurial recycling and technology diffusion would not necessarily diminish if IPOs were incentivized, and foreign acquisitions avoided especially. Such externalities could even increase and help build the local entrepreneurial ecosystem.

Conclusions and future research
The purpose of this article is to investigate if and how exit routes of venture capital financed startups matter from a regional development perspective, i.e. to what extent firms stay and grow post-exit dependent upon exit.

Empirical results show that the best performing top three percent startups exit by IPO on regulated stock exchanges and remain on a growth trajectory post-exit. Among the remaining 97 percent startups, they exit based on performance by foreign acquisition followed by domestic acquisition and finally IPO on MTF. Approximately half of these acquired startups are consolidated and closed down post-exit, while the remaining acquired startups experienced comparatively slower post-exit growth. Startups that exit by IPO on MTF outgrow domestic acquired and, in relative terms, foreign acquired startups post-exit.

A key contribution is that exit route is strongly related to subsequent growth, both in terms of magnitude and whether the startup continues to operate in the region. VCs' interest is primarily on valuation increase until exit, with a bias towards acquisitions (Cumming, 2008). For those concerned with post-exit growth, this study confirms that IPOs are more beneficial in terms of post-exit relative growth. Public policy should thus be exit-centric, and incentivize and facilitate IPOs more easily, both by regulated stock exchanges and MTFs.

Conclusions open several avenues for research. We present a previously unseen post-exit pattern specific for venture capital funded startups. However, we cannot as yet gauge the extent of generalizability nor adequately explain the causality driving exit choice and post-exit development. For generalizability, future studies should examine exit and post-exit patterns of startups in additional regions and countries to provide a deeper understanding of the regional dynamics and long-term consequences of venture capital and exits. Studies in Ireland (Hogan *et al.*, 2018), UK (Mason and Harrison, 2006) and Canada (Carpentier and Suret, 2014) support the Swedish findings and indicate a geographically unbound pattern to exits and post-exit development, but further studies are required to substantiate the pattern.

Regarding causality and exit choice, it is clear that VCs prefer acquisitions. However, we do not yet understand the cause and rationale for this preference and to what extent other investors have similar interests. We do not understand the influence of firm characteristics, such as industry, or environmental context, such as timing and geography, influence exit choice. For post-exit development causality, we can see that exit routes lead to different post-exit growth trajectories. Each of these trajectories needs to be examined for their individual drivers and logic. A methodological challenge here is overcoming the barriers of tracking an acquired

startup after consolidation and integration into an incumbent and distinguishing the impact inherent from the former startup from all the other activity within the incumbent.

Due to our current interest in venture capital, we excluded startups that received other forms of equity funding, such as PE groups, family offices, angel groups and crowdfunding. PE funding has shown to be more IPO inclined than VC funding (Lerner *et al.*, 2012), so there is reason to believe that exit route is related to investors. Future studies should examine the exit and post-exit patterns of startups with alternative equity funding to venture capital, if they lead to comparable long-term growth without the strong preference towards acquisitions.

From an entrepreneurial finance perspective, MTF offers an interesting avenue of research. MTF is a relatively new exit route, with a potential for wider adoption as it offers a lower threshold exit for investors, post-exit financing for the startups and beneficial regional growth. Future studies should examine how suitable MTFs are for adoption in further regions. MTFs should also be analyzed from a shareholder perspective, how returns over time compare to other investment alternatives, to gauge their suitability as reliable and stable long-term financial placement for the public.

From a regional development perspective, externalities associated with each exit route is an essential area of continued study. If certain exit routes lead to increased innovation, higher pace of technology diffusion and higher levels of entrepreneurial recycling than others, such externalities should be compared with the regional value of retaining growth after exit for a specific firm. This study barely scratches the surface with the IP indicator, and further studies into externalities of startups compared across exit routes are encouraged.

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Appendix 1: Sales, employees, profit, industry - Pre-exit vs Post-exit

Pre exit

ALL 273 100%	Sales	Employees	Profit	Age at exit	HGF	Inorganic growth	IP
Average	45	26	-7	9	20%	19%	90%
Median	10	15	-2	8			
Max	1396	426	108	23			
Min	0	0	-130	1			

IPO regulated 8 3%	Sales (msek)	Employees	Profit (msek)	Age at exit	HGF	Inorganic growth	IP
Average	381	77	-1	11	50%	25%	100%
Median	145	60	16	11			
Max	1396	181	108	17			
Min	0	5	-114	5			

IPO MTF 78 29%	Sales (msek)	Employees	Profit (msek)	Age at exit	HGF	Inorganic growth	IP
Average	19	17	-12	9	10%	21%	96%
Median	2	8	-4	8			
Max	222	162	14	23			
Min	0	0	-75	1			

M&A Foreign 118 43%	Sales (msek)	Employees	Profit (msek)	Age at exit	HGF	Inorganic growth	IP
Average	53	34	-4	9	31%	20%	88%
Median	25	22	-1	9			
Max	412	426	99	20			
Min	0	0	-130	2			

M&A Domestic 69 25%	Sales (msek)	Employees	Profit (msek)	Age at exit	HGF	Inorganic growth	IP
Average	23	18	-7	8	9%	16%	87%
Median	7	12	-2	7			
Max	152	147	36	19			
Min	0	0	-84	2			

Post exit

ALL 172	Sales	Employees	HGF	Inorganic growth	IP
Average	57	25	9%	15%	55%
Median	13	9			
Max	612	200			
Min	0	0			

IPO regulated 4 — 4 exit too recent	Sales	Employees	HGF	Inorganic growth	IP
Average	1 168	249	38%	38%	88%
Median	565	171			
Max	3 457	624			
Min	85	30			

IPO MTF 39 — 3 bankruptcy, 36 exit too recent	Sales	Employees	HGF	Inorganic growth	IP
Average	42	36	10%	22%	96%
Median	14	12			
Max	233	243			
Min	0	1			

M&A Foreign 84 — 18 emptied, 16 exit too recent	Sales	Employees	HGF	Inorganic growth	IP
Average	102	59	10%	11%	41%
Median	30	15			
Max	2 305	2 770			
Min	0	0			

M&A Domestic 45 — 14 emptied or out of business, 10 exit too recent	Sales	Employees	HGF	Inorganic growth	IP
Average	38	16	1%	13%	33%
Median	10	4			
Max	254	200			
Min	0	0			

Appendix 2 - Sales, employees, profit, growth, IP, industry - HGFs vs All companies

ALL PRE — 273

	Sales	Employees	Profit	Inorganic growth	IP
Average	45	26	-7	19%	90%
Median	10	15	-2		
Sum	12 351	7 144	-1 897		

HGF PRE — 54

	Sales	Employees	Profit	Inorganic growth	IP
IPO - regulated — 4	7%				
Average	563 944	100	2 655	25%	100%
Median	400 650	105	17 201		
Sum	2 255 775	399	10 620		
IPO - MTF — 8	15%				
Average	48 590	42	-10 894	50%	100%
Median	21 541	26	-6 168		
Sum	388 718	335	-87 149		
M&A - Foreign — 36	67%				
Average	102 999	60	-2 629	31%	92%
Median	66 324	39	4 261		
Sum	3 707 948	2 176	-94 656		
M&A - Domestic — 6	11%				
Average	66 167	41	1 719	33%	67%
Median	67 658	36	340		
Sum	396 999	247	10 315		
ALL HGFs — 54					
Average	125	58	-3	33%	91%
Median	61	38	2		
Sum	6 749	3 157	-161		

ALL POST — 172

	Sales	Employees	Inorganic growth	IP
Average	57	25	15%	55%
Median	13	9		
Sum	16 612	8 134		

HGF POST — 24

	Sales	Employees	Inorganic growth	IP
IPO - regulated — 3	13%			
Average	1 247 292	236	100%	100%
Median	200 180	54		
Sum	3 741 876	708		
IPO - MTF — 8	33%			
Average	56 072	38	38%	100%
Median	29 520	26		
Sum	448 574	300		
M&A - Foreign — 12	50%			
Average	375 498	289	42%	58%
Median	188 768	60		
Sum	4 505 974	3 464		
M&A - Domestic — 1	4%			
Average	179 409	7	100%	100%
Median	179 409	7		
Sum	179 409	7		
ALL HGFs — 24				
Average	370	187	50%	79%
Median	95	35		
Sum	8 876	4 479		

Paper III

VENTURE CAPITALIST'S EXIT CHOICE: DECIDING THE FATE OF SUCCESSFUL STARTUPS

Per Hulthén

ABSTRACT

Recent studies have shown that exit route influences the long-term economic impact of startups. This study uses venture capital and behavioral finance theory to examine *how venture capitalists (VCs) choose exit route for startups, which factors they consider and these factors relative importance*. Qualitative structured interviews are conducted with VCs, stepping through their preferences in deciding between Initial Public Offerings (IPO) and mergers and acquisitions (M&As) as well as domestic and foreign exits. The VCs identify the risks and uncertainties they associate with each exit route and the rewards required to compensate for these risks and uncertainties. Biases in decision making are observed and inquired about. Findings are that the factors considered by the VCs are uniform, but the perceived importance of these factors strongly diverge.

Conclusions are that VCs perceive themselves to be sole deciders of exit route, overriding entrepreneurs if required. VCs have an M&A preference and aversion to IPOs, due to the uncertainty associated with the IPO's lockup period. The magnitude of the IPO aversion was dependent on individual VCs familiarity with IPOs, loss of control issues and loss aversion. An empirically derived descriptive model is proposed for how VCs make exit choice, with validation by statistical testing as a natural next step. Conclusions explain the over-representation of M&As in startup exits. Implications are that VC's IPO aversion may limit earnings for startup shareholders. VC's sole deciding power, strong M&A preference and low threshold to foreign M&As, may also be counterproductive to policies for regional growth. Recommendations for future research in financial decision making are offered.

Keywords: Decision Making, Cognition, Bias, Exit, Venture capital

INTRODUCTION

For the past two decades, the innovation policies of many nations and regions include support and even public investment into high-tech startups accelerated by private venture capital (Storey & Tether, 1998; Lerner, Leamon, & Hardymon, 2012; OECD, 2001 & 2010; World Economic Forum, 2009 & 2011). Recently, the exit route of venture capital funded startups has gained more interest, as studies indicate that different exit routes, such as Initial Public Offerings (IPOs) and Mergers and Acquisitions (M&As) as well as domestic and foreign exits, lead to significantly different long-term economic impact (Mason & Harrison, 2006; Mason & Brown, 2014; Carpentier & Suret, 2014; Brown, Mawson & Mason, 2017; Hogan, DeTienne, Hutson & Smith, 2018). If some exits result in greater economic impact, a critical question becomes: who decides on the exit and on what basis?

Venture capital theory assumes that venture capitalists (VCs) make the exit decision based on profit maximization and usually contractually control the exit decision (Cumming, 2008; Cumming & Johan, 2008). If VCs control the exit decision, it is important to confirm this and understand on what criteria they make the exit decision. Apart from the economic impact, the exit decision decides the returns for the VCs, their limited partners, the entrepreneurs and all other shareholders of the startup.

This study uses venture capital and behavioral finance theory to examine the research question of *how VCs choose exit route for startups, which factors they consider and these factors relative importance in the decision*. Method used is qualitative structured interviews with twelve Swedish VCs. In the interviews, the VCs are asked to step through their decision making process, evaluating four exit routes: domestic M&A, foreign M&A, domestic IPO and foreign IPO. The VCs identify the risks and uncertainties they associate with each exit route, and quantify the reward required to compensate for these risks and uncertainties, effectively setting their subjective price on the risks and uncertainties. The interviewer further asks the VCs to explain their reasoning and subjective pricing, controls for context and inquiries about self-expressed biases to better understand the VC's cognitive processes.

Conclusions are that VCs perceive themselves to be sole deciders of exit route, overriding entrepreneurs if required. Furthermore, the factors considered by the VCs in their decision making are uniform. However, the subjective pricing of the VC's diverges for the uncertainty associated with the lockup period for IPOs, based on biases specific for the individual VC. As a consequence, VCs have an M&A preference and IPO aversion, which offers an explanation for the dominance of M&As in exits (Lerner, Sorensen & Strömberg, 2009). An empirically derived model is proposed for how VCs make exit choice, that conforms to Tversky and Kahneman's (1992) requirements for a descriptive decision making model. Implications are that VC's loss aversion may be limiting earnings for all startup shareholders. The VC's sole deciding power, with strong M&A preference, IPO aversion and low threshold to foreign M&As, may also be counterproductive to policies for regional growth. Future studies are recommended to pursue statistical testing of proposed model, and additional promising research venues are identified.

THEORY

This chapter uses venture capital theory to explain the context of startup exits and behavioral finance theory to frame the decision making process.

Venture capital theory and startup exits

Venture capital fills the early stage equity gap for small firms with high growth potential and thereby drive economic growth by allowing the startup to grow (Florida & Kenney, 1988). In the last two decades, the role of the venture capitalist has been further emphasized as the enabler and accelerator of entrepreneurial economic growth (Gompers, Kovner, Lerner & Scharfstein, 2010: Lerner, 2009; Lerner et al, 2012). Even though venture capitalists have, so far, been the most successful in Silicon Valley with examples such as Apple, Google and Facebook (Shane, 2008 & 2009), venture capitalism has spread across the world and is often expected to be a generalized driver of economic growth and innovation (Kortum & Lerner, 2001). The ability to make a profitable exit lies at the heart of venture capital investing (Sahlman, 1990; Gompers, 1995; Gompers & Lerner, 1999).

The exit timing for the venture capitalist should optimally be "when the projected marginal value added as a result of the VC's efforts, at any given measurement interval, is less than the projected cost of these efforts", with consideration that the limited life time of VC's funds may force a liquidation of investments before this time due to requirement to pay back limited partners (Cumming & MacIntosh, 2003). The average holding period for a venture capitalist to own an equity stake in a startup before exiting has shown to be five years (Sahlman, 1990; Cochrane, 2005).

There are five types of VC exits: (a) an initial public offerings, "IPO", in which a significant portion of the firm is sold into the public market; (b) an acquisition exit, "M&A", in which the entire firm is bought by a third party; (c) a secondary sale, in which only the VC's shares are sold to a third party, which is usually less desirable and profitable; (d) a buyback, "MBO", in which the VC's shares are repurchased by the management of the entrepreneurial firm, which is also less desirable and profitable; and (e) a write-off, in which the VC walks away from the investment, usually due bankruptcy or closing down of the firm (MacIntosh, 1997).

Studies of VC exits during 2000-2010 in North America and Western Europe reveal that M&As dominate with 78.3% M&As compared to only 3.5% IPOs (Lerner et al, 2009). This is despite the fact that IPOs historically have provided a 22% price valuation premium over M&As (Brau, Francis & Kohers, 2003). To put this in perspective, early stage venture capitalists in USA state an expected average return on investment (RoI) of 42%, and later stage venture capitalists of 33%, even though industry data show that few venture capitalists deliver on these expectations and on average only half of these returns are achieved (Elango, Fried, Hisrich & Polonchek, 1995).

Although trade M&As may result in a lower value, they do however provide immediate, full liquidity to both entrepreneur and VC, which is usually not the case in an IPO (De Clerq, Fried,

Lehtonen & Sapienza, 2006). Major shareholders in IPOs are blocked from selling shares during a lockup period following a listing (usually 180 days). During the lockup period, the VC runs the risk of share prices dropping, and when the lockup period ends the sudden increase in supply of shares without an equivalent increase in demand has shown to result in a price drop of on average 3-4% (Bradley & Roten, 2001). Finally, the cost of going public is high, upwards 7% of the capital raised, although this cost is paid by the firm and not investors (Chen and Ritter, 2000).

Firm-specific and macroeconomic factors naturally matter for exit. Larger, dominant and high-tech firms are more inclined towards IPOs, while services firms, firms with high debt and firms in leveraged industries and industries with few actors were more M&A inclined, coupled with a positive stock exchange trend and lower rates favoring IPOs and the opposite favoring M&As (Brau et al, 2003, Poulsen & Stegemoller 2008, Bayar & Chemmanur, 2011). Institutional factors enable exits, as countries with stable financial and legal systems are more favorable for IPOs (Cumming, Fleming & Schwienbacher, 2006). Management and ownership further influence exit. Companies that need less oversight and have a stronger track record are predisposed to IPOs, while companies that require more controls are predisposed for M&As (Bienz & Leite, 2008). Established VC firms are biased towards M&As, while younger VC firms are more open to IPOs, especially if an IPO coincides in time with their fund raising (Gompers, 1999). Entrepreneurs are generally biased towards IPO due to private benefits (Schwienbacher, 2008), which is one reason VCs often ensure contractual control of the exit choice (Cumming, 2008; Kaplan & Strömberg, 2003) and the exit route is pre-planned already at the time of the initial investment (Cumming & Johan, 2008).

VCs traditionally invest from a fund, where the majority of capital come from limited partners (LP), and the VCs as general partners (GP) receive their compensation by a management fee, usually 1-3% annually of the fund, and a profit split, usually 20-30% of capital gain, when the fund is liquidated after usually 7-11 years (Gompers & Lerner, 2000; Elango et al, 1995). The VCs investments and exit procedures are outlined in agreements, where the stated priority for the VCs is profit maximization, and the LPs rely on the VCs to make optimal financial risk taking decision, which are neither too aggressive nor too cautious (Lerner et al, 2012).

If the VCs were to make sub-optimal decisions, or prioritize differently than profit maximization, principle-agent concerns arise as the VCs goals and actions as agents are not aligned with the LPs expectations as principles (Jensen & Meckling, 1976). Thus, it is important to remember than VCs are traditionally bound by contracts to only prioritize maximized returns within the VC's fund lifetime, in comparisons to investors who invest their own money or entrepreneurs who may choose to prioritize and act differently.

In is important to note that the assumption in venture capital theory, that the VC controls the exit decision, is a contrary assumption to the entrepreneurial exit literature which focuses on the process by which the founders of privately held firms leave the firm they helped to create (DeTienne, 2010; Wennberg et al, 2010; Wennberg & DeTienne, 2014). Exit choice is here framed based on the entrepreneur's decision to leave their firms, and thereby likely sale of said

firm, and offers several explanations to exit choice, such as threshold theory (DeTienne & Cardon, 2012; DeTienne & Chirico, 2013), theory of planned behavior (Ajzen 1991), socioemotional wealth (Gomez-Mejia et al. 2011) and the 'imprinting' of early structures and experiences has on the later development and exit of the firm (Albert & DeTienne 2016).

While the venture capital literature argues for profit maximization for the VC as a basis for exit choice, entrepreneurial exit literature instead base the choice on the preferences of the entrepreneur, for which profit maximization is only one part. These contrary assumptions, between the venture capital and entrepreneurial exit theory, on who decides on exit may be explained as *'without a VC the entrepreneur may decide exit, but once a VC invests the VC decides'*. The *'paradox of success'* in VC-funded startup that entrepreneurs are more likely to be replaced with growing success of the startup (Wasserman, 2003), would support this explanation. For the purpose of our interview study, we should however include a control question for who the actual decision maker is. In summary, there are multiple factors that seem to influence exit choice, although which of them are actually considered by the decision maker and their relative important in the exit process is not fully understood.

Behavioral finance theory and decision making
Early organizational theory defined decision making as a process of five distinct phases: defining the problem; analyzing the problem; developing alternate solutions; deciding upon the best solution; converting the decision into effective action, often relying on mathematical modeling and viewing decision making as a fully rational process of finding an optimal choice given the available information (Drucker, 1955). The limited cognitive ability of individuals, in processing all available information in the time given to make a decision, was however recognized and gave rise to the concept of bounded rationality, in which decision makers seek a satisfactory rather than optimal solution (Simon, 1955, 1972 & 1997).

Decision theory later emerged as the study of the reasoning underlying an agent's choice, divided into the two branches of *normative*, how decision should be done, and *descriptive*, how decisions are actually done (Edwards, 1961; Slovic, Fischhoff & Lichtenstein, 1977; Einhorn & Hogarth, 1981). From this descriptive branch, the behavioral economics field emerged focusing on *heuristics*, rules of thumb for how most decisions are actually made, *framing,* anecdotes and stereotypes that individuals rely on to understand and respond to events, and *market inefficiencies,* explaining mispricing and non-rational decision making (Kahneman, 2003; Shiller, 2003; Do, 2011; Camerer & Loewenstein, 2011).

The related field of behavioral finance grew out of behavioral economics, as traditional frameworks were unable to explain empirical patterns such as stock market bubbles (Ritter, 2003). The myth of professional investors making rational data driven investment decisions had been debunked by case studies illustrating the subjective nature of actual trading activities (Abolafia, 2001; Zaloom, 2003). Modern finance often assumed that agents in the economy were rational in making decisions according to the axioms of expected utility theory and made unbiased forecasts about the future, despite that behavioral economics had empirically shown that cognitive biases influence financial decisions (Thaler, 2010).

Even sophisticated investors appear to have both a birthplace bias and local bias in their choice of investments (Lindblom et al, 2018). To the degree cognitive biases have been recognized in venture capital, VCs have been shown to have a local bias in investing, with the strongest local bias among less experienced and specialized VCs (Cumming & Dai, 2010), while there are indications of an IPO bias among VCs if the IPO coincides with the VC raising a new fund (Gompers, 1996). When investigating exit choice in this study, it is thereby important to focus on how choices are actually made, including likely biases, and not assume that normative models for how decisions should be made accurately reflect actual behavior.

Biases are however diverse and varied; at least eighty unrelated biases can be produced by the same information-theoretic generative mechanism (Hilbert, 2012). Biases most relevant to the context of VC's exit choice are arguably related to (a) *prospect theory* that people make decisions based on potential gains and losses rather than final outcome, (b) *loss aversion*, that potential losses outweigh potential gains, and (c) *familiarity*, that people favor what is familiar to them (Tversky & Kahneman, 1974, 1991 & 1992; Kahneman & Egan, 2011; Kahneman & Tversky, 2013).

Tversky and Kahneman (1992) list five requirements for an adequate descriptive theory of choice, which deviate assumptions made in traditional rational decision theory: (1) *framing effects*, that variation in framing of options yield systemically different preferences, (2) *nonlinear preferences*, that probability and preference are not always linearly related, (3) *source dependent*, that both the degree and source of uncertainty matters and familiarity is often preferred even if objective risk increases, (4) *risk seeking*, where a small probability of substantial profit or loss is preferable to a modest expected value, and (5) *loss aversion*, that losses loom larger than gains with considerable asymmetry.

METHOD

This chapter explains (a) the framing and research design to answer the research question, (b) the sample selected to fit the research design, (c) the formulation of a hypothetical VC Exit Choice model, based on theory and extrapolated assumptions, and finally (d) the data collection and analysis process leading to the results.

Framing and Research Design

The research question posed by this study is *how VCs choose exit route for startups, which factors they consider and these factors relative importance in the decision*. As the subject of study is a process, with the relevant components and variables uncertain, the approach needs to be explorative and the methodology qualitative. Once a model is constructed and relevant variables identified, the model could be tested with statistical methods in a future study.

In framing the study, the focus is limited to VCs choice between IPOs and M&As, as these choices constitute the most likely and beneficial exit scenario for successful startups with VC funding (Lerner et al, 2009). A distinction is also made between domestic and foreign exits,

since they may have different economic impact consequences and carry different conditions that VCs consider in their exit choice. Furthermore, exit choice is deciding between different processes, which each carry inherently different risks and rewards and varying degrees of uncertainty. The study should thereby examine how VCs assess risk, rewards and uncertainties for each exit alternative and how much comparative importance they place on these factors. Finally, biases in the decision making process should to be identified and their importance understood.

For the purpose of this study, a focus on heuristics would be insufficient. Heuristics are black box solutions, simplifying a more complex set of assessments into an easy to use simple rule of thumb and often incorporates several biases within this black box, and specific for certain context of decisions or even individual organizations (Bingham & Eisenhardt, 2011). The specific nature of heuristics makes comparisons over a larger population problematic, and their black box nature limits us in examining the individual factors, their relative importance and any underlying biases. To isolate the individual factors considered by the VC, and ascertain their relative importance, the decision process needs to be conducted in sequences, to allow variation of the factors considered.

Based on the purpose of this study and theory, the research process is structured into five sequential steps, each with a specific sub-question to clarify the focus of the step. As VCs and entrepreneurs may have divergent interests, it is important to first ascertain to what degree VCs makes exit choices solely or need to compromise. The first sub-question is therefore formulated as: *To what degree does the VC decide alone on exit choice?*

Before exit alternatives can be compared, and a choice made, the pros/cons of each alternative from the VCs perspective should be understood. The second sub-question therefore: *What are the risk/reward factors VCs associate with each exit alternative*? Once the risk/reward factors have been identified, we can move on to understand the relative importance of these factors to the VC, with the third sub-question: *How do VCs compare the aggregated risk/rewards of the exit alternatives?*

Once the comparative importance of factors has been established, the potential influence of biases remains to be investigated to understand to what degree the VC's decision making is objective/subjective and generalizable, with the fourth sub-question: *Which identifiable biases influence the VCs exit choice?* Finally, the last step is to re-examine the hypothesized choice model in light of the findings, with the last fifth sub-question: *What could be an empirically derivable VC's Exit Choice model?*

The sequential structuring of the decision making process, and importance of observation during the process, requires the data collection method to be by interview. Furthermore, as differences in framing of options will effect outcome (Tversky & Kahneman, 1992), the interviews need to be structured so the framing for each respondent is identical. Structured interviews will also allow the interview data to be comparable across interviewees. Deviation from protocol should only occur to ask follow-up questions, if an interviewee answer is vague

or unusual and warrants further explanation (Brinkmann, 2014). Additionally, the subject should be observed during the decision making process, as behavior such as body language and time taken to answer may reveal insights into the cognitive processes of the interviewee.

The role of the interviewer is to ask questions and guide the interviewee through the steps of the structured decision making process, while refraining from providing the interviewee with the factors to consider, thereby minimizing the risk of confirmation bias of the interviewer influencing the interview. This research design is similar to talk-aloud protocol, a version of think-aloud protocol (Van Someren, Barnard & Sandberg, 1994), in that we ask respondents to make decisions and explain their reasoning, with the relaxed requirement that we do not require respondents to speak continuously and they are allowed breaks to think. Finally, due to the sensitive nature of asking VCs to honestly make their decision making processes transparent, and thereby open themselves up to criticism, all interviewees are offered anonymity to facilitate their participation (Opdenakker, 2006).

Sampling
Due to the exploratory nature of the study, the sample was limited to twelve Swedish VCs. As we expected heterogeneity in the sample, and it was unclear what factors were considered by the VCs, it would be premature to go for a large scale hypothesis testing. A limited sample of twelve VCs could however explore which factors were considered, their relative importance and generate a model for future quantitative confirmation. Furthermore, as a previous study has shown that VCs' behavior differ between countries (Berglund, 2011), it would be best to focus on VCs from one country but sample for variety within that countries VC population (Kuzel, 1992). Therefore, the three sampling criteria were that the VCs (a) were traditional venture capitalists, in the sense that they invested other peoples' money and had limited partners they were responsible to, (b) had experience from multiple exits and were familiar with the exit choice decision-making context and (c) were Swedish.

The sample of VCs is shown in Table 1 below with experience and industry focus. To ensure results were generalizable, venture capitalists were selected for variety in that they operate in different investment phases, cover different industries and had different degrees of experience as VCs. If there were generalizable patterns, they should be detectable across all these characteristics of the interviewees. The experience of the VC was ranked in a scale (1= <2 years as VC, 2=2-5 years, 3=6-15 years, 4=16-25 years, 5= >25 years). Industry focus was divided into Bio/Pharma, ICT (Information and Communication Technology) or Generalist.

Table 1: Characteristics of sample VCs, with experience and industry focus

	VC's characteristics	
	Experience (1-5)	Industry focus
VC1	4	Generalist
VC2	5	Generalist
VC3	3	Bio/Pharma
VC4	4	ICT
CV5	3	ICT
VC6	3	Generalist
VC7	4	ICT
VC8	4	ICT
VC9	2	Generalist
VC10	5	Bio/Pharma
VC11	5	Bio/Pharma
VC12	5	Generalist

A hypothetical VC Exit Choice Model

Based on theory, and assumptions extrapolated from theory, a hypothetical VC's Exit Choice Model is constructed to serve as a theoretical baseline from which to formulate the interview protocol. The model is constructed as two parts, *M&A cash out* and *IPO cash out*, with an optimal choice for the VC being to choose whichever of the two exits has the highest expected value, all factors considered. Factors influencing the domestic vs foreign aspects are formulated as separate assumptions, which influence the main parts of the model when applicable.

If the interviewees identify the same factors as contained in the model, the model is to a degree substantiated. If the interviewees fail to mention factors contained in the model, these factors may not be relevant for the VCs decision and could be removed from the model pending further examination. If the interviewees mention factors not previously contained in the model, and these factors are of sufficient importance, the model is amended to integrate these factors. The purpose is to arrive at a model for VC exit choice that can be statistically tested in a future study.

In deciding an exit choice, VCs choose between processes which each have inherently different risks and rewards and varying degrees of uncertainty. The model is thereby formulated as which factors are assumed to be considered in each exit scenario. An M&A is arguably a quicker, more predictable and least uncertain processes, compared to an IPO, since the VCs negotiate an M&A until they reach an agreeable deal. If no agreeable deal is reached, they may withdraw from negotiations and try another negotiation or wait for better circumstances. The inherent uncertainty in M&As should thereby rest in contingency clauses in the contract, where the deal is adjusted post-exit based on event after the agreement is reached. Naturally, there is also the

VC's share of transaction costs for the negotiation and due diligence. The first part of the hypothetical model is thereby formulated as:

> *M&A cash out = (M&A negotiated price) - (contingency clauses) - (share of transaction costs for negotiation and due diligence)*

In comparison, the IPO carries both the risks, costs and efforts of taking the startup public and the post-IPO uncertainty of price fluctuation before the lockup period ends and the VC's has the option to sell their shares. It is therefore reasonable to assume that an IPO should carry a price premium compared an M&A, to compensate for the higher risks, uncertainties and delayed rewards and still be attractive. A price drop would be expected after the lockup period ends, due to increase in supply without are corresponding increase in demand. If the VC sells their share directly after the lockup period ends, the volatility of the shares is a concern. However, if the VC can afford to wait for weeks or months for an optimal time to sell, volatility is less of a concern and the long-term stock market trend is more important.

The volatility and stock market trend need however not be negative to the expected returns of the VC, in an upwards market trend with soaring share prices they may be to the VC's benefit. The delay for the VC in having to wait for the listing process, the lockup period and a suitable time post-lockup to sell shares does however have a depreciating effect, as delayed payments always do, and the VC's IRR and the length of the delay (t) should reflect the level of depreciation. Finally, the VC's share of the transaction costs for the listing process naturally impact. The second part of the hypothetical model is thereby formulated as:

> *IPO cash out = (IPO listing price) – (post-lockup price drop) + (volatility and stock market trend) – ((VC's IRR)*t) - (share of transaction costs for listing process)*

When comparing domestic and foreign exits, it becomes a question of transaction costs and information asymmetries. Domestic exits should generally have lower transactions and less information asymmetry, due to closer spatial and cultural proximity between buyer and seller. To compensate for the greater information asymmetry in foreign M&As, it is arguably likely that contingency clauses are more common and severe in foreign M&As than domestic.

However, it is reasonable to assume that foreign acquisitions on average yield a higher negotiated price, as widening the potential buyers from domestic to foreign increases the population of possible buyers significantly and thereby the a higher likelihood of finding a higher price. There may be specific circumstances where this logical does not hold true, such as Silicon Valley where some of the world's largest tech companies are situated so an acquisitions price may often be the highest there. In some globalized contexts, these overall assumptions may not be true, or the differences negligible, but until disproven we will assume these generalization in formulating the third part of the hypothesis:

> *(domestic contingency clauses) < (foreign contingency clauses)*
> *(domestic share of transaction costs) < (foreign share of transaction costs)*
> *(domestic negotiated M&A price) < (foreign negotiated M&A price)*

A final note on domestic and foreign acquisitions, is that the model presently builds on the assumption of a smaller country like Sweden. For a larger country, such as the USA where individual states are the size of smaller countries like Sweden, the model would substitute domestic and foreign with intra-state and extra-state. In the state case, contingency clauses and transaction costs across states would arguably be low, due to the low internal barriers between states within the country. It is may also be that the negative impact of extra-state acquisitions are different than foreign acquisitions.

In comparing domestic and foreign IPOs, there is an added complexity in comparing stock markets across nations. A foreign stock market arguably entails higher listing costs, but may have a lower volatility, due to larger trading volumes, and more advantageous market trend than the domestic stock market. Furthermore, larger stock markets may have better analyst coverage and thereby higher visibility for listed firms with lower information asymmetry. Thereby, the question is more about the size of the stock market than domesticity of the stock market, as we formulate the last forth part of the hypothesis as:

(small stock exchange transaction costs) < (large stock exchange transaction costs)
(small stock exchange volatility) > (large stock exchange volatility)

The influence of geography and industry on the exit choice are unclear. Some theory indicate they may influence, as context usually matters, but there is no clear indication of how they influence. Geography and industry will be left outside the model as uncertain variables to be examined in the interview to see if any answers emerge. Finally, the IPO bias mentioned in previous studies (Gompers, 1996), that venture capitalists raising new funds may be biased towards IPO due to increased visibility, is for now excluded from the model. This is due to this bias being temporary by its nature and circumstantial for the VC, rather than persistent and circumstantial for the startup. If VCs mention this bias during the interviews, the bias will be integrated into the model. However, if none of the interviewees mention it, it shall remain excluded from the model.

Data collection and analysis
The interview is structured in five parts: (1) introduction, formalities and background check, (2) control for decision maker, (3) sequential decision making, (4) control for firm characteristics and (5) control for self-expressed biases. The protocol is attached in appendix 1. In the first part, interviewees accept recording of the interview, confirm no prior knowledge of the expected results of the study to ensure no priming and summarize their background, to confirm they meet the sampling criteria and provide data on their exit experience. In the second part, interviewees respond to two statements with comments, providing data on SQ1. Direct statements are used, rather than open questions, to minimize the risk of the interviewee avoiding to answer the question and ensuring the answers are comparable across the sample.

 In the third part, the interviewees decide in steps between four exit options, (1) domestic M&A, (2) foreign M&A, (3) domestic IPO and (4) foreign IPO, for a generic startup assumed to be large and successful enough for all four exit options to be feasible. The steps are (a) ranking the four exit options in preference, assuming they have equal expected money on the table, (b)

detailing the pros/cons they associate with each exit option in comparison to the other options and (c) quantifying the additional money on the table required for each exit option, to compensate for the identified risks and uncertainties in each exit option, to make all exit options equally attractive. This last step effectually asks the VCs to assign and motivate their subjective pricing on the risks and uncertainties they've listed. A hypothetical baseline exit price of 100M is assumed for the first choice of the interviewees, a sufficient high price for the interviewees to focus on relative returns (%) rather than final returns ($). The VCs choices, comments and behavior are recorded, providing data for SQ2 and SQ3.

In the fourth part, the interviewees respond to questions if the location and industry of the startup influence the decisions in the previous part. In the final fifth part, interviewees respond to statements and questions on self-expressed biases due to loyalty towards regions or entrepreneurs influence their decisions. The fourth and fifth parts provide data for SQ4. The collected interview data is analyzed to answer the sub-questions, contrasted against theory and used finally used to construct a revised descriptive VC's Exit Choice model.

FINDINGS

The twelve interviewees had a variety of backgrounds within venture capital and experiences before becoming a venture capitalist. Some had never done IPOs, while others had done over a dozen, while all of them had participated in multiple M&A exits. The responses of the interviewees are summarized below for each part of the interview.

Decision maker

All twelve interviewees confirmed, that *'Entrepreneurs are crucial to the success of a startup'* and that *'VCs always want to control the exit decision, and usually get that control'*. A majority of the respondents paused before confirming the second statement. Several interviewees commented that they would not phrase the second statement like that themselves, but it was essentially true in almost all cases. Some took time to explain that it was their job to ensure that they had control of the exit, to safeguard their investment.

Sequential decision making

All twelve interviewees confirmed that the four exit options – domestic M&A, foreign M&A, domestic IPO and foreign IPO - were the most preferable exits. All but one, confirmed that domestic M&A is the most preferable exit followed by foreign M&A, provided all exit options had equal money on the table. The rationale was that a domestic M&As are the most convenient and predictable exit, and a foreign M&A entailed more work, a longer process, carried cultural and legal risks and usually contained more contingency and escrow clauses than a domestic M&A. The single interviewee to diverge in preference order of exit options, preferred foreign M&A over domestic M&A. In that interviewee's experience, foreign M&As had been faster and easier processes than domestic M&As, due to the foreign acquirers being more experienced in acquisitions and therefore managed the acquisition process more efficiently than less experienced domestic acquirers. All interviewees further expressed expectations that a foreign

M&A have a higher negotiated price than a domestic M&A. The interviewees answered without hesitation, as if listing things from memory.

Nine out of twelve interviewees stated the domestic IPO as the third most preferable exit, followed by the foreign IPO, still provided all exit options had equal money on the table.
The remaining three interviewees reversed the order to foreign IPO being preferable to domestic IPO. The primary concern for all interviewees was the lockup period for major investors, effectively postponing their exit upwards a year with continued financial uncertainty. Secondary concerns were the additional work the company and venture capitalists had to do to prepare the startup for going public and performing the listing. The nine interviewees that preferred domestic IPO rationalized this as the foreign IPO having the same risks and uncertainties as a domestic IPO, but with at a greater magnitude.

The three interviewees that preferred foreign IPO, reasoned that the financial risks were lower with the foreign IPO. As foreign stock exchanges are often larger, and thereby have more trade volume, it becomes easier to sell off remaining shares as the lockup period ends which reduces the risk of the firm's stock price falling post-exit due to low trading activity. This same fact was also mentioned by four additional interviewees, although they still preferred the domestic IPO, as the foreign IPO was in their own words '*outside their comfort zone.*' The answers now came slower than earlier in the interview, as if reflecting on IPOs was not as rehearsed and familiar topic as the answers for M&As.

Next, focus shifted to estimate the price increase required to compensate for the disadvantages (risks, uncertainty, extra work, delayed exit, etc) the interviewees had identified with their second to fourth preferred exit choices, in order to make all options equally attractive. This shift was unexpected for all interviewees, and all answered slower from this point onwards, as if the perspective was somewhat new and the answers less rehearsed. The eleven interviewees that preferred the domestic M&A, required 0-20%, with a median of 8%, added price to the foreign acquisition to make it equally attractive to the domestic acquisition. When explaining the added price, the emphasis was on the contingency clauses, not the extra work or risks.
The sole interviewee, whom preferred the foreign M&A, required 10% added price to the domestic M&A as compensation for extra work and contingency clauses.

The added price for IPOs required considerable thought for the interviewees before they answered. The interviewees required 30-100% added price, with a median of 50%, when comparing domestic IPO to their first choice M&A. The primary reason was compensation for delayed exit with continued uncertainties. The additional work, costs and effort with listing was secondary, and only mentioned by some. Furthermore, the interviewees required a 20-125% added price, with a median of 75%, when comparing domestic IPO to their first choice M&A. Three of the interviewees argued that the advantages of listing on a larger stock exchange outweighed the additional transaction costs, with the assumption that a foreign stock exchange was also larger. The remaining nine interviewees preferred domestic IPO, several again mentioning that the foreign IPO was '*outside their comfort zone*'.

Firm characteristics

Nine of the twelve interviewees stated that it did not matter what industry the startup was in for their exit preferences. For the three interviewees that industry mattered, they explained that biotechnology, pharma, medtech and cleantech startups in their opinion were naturally inclined for IPOs, based on two facts. First, these types of startups have longer time to break even, and require large investments to get to break even, but yield stable cash flows once they get there. Thus, there is an acceptance in the stock market to value these types of companies highly, despite often not being profitable at the time of listing. Secondly, private individuals investing in the stock market, not institutions, assign a sentimental value to these types of companies that quote *'save the world from disease and pollution'*, and thereby favor owning shares in them, which drives up price and ensures a minimum trading level in the stocks.

All twelve interviewees acknowledged that it helped considerably if the startup was located in a metro area, with good international access to flights. Two interviewees also stated that it mattered which metro area, as '*some locations are better to grow in than others, so location influences growth which long-term influence exit opportunities'.*

Self-expressed personal biases

None of the interviewees believed that the exit preferences of the entrepreneur was likely to override their exit preferences as VCs. Their opinion as VCs, on which exit route would be the best deal, would decide the exit route. Some interviewees expressed that they were of course always willing to listen to the opinions of the entrepreneur. All of the interviewees confirmed the statement that entrepreneurs generally prefer IPOs and that VCs had a preference for M&As. Some interviewees pointed out that not all entrepreneurs prefer IPOs, but none contradicted that they as VCs had a preference for M&As.

When asked if they would accept a slightly less profitable exit, if it made the entrepreneur happy, five of the interviewees stated they would not. Their rationale was that they were obligated to their limited partners to profit maximize. The remaining seven interviewees were willing to compromise on exit price to keep the entrepreneur content, but diverge in the extent and rationale. Five would give up 0.1-3% of the exit price as a pragmatic *'operational insurance'.* An unhappy entrepreneur could cause problems for the VC and make an acquisition process harder, so it was worth something to keep the entrepreneur content. The remaining two interviewees were willing to give up 5-10% of the exit price, based on moral obligation. They reasoned that without the entrepreneur there would never have been a startup. Keeping the entrepreneur happy was also long-term a good business practice, as a happy entrepreneur spreads good word-of-mouth and is open to do business again in the future.

Last question was if the VCs would accept a slightly less profitable exit, if it meant a domestic exit and thereby increasing the startup remaining locally long-term. Eight of interviewees answered that they would not, citing their obligation to their limited partners to profit maximize. Four interviewees said they would, in the range of 5-10% on the exit price. One of these four interviewees explained his decision in the following manner, summarizing the sentiment of all four adequately: '*In my early career I did not have this opinion, but a deal a few years back*

changed my opinion. We sold a medtech company to a foreign acquirer and as part of the deal they promised to keep operations going here in the region. However, a few years later there was no trace left of the company in the region, so they negated on that promise. This experience changed my perception, and since I represent [a VC funded to a large extent by public capital] I believe our general and limited partners would agree with me on this issue'.

The interviews lasted 35-90 minutes, with a mean of 60 minutes. Findings are summarized in two tables in appendix 2, divided into (a) factors considered by the VC in their exit decision and (b) price thresholds and self-expressed biases, presented with VCs characteristics divided into experience (1-5) and industry focus.

DISCUSSION AND ANALYSIS

Next, we go over each interview step and analyze the findings related to the formulated sub-questions and discussing how it supports, contradicts and/or complements existing theory.

To what degree does the VC decide alone on exit choice?

All interviewed VCs were consistent in the opinion that the VC, or the VCs in a syndication, decide on exit by themselves. Some would compromise slightly on the exit price, maximum 10%, to keep the entrepreneur happy. This supports earlier venture capital studies (Kaplan & Strömberg, 2003; Cumming, 2008; Cumming & Johan, 2008) and limits the validity of entrepreneurial exit theory on exit choice to entrepreneurs without venture capital (DeTienne & Cardon, 2012; DeTienne & Chirico, 2013; Ajzen 1991; Gomez-Mejia et al. 2011).

What are the risk/reward factors VCs associate with each exit alternative?

The interviewed VCs cite similar, if not identical, factors associated with each exit choice, but diverge in their opinion of the importance of the factors. For M&A, the contingency clauses were primary concerns with transaction costs as a secondary concerns. For IPOs, the crucial factor was the lockup period, followed by volatility/trend and transaction costs. This is consistent venture capital theory on exits (Gompers, 1999; Chen and Ritter, 2000; Bradley & Roten, 2001; Brau et al, 2003, De Clerq et al. 2006; Lerner el al, 2012), and extends this theory by highlighting the importance of contingency clauses in M&As, which has been previously gone mostly unmentioned.

Furthermore, the differences between domestic and foreign IPOs were redefined by the VCs as the difference between large and small stock exchanges, equating domestic with small and foreign with large. The important difference was the larger volume of trades and lower volatility the VCs perceived with larger stock exchanges, that enables easier selling of stock. Previous exit studies on IPOs have almost exclusively studied larger stock exchanges (Lerner et al, 2009; Brau et al, 2003; Bradley & Roten, 2001; Chen and Ritter, 2000), leaving the alternative of listing startups on smaller stock exchange a mostly unexplored exit route. The relative importance of smaller stock exchanges to venture capitalists and entrepreneurs, and the degree

to which they are rightfully or wrongly neglected due to their limited trading volumes, is an interesting topic for future studies.

Most VCs did not believe industry mattered to the exit, although a minority held the opinion that startups in bio, pharma, medtech and cleanteach industries were more inclined to go public. The reasons they offered, that startups in these industries are attractively valued due to investors' appreciation of their late but reliable revenue streams but also the sentimental value of societal impact beyond mere economics, are not obvious from past literature. It raises the question to which degree investors on stock exchanges are more long-term, and holistic in looking past mere financials, in their investment strategy than present financial theory indicates.

How do VCs compare the aggregated risk/rewards between the exit options?
The interviewed VCs diverged in the subjective pricing of risk and uncertainty in primarily IPOs, as can be seen below in Table 2. The level of divergence in assessment is surprising, that the same factors are considered but the importance placed on them varied so much.

Table 2: VC's comparative assessment of exit alternatives in exit choice

VC's comparative assessment of exit alternatives	Domestic M&A	Foreign M&A	Domestic IPO	Foreign IPO
Price increase to compensate for risks, mean	1%	8%	49%	66%
Price increase to compensate for risks, median	0%	8%	50%	75%
Price increase to compensate for risks, min/max	0-10%	0-20%	30-100%	20-125%

There was no clear connection between experience, industry focus and subjective pricing, implying that assessments are more influenced by individual values and personality of the VC, than a result of their professional characteristics as VC. Prior studies have shown operational differences between VCs in different countries and VCs with different backgrounds (Berglund, 2011), but the extent of divergence implies a heterogeneity in VCs' business practices that is larger than previously recognized.

Furthermore, the relatively low threshold to M&A, and high threshold to IPOs, provide a plausible explanation to the overrepresentation of M&As compared IPOs in exit statistics (Lerner et al, 2009). Since IPOs historically have provided a 22% price valuation premium over M&As (Brau et al, 2003), but this price premium is considerably below the 50% and 75% median price thresholds stated by most of the VCs in this study. What would explain this high threshold, which may seem unrealistic to achieve? The VC's answer that reoccurred repeatedly was that IPOs was '*outside of their comfort zone*', which is directly linked to the behavioral finance concept of *familiarity*. A likely explanation could be that the VCs unfamiliar with IPOs, since they had no personal experience of it, were hesitant to exit by IPO. However, if this was

the entire answer, why was did some VCs with prior IPO experience and good outcomes, still set a high subjective price threshold on IPOs?

The '*outside of their comfort zone*' comment was several times mentioned while talking about the uncertainty of what happens to the share price during the lockup period. In this context, some VCs referred to factors outside of their control. An alternative interpretation is thereby that the VC is not comfortable with leaving the final share price and exit value to be decided by the stock market. People naturally prefer uncertainties they believe they can influence, over uncertainties they cannot control the outcome of. Furthermore, the VCs consistently reference the risk of the share price dropping after exit. This fixation on potential downside is textbook *loss aversion*, as potential loss loom larger than potential gains (Tversky & Kahneman, 1991). Previous studies have shown a cumulative effect as uncertainties magnify each other (Tversky & Kahneman, 1992), thus our interpretation is that *unfamiliarity*, *lack of control* and *loss aversion* act as cumulative factors in an expressed *IPO aversion* among VCs.

This raises the question if the IPO aversion is considerable or negligible. To determine this, we require a theoretical approximation of a reasonable IPO price threshold to compare with. Assuming (a) a 4% post-lockup price drop based on historical averages (Bradley & Roten, 2001), (b) an actual VC ROI of 20% (Elango et al, 1995) with a delay of upwards a year from IPO before finding an optimal time to sell to counter volatility, (c) a neutral market trend during this year, with neither positive nor negative effect on price, and (d) a trickle down of 2% to the VC of the total 7% costs of going public (Chen and Ritter, 2000), we would arrive at a 26% threshold of required price premium. This 26% threshold closely resembles the 22% actual premium for IPOs in previous studies (Brau et al, 2003). This theoretical threshold is considerably lower than the 50% and 75% medians found in this study, so there is valid argument to be made for the *IPO aversion* being not just considerable, but even excessive. The high *IPO aversion* could also be interpreted as a limited expression of *risk seeking* (Tversky & Kahneman, 1992) as a very high reward is required to compensate for risking a downside to an already positive expected exit price value.

Which expressed biases influence the VCs exit choice?

In addition to the *IPO aversion* just discussed, two self-expressed biases were included in the interview, discounting to keep the entrepreneur happy and discounting for a domestic exit, as summarized as entrepreneur bias and domestic bias in Table 3 below.

Table 3: Swedish VC's self-expressed biases in exit choice

VC's self-expressed biases	Entrepreneur bias	Domestic bias
Discount on exit price due to bias, mean	2%	3%
Discount on exit price due to bias, median	2%	0%
Discount on exit price, variation	0-10%	0-10%

Since the profit maximization goal for VCs is often contractually binding (Lerner et al, 2012), it was noteworthy to hear these biases confessed. Arguably the confession of the biases may have been facilitated by the anonymity promised to the interviewees. These self-confesses biases were only admitted by a minority of the VCs and the discount range was considerable. These facts confirms the divergence and heterogeneity in VCs business practices previously recognized in literature (Berglund, 2011). An extended study could confirm if these biases are an anomaly specific for Swedish VCs or a more generalized pattern among a minority of VCs. The IPO bias related to the VCs raising fund (Gompers, 1996) was never mentioned by any of the interviewees, indicating that it may be a bias specific for US VC's, of limited influence, of a temporary nature and/or sensitive to the VCs to mention.

What is an empirically derived descriptive VC's Exit Choice model?
The hypothetical Exit Choice model was supported, in that all of the included variables were confirmed as relevant by the interviewed VCs. Of the identified three biases, IPO aversion, entrepreneur bias and domestic bias, only the IPO aversion is judged to be large and common enough to be incorporated in the model for future statistical testing. Furthermore, the IPO aversion is comprised of three factors, (1) unfamiliarity, (2) lack of control and (3) loss aversion, with each of these factors varying on an individual basis and act cumulatively to magnify each other. The revised model is seen below, as proposed descriptive VC Exit Choice instead of hypothetical VC Exit Choice.

M&A cash out = (M&A negotiated price) - (contingency clauses) - (share of transaction costs for negotiation and due diligence)

*IPO cash out = (IPO listing price) – (post-lockup price drop) + (volatility and stock market trend) - ((VC's IRR)*t) - (Share of transaction costs for listing process) - (**IPO aversion**)*

IPO aversion = (IPO unfamiliarity)* (lack of control) * (loss aversion)

(domestic contingency clauses) < (foreign contingency clauses)
(domestic share of transaction costs) < (foreign share of transaction costs)
(domestic negotiated M&A price) < (foreign negotiated M&A price)
(small stock exchange transaction costs) < (large stock exchange transaction costs)
(small stock exchange volatility) > (large stock exchange volatility)

The proposed model above meets the requirements Tversky and Kahneman's (1992) list for an adequate descriptive theory of choice model, and can as next step be statistically validated with a larger sample. An important limitation of the VC Exit Choice model is that it presently has the perspective of a smaller country. For a larger country, such as the USA, the model would substitute domestic and foreign for intra-state and extra-state, with expectations of lower contingency clauses and transaction costs intra-state that domestically.

CONCLUSIONS

This study examined how venture capitalists make exit choice for startups, which factors they consider and their relative importance. Conclusions are that the VCs alone decides on exit, overriding entrepreneurs if required, with a strong M&A preference and IPO aversion. The VC's exit choice is based on a set of factors focused on perceived profit maximization. However, indications are that the IPO aversion makes VCs overcautious towards IPOs, which may limit potential earnings. An empirically derived model is proposed for VC's Exit Choice, for future statistical testing. Conclusions offer an explanation to the overrepresentation of M&As among VC-funded startups (Lerner et al, 2009).

Implications for policy are significant. If VC's make startup exit choice alone, with a strong M&A preference and IPO aversion coupled with a low threshold to foreign M&As, then existing policies promoting venture capital may be pushing startups towards foreign acquisitions rather IPOs. These policies would thereby be counterproductive to recent studies documenting the possible detrimental impact of foreign acquisitions (Hogan et al, 2018) compared to the inclusive impact of IPOs (Mason & Brown, 2014).

Implications for practitioners are important. If VC's make overcautious exit decisions, shying away from potentially superior earnings of IPO exits due to IPO aversion, limited partners of the VCs and other shareholders in the startups, such as entrepreneurs and angels, should be concerned that their potential earnings are reduced. These implications may be specific for Sweden, but arguably there should be generalizable for VCs in more countries.

Future research should substantiate the findings of this study, qualitatively and quantitatively, on an international level. The proposed descriptive model for VC Exit Choice theoretically meets the requirements posed by Tversky and Kahneman's (1992) for an adequate descriptive theory of choice model, and can as next step be statistically validated with a larger sample.

Furthermore, conducting additional qualitative interview studies on other startup investors, such as angel investors and private equity investors, would deepen our understanding of how specific the identified biases are for VCs or if they are general for all startup investors. As the VCs have strict investment procedures to follow, and are accountable to limited partners, angel investors that invest their own money are in comparison free to do as they want. This should arguably give rise to different biases, as angel investors can allow themselves to be more sentimental and less bound to strict profit maximization, as well as open for more risk seeking and less IPO aversion.

Additionally, findings that firms in different industries may be pre-disposed towards certain exits, based on their life cycle, specific industry dynamics and impact beyond mere financials, are interesting avenues for future studies. If proven correct, it would add a new dimension to firm life cycle theory with important implications for industry-specific policies. Finally, the heterogeneity in decision making shown by this study among the VCs in the Swedish VC, highlight the high degree of heterogeneity in the population scholars refer to as VCs. It may be

that prior venture capital studies have overgeneralized how similar VCs act in different settings, and future studies should be more sensitive to how contextually bound results are.

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APPENDIX 1: INTERVIEW PROTOCOL FOR VC INTERVIEWS

Interview protocol for VCs exit choice inteview		
I Introduction, formalities and background check	Answer type	Purpose
1 Do I have your acceptance to recording interview, after promise of anonymity?	Yes/No	Verify recording and anonymity
2 Have you heard about my research before?	Yes/No	Verify no priming pre-interview
3 Occupation today?	Comments	Background and verify sample criteria
4 Background in startup ecosystem?	Comments	Background and verify sample criteria
5 Years in the local startup ecosystem?	Comments	Background and verify sample criteria
6 Do you have experience of making and/or participating in multiple exit decisions?	Yes/No, no of exits	Background and verify sample criteria
II Control for decision maker	Answer type	Purpose
7 "Entrepreneurs are crucial to the success of a startup" - True or false?	True/False, comments	Preparing for next question
8 "VCs always want to control the exit decision, and usually get that control" - True or false?	True/False, comments	Verify who makes actual exit decision
III Sequential decision making	Answer type	Purpose
9 Are the four most attractive exit options: domestic M&A, foreign M&A, domestic IPO and foreign IPO?	Yes/No, comments	Verify four options
10 If the exit price was similar for all four options, which would you prefer?	Choice of 4 options	Ranking first options in preference
11 What are the pros and cons of this choice, over the other exit options?	Comments	Motivating first preference choice
12 From the remaining three options, which would you prefer next?	Choice of 3 options	Ranking second options in preference
13 What are the pros and cons of this choice, over the other exit options?	Comments	Motivating second preference choice
14 From the remaining two options, which would you prefer next?	Choice of 2 options	Ranking third options in preference
15 What are the pros and cons of this choice, over the other exit option?	Comments	Motivating third preference choice
16 What are the pros and cons of the last option, compared to the other options already chosen?	Comments	Motivating fourth preference choice
In the previous questions, the expected price (reward) was equal for all four options.		
Now we ask for the price increase required to make all options equally attractive, establishing thresholds.		
17 How much price increase, in %, is required to make the second option equally attractive to the first option?	%	Establish first threshold %
18 How do you motivate this price increase threshold?	Comments	Motivating threshold %
19 How much price increase, in %, is required to make the third option equally attractive to the first option?	%	Establish second threshold %
20 How do you motivate this price increase threshold?	Comments	Motivating threshold %
21 How much price increase, in %, is required to make the fourth option equally attractive to the first option?	%	Establish third threshold %
22 How do you motivate this price increase threshold?	Comments	Motivating threshold %
IV Control for firm charachteristics	Answer type	Purpose
23 Would it matter what industry the startup was in?	Comments	Checking for influence of industry
24 Would it matter where the startup was located?	Comments	Checking for influence of geography
V Control for self-expressed personal biases	Answer type	Purpose
25 Would the preferences of the entrepreneur override this analysis?	Comments	Checking for bias
26 "Entrepreneurs prefer IPOs, while VCs prefer acquisitions" - True or false?	True/False, comments	Checking for bias
27 Would you leave money on the table in choosing an exit that makes the entrepreneur happy?	Yes/No, comments	Checking for bias
28 If yes, how much in % and why?	%, comments	Quantifying extent of bias in %
29 Would you leave money on the table in choosing a local exit, even if a foreign exit was more profitable?	Yes/No, comments	Checking for bias
30 If yes, how much in % and why?	%, comments	Quantifying extent of bias in %
End of interview. Thank the interviewee for his/her time.		

Appendix 2: Summarized findings of VC interviews

Table 4: Indicators validated or not in the VC interviews

Factors considered	Decision maker	Domestic M&A factors		Foreign M&A factors		Domestic IPO factors			Foreign IPO factors			Startup characteristics		Assumptions testing				
	VC sole decision	Contingencies	Transaction costs	Contingencies	Transaction costs	Transaction costs	Lockup	Volatility/Trend	Transaction costs	Lockup	Volatility/Trend	Geography	Industry	D:CC<F:CC	D:TC<F:TC	D:NP<F:NP	SSE:TC<LSE:TC	SSE:Vol>LSE:Vol
VC1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0
VC2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
VC3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
VC4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CV5	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
VC6	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0
VC7	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
VC8	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1
VC9	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
VC10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
VC11	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
VC12	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0
Validation indication	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,17	0,58	1,00	1,00	1,00	1,00	0,58

Note: In assumptions testing, abbreviations mean the following ; D:CC<F:CC = Domestic Contingency Clauses < Foreign Contingency Clauses; D:TC<F:TC = Domestic Transactions Costs < Foreign Transactions Costs; D:NP<F:NP = Domestic Negotiated Price < Foreign Negotiated Price; SSE:TC<LSE:TC = Small Stock Exchange Transaction Costs < Large Stock Exchange Transaction Costs; SSE:Vol>LSE:Vol = Small Stock Exchange Volatility < Large Stock Exchange Volatility.

Table 5: Exit price thresholds established in the interviews and VC's charcteristics

Exit price thresholds	M&A		IPO		Self-expressed biases		VCs characteristics	
	Domestic	Foreign	Domestic	Foreign	Entreneur bias	Domestic bias	Experience (1-5)	Industry focus
VC1	0%	20%	50%	75%	0%	0%	4	Generalist
VC2	0%	15%	50%	25%	0%	0%	5	Generalist
VC3	0%	5%	75%	75%	0%	0%	3	Bio/Pharma
VC4	0%	20%	50%	75%	10%	0%	4	ICT
CV5	0%	10%	30%	20%	5%	10%	3	ICT
VC6	10%	0%	50%	100%	3%	6%	3	Generalist
VC7	0%	8%	100%	125%	0%	0%	4	ICT
VC8	0%	0%	30%	50%	3%	0%	4	ICT
VC9	0%	3%	50%	75%	3%	0%	2	Generalist
VC10	0%	0%	40%	100%	0%	0%	5	Bio/Pharma
VC11	0%	1%	30%	20%	0.1%	1%	5	Bio/Pharma
VC12	0%	15%	30%	50%	2%	5%	5	Generalist
Mean	1%	8%	49%	66%	2%	2%		
Median	0%	8%	50%	75%	2%	0%		
Min	0%	0%	30%	20%	0%	0%		
Max	10%	20%	100%	125%	10%	10%		

Paper IV

Startup exits and the evolution of entrepreneurial ecosystems:
Exploring divergent paths

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Abstract

This study conceptualizes entrepreneurial ecosystems (EEs) as a circular three layer system with startup exits driving its evolution. Using interviews with EE veterans, we map expected post-exit behavior of the four participatory agents in an EE - entrepreneurs, business angels, venture capitalists and key employees. Findings support the circular three layer EE concept and provide insights into the mechanics of role transitions dependent on financial exit success. Policy implications are significant; growing entrepreneurial ecosystems requires successful exits. Without successful exits, it is only a matter of time until ecosystems stagnate and depopulate.

Furthermore, the binary post-exit continuation of VCs imply that policies aimed at bridging early stage funding gaps with early stage VCs may only be temporary solutions. Recommended future empirical research is to compare expected and actual post-exit behavior, ascertain generalizability across EEs, study connections between startup exits and EE inflow, non-nascent agent role transitions and correlations between agent transitions and investments. Additionally, we propose utilizing agent-based modeling and simulation (ABMS) and system dynamics modeling (SD) to understand the critical conditions of evolutionary processes of entrepreneurial ecosystems.

Introduction

Research in entrepreneurship has begun to broaden its focus from entrepreneur- or venture-centric explanations to entrepreneurial ecosystems that engender explicit interdependencies of market and business processes. As the notions of entrepreneurship ecosystem (Isenberg, 2010) and start-up community (Feld, 2012) gained popularity in entrepreneurial practice, academics have sought to explicate their relational basis (Spigel, 2017), underlying processes (Spigel & Harrison, 2018) and levers of governance (Autio & Levie, 2017). So far, these models have been necessarily static, describing the building blocks and interactions that constitute an ecosystem. As startups are by their nature 'ongoing journeys' (Garud et al, 2018) and the question of ecosystem resilience arises (Roundy et al, 2017), so does the need to understand the evolutionary process of the ecosystem. Recent work has begun exploring different ways of mapping the interacting elements of an ecosystem, with a view of understanding and harnessing its complexity (Talmar et al, in press).

A well-functioning entrepreneurial ecosystem produces numerous startups with varying degrees of survival and success. Successful startups eventually exit through mergers and acquisitions or initial public offerings (Cumming & MacIntosh, 2003). Exits act as catalysts for further entrepreneurial activity (Stuart & Sorenson, 2003), releasing resources previously bound in the startup, such as capital, talent, expertise, and networks, to flow back into the ecosystem. As the individuals returning to the ecosystem gain experience, they may transition to new roles within it. Successful entrepreneurs become serial entrepreneurs or business angels; business angels become venture capitalists; and key employees become entrepreneurs. Within such a positive feedback loop, success becomes self-reinforcing and as the reputation of the entrepreneurial ecosystem grows, it attracts new entrepreneurs, investors and talent. In contrast, along a negative feedback loop, an ecosystem that does not produce enough successful startups with profitable exits will eventually cause the entrepreneurs, investors and talent to pursue other career paths or move to other ecosystems. This naturally raises an important question: how do ecosystems settle on one or the other evolutionary trajectory?

To explore this question, we develop a conception of an entrepreneurial ecosystem as a circular three layer system seen in Figure 1. The core of the ecosystem are startup firms (layer 1). Surrounding them is a community of four active types of agents who participate in developing the startups: entrepreneurs, business angels, venture capitalists and key employees (layer 2). The outermost layer is a broader support community, consisting of the regional workforce and the institutions such as universities, agencies, incubators/accelerators and professional networks that sustain and anchor the ecosystem in the surrounding region (layer 3). The engine of the ecosystem are the startups in conjunction with their directly participating agents. We consider how their success (or failure) shapes the evolution trajectory of the ecosystem via the transitions it triggers into, away from, and across participatory roles. In turn, the broader support community influences the conditions for success for the startups.
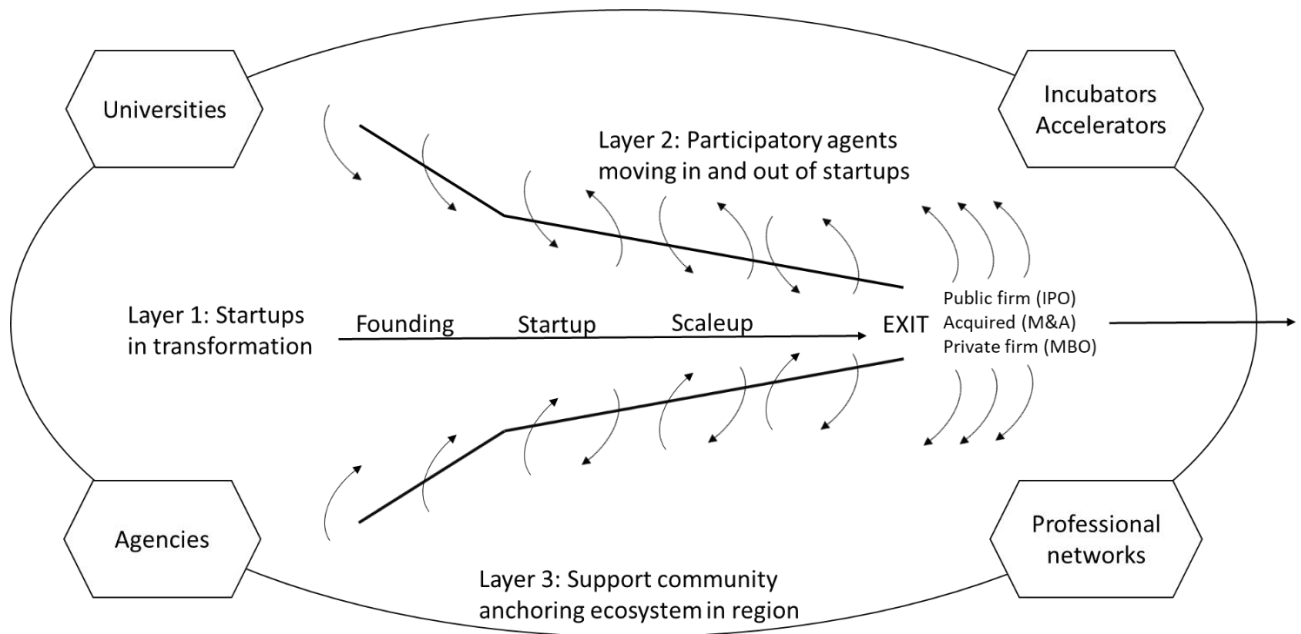
Figure 1: Entrepreneurial Ecosystem (EE) as a circular three layer system

Viewed in a dynamic sense, our conception focuses attention on the continuous flow of people and resources between the layers of the ecosystem, with startup exits, successes and failures, acting as catalysts to such flow. We thus argue that exits drive the evolution of the participatory agents in an ecosystem and the aggregated evolution of the agents drives the evolution of the ecosystem. Successful exits should thereby result in a growth trajectory for the ecosystem, while failed exits result in stagnation and eventual decline. As such, the paper takes a first step in mapping the mechanism of role transitions of the participatory agents, as dependent on the level of financial success of the startup exit. Doing so can serve as a stepping stone to understanding the causal connections and feedback loops of the ecosystem itself, and in extension how interventions can alter the development trajectory of an ecosystems.

Theory

Wider interest in entrepreneurship rests on interdependence with economic growth and regional development (Bathelt et al, 2004; Audretsch et al, 2006; Acs, 2008; Acs et al, 2009). The quest for understanding why entrepreneurship and growth flourish in some regions, but not others, has led scholars to combine perspectives from regional development, strategic management and entrepreneurship into the holistic notion of Entrepreneurial Ecosystem (EE) as a locus of explanation (Acs et al, 2017; Autio et al, 2014; Malerba & McKelvey, 2018; Spigel, 2017). An entrepreneurial ecosystem pertains to the "actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region" (Spilling, 1996: 91). As such, it shapes entrepreneurial opportunities through its cultural, material and social attributes (Spigel & Harrison, 2018) and acts as an enabling force for the venturing efforts of entrepreneurs (Isenberg, 2016; Roundy et al., 2018).

The development of EEs as a distinct research stream rests on descriptions of their key aspects such as the startup community (Feld, 2012), connection to policy (Mason & Brown, 2014; Stam, 2015; Brown & Mason, 2017), governance (Autio & Levie, 2017), education (Regele & Neck, 2012) and regional relationships (Spigel, 2017; Capozza et al, 2018). As a clear static picture has emerged of what an ecosystem is, the next research hurdle pertains to understanding its dynamics and resilience. This is evident in the recent empirical and conceptual attempts to capture the evolutionary mechanics of EEs (Simmie & Martin, 2010; Martin, 2011; Williams & Vorley, 2014; Motoyama & Watkins, 2014; Boschma, 2015; Mack & Mayer 2016, Alvedalen and Boschma, 2017; Roundy et al, 2017; Stam & Spigel, 2017). One of the reasons this has remained an elusive task is the lack of specification for the feedback loops of the system, i.e. the recursive links among successive cohorts of venturing efforts. This is a key component to any dynamic system.

Ecosystem dynamics
Fundamental to the understanding of a system and its dynamics is the holistic structure of its elements and the feedback loops that reflect how these elements interact over time to determine the performance of the system (Senge, 1990). Systems thinking entails emphasis on wholes and interrelationships, rather than individual things. Thus, when we seek to understand the development of a new venture, we highlight individual elements such as founders, key team members, and early investors, and we take these for granted. In well-developed entrepreneurial ecosystems, they simply exist. It is when we consider under-developed or non-existent ecosystems that we wish to develop – a key goals of current policies for promoting entrepreneurship – the issues of where entrepreneurs, key team members and investors come from and how long they remain active come to the fore.

From a systemic perspective, the entrepreneurial vibrancy of an organization or region depends on the availability and circulation of ideas, talent, and capital (Hamel, 1999). Ideas need to be connected with enterprising individuals to be taken forward, as reflected in the notion of individual-opportunity nexus (Venkataraman, 1997). In turn, capital needs to be channeled through specialized intermediaries, such venture capital firms or business angels, in order to deal with the issues of uncertainty and information asymmetry that permeate the early stages of entrepreneurial development (Amit, Brander & Zott, 1998; Sahlman, 1990). Finally, we also know that the development of new ventures depends on human capital and thus the attraction of key talent (Bruderl et al., 1992; Davidsson & Honig, 2003).

In this sense, ecosystems use external pipelines to import resources not locally available (Bathelt et al, 2004). We expand on this to conceptualize EEs themselves as a pipelines, transforming capital and talent into startups. Adopting a view of EEs as pipelines, raises the question of the mechanics for people and resources leaving and returning to the EE. Successful startups eventually exit through mergers and acquisitions (M&As) or Initial Public Offerings (IPOs) and in cases of less success entrepreneurs may buy out their investors (MBO) (Cumming & MacIntosh, 2003). Acting as powerful signals, IPOs and M&As lead to increased founding rates of new startups in the region, by motivating new individuals to pursue opportunities and

releasing the resources previously bound in the exited startups to go into the founding of new startups (Stuart & Sorenson, 2003). Exits occur with some regularity, as investors such as venture capitalists require liquidity within certain timeframes and therefore hold their equity stakes in startups only for an average of five years (Cochrane, 2005; Sahlman, 1990).

Case studies of post-exit development of startups reveal examples of nascent entrepreneurs becoming not only serial entrepreneurs but also business angels and venture capitalists (Mason & Harrison, 2006). In this sense, entrepreneurial recycling, where entrepreneurs return to the ecosystem, is inherently tied to the startup exits (Mason & Brown, 2014). However, the mechanics of (1) how and in what role people return to the ecosystem; and (2) how these relate to startup exits are still unknown. Indeed, the entrepreneurial exit literature (DeTienne, 2010, Stam et al; 2010; Wennberg et al, 2010; Wennberg & DeTienne, 2014) provides some answers in terms of how and why entrepreneurs leave the firms they create, but has yet to explore extensively what they do post-exit.

There is nevertheless evidence that they do return to the ecosystem even after negative exits (Jenkins & McKelvie, 2017), suggesting a need to look closer at this feedback loop. Entrepreneurs depend for their success on the resources and productive efforts of other agents such as business angels (BAs), venture capitalists (VCs) and key team members who join post-founding as the startup grows (Feld, 2012; Meglio et al, 2017). Therefore, from an EE perspective, understanding the transitioning to the next cohort of startup efforts should focus on the systemic recycling of all four key participants in the development of startups. Furthermore, given the combinatorial multiplicity of successive roles among returning participants, there is a need to explain what type of exit triggers what type of transition among the four key participants.

EE as a circular three-layer system
Career transition cycles in organizational theory suggest that individuals' transition between roles over a career is influenced by the norms in their environment and the individual's chronological age, professional age, success rate, self-reflection and –later in life – their interest in generativity (Super et al 1957; Erikson, 1968; Levinson et al, 1978). Voluntary role transitions originate from precipitating events leading to an escalation of doubts, with seeking and weighing alternatives while reexamining one's identity, until a turning point event facilitates the transition into a new role (Ashforth, 2000). Resources, transferability of skills and interests of the individual predict the alternatives that are considered (Ebaugh & Ebaugh, 1988). Previous longitudinal studies have shown the importance of financial motivations to the success of nascent entrepreneurs (Cassar, 2007). Applying these insights to the context of EE suggests that financially more successful startups exits should lead to different post-exit role transitions than less successful exits.

Synthesizing these insights from the literature on venture capital exits, entrepreneurial recycling/exits and role transitions in the context of EE, we conceptualize an EE as a circular three-layer system (as shown in Figure 1). The core or the driving engine of the ecosystem are the startup firms, with an inflow of ideas, capital and talent from the surrounding ecosystem

and exits triggering outflows back into the ecosystem. To use a visual metaphor of playground slide, this is tantamount to ideas, talent and capital coming together to go down the (entrepreneurial) slide, with the options – once coming through – of climbing back up to have another go or moving on to something else. This is the first or innermost layer of the system.

Queueing up to go down the slide are four types of agents who participate in developing the startups: entrepreneurs, business angels, venture capitalists and key employees. They represent the second layer of the system. The key dynamic at this layer are the decisions that these agents make as to their further participation in startup processes. They can decide to have another go – i.e. return to the first layer – or leave, i.e. move on to something else. If they return to the first layer to lead or support another start-up effort, they can do so in the same role (entrepreneur, business angel, venture capitalist, key employee) or in a different role. These decisions represent a feedback loop that connects the two layers in a recursive sense, in that the output of one becomes the input of others, in multiple iterations of the systemic process over time.

There is a strong intuition from the extant literature that these feedback loops are important and real. Yet, because they have been developed in a piecemeal, fragmented sense – residing in different fields of research – this has prevented their systemic synthesis. For instance, venture capital firms' abilities to raise a new fund depends on their successful track record, driven by prominent exits (Gompers & Lerner, 1999; 2001; 2004). A longitudinal study of the US VC industry, showed that a significant number of VC firms become inactive over time and new VC firms appear all the time (Dimov & Martin de Holan, 2004). In turn, successful VC firms develop reputation and status that attract entrepreneurs (Sorenson & Stuart, 2000) and co-investors (Podolny, 2001). The background of venture capitalists, particularly having prior entrepreneurial experience, matters for their ability to support investments to successful exits (Dimov & Shepherd, 2005). The broad intuition here is that entries and exits are intrinsic parts of the ecosystem dynamics.

The third, outermost layer is a broader support community, consisting of the regional workforce and the institutions that sustain and anchor the ecosystem in the surrounding region. The availability of talent is entwined with the formative role of universities and the experience provided by other organizations. In turn, the context of these organizations plays an important role in shaping the transition of its members to entrepreneurship (Dobrev & Barnett, 2005). Furthermore, entrepreneurial skills and network connections are facilitated by the incubators, accelerators and other support institutions (Cohen, 2013; Cohen & Hochberg, 2014; Bliemel et al, 2019). Finally, tax policies and regulations can have a significant impact on the supply of business angels and venture capitalists. For instance, the SBIC program of the late 1950s encouraged the formation of venture capital firms, while the pension regulation reforms of the late 1970s in the USA created the conditions for the supply of capital to venture capital firms (Gompers & Lerner, 2001). Similarly, section 1244 of the Inland Revenue Code introduced in the late 1950s enabled losses on investments in small businesses to be written off against income tax liabilities. The HMRC in the UK, through its Enterprise and Seed Enterprise Investment Schemes (EIS and SEIS) provides a strong incentive for business angel investment.

Having outlined the layers and interconnections of an entrepreneurial system, our next task is to gather empirical evidence that can (1) reaffirm the identified feedback loops and (2) provide some estimates of the transition probabilities associated with the decisions of key agents to enable further exploration of the ecosystem dynamics. This represents the first of a three-step approach to addressing the question of ecosystem evolution as a result of startup exits and associated role transitions. It will feed into a future second step, which will investigate the generalizability of expected agent behavior across ecosystems. A further, third step will develop an agent-based computational model of ecosystem evolution, anchoring the transitions of participatory agents in the qualitative insights developed here. Such a computational approach enables us to explore alternative evolutionary histories in lieu of the daunting task of tracking all the agents in existing ecosystems over time.

Method

The goal for the empirical part of this paper is to develop a qualitative sense of the post-exit behavior of the participatory agents of an ecosystem. We focus on the Swedish entrepreneurial ecosystem due to its sufficient maturity and comparability to other established ecosystems. The first Swedish venture capital firm was established in 1973 and the entrepreneurial ecosystem has evolved through four decades of startup activity to become relatively stable and mature (Lerner & Tåg, 2013; Karaomerlioglu & Jacobsson, 2000; Isaksson, 1998). Startups with well-known brands which originate from Sweden are for example Skype, Klarna, Spotify, Mojang with MineCraft and King with Candy Crush. Sweden provides a European baseline for future comparisons to other ecosystems, being successful enough to merit investigation while smaller in scale and thereby easier to relate to than Silicon Valley.

We recognize that some may find it contention to refer to the Swedish EE, as Sweden is a national level rather than regional or metropolitan where EEs are often expected to operate (Audretsch & Belitski, 2017), and there is ambiguity as to 'where an ecosystem starts and where it ends' (Ahokangas et al, 2018). However, we adopt the socio-cultural perspective that the shared community marks the boundaries of the ecosystem (O'Connor et al, 2018; Acs et al, 2017). In the case of Sweden, professionals can easily transfer between the three major startup hubs in Sweden – Stockholm, Göteborg and Malmö/Lund – with a transit time of 2-4 hours (Eriksson & Rataj, 2019). Business angels and venture capitalists invest across all three hubs, while entrepreneurs and employees may transfer between the hubs when engaging in new ventures, and the community often refers to itself as the 'Swedish' startup community. Further substantiating these insights, the interview answers in this study were remarkably similar, regardless which hub the interviewee was from, reinforcing that the similarities across the three hubs are far greater than the dissimilarities.

Our first task was to interview veterans of the Swedish entrepreneurial ecosystem and map their decades of experiences from hundreds of startups through a field decision task. This enables us to aggregate and quantify the veterans' expectations of "how things usually go", based on having seen dozens of startups from founding to exit and seen what the participating agents did

post-exit. If the respondents irrespective of each other mapped approximately the same post-exit behavior of the agents, the pattern should be representative of their shared view of the ecosystem reality. Respondents were sampled in the ecosystem by snowball networking (Noy, 2008), starting with the people who had spent the longest time in the ecosystem and ensuring diversity in background among respondents in terms of distribution geographically across all three hubs as well as variety in present role and background. If respondents were revealed to have limited insight into the post-exit transition patterns for all four agents, and thereby could not complete the matrix with a degree of certainty, they were removed from the sample. The final sample consisted of seventeen respondents, comprised of nine venture capitalists, four executives from incubators and four business angels. Three of the seventeen respondents were women. There were no discernable differences in the answers of the respondents based on background, present role or gender. No entrepreneurs were among the final respondents, as the interviewed entrepreneurs had expressed that they had primarily experienced their own journeys and had limited insight into the transition patterns for the other agent types.

Respondents were individually asked to map the expected post-exit behavior of the actors, based on five different levels of financial exit success. In line with the most common industry practice of these professionals, the success levels pertained to Return on Investment (RoI) was expressed as Cash-on-Cash Multiple of invested capital (Gompers et al, 2019). In this study, the exit multiple – i.e. exit value as a multiple of the original investment – was for the first investors in the startup. A 1.5x RoI multiple would for example mean that the first investor received 50% gain or excess return at exit. The five levels of exit success were (i) failure, no gain, (ii) slight financial gain with1.5x RoI, (iii) good financial gain with 3x RoI, (iv) great financial gain with 10x RoI and (v) extreme financial gain with 100x RoI. Naturally, post-exit role transitions are not merely a result of return on investment multiples. The purpose of the study is however to show the connection between increasing level of returns and role transitions, to substantiate the conceptualization of the cyclical nature of the EE and lay the foundation for future empirical studies and the wider range of factors that influence role transitions. Furthermore, in any given successful exit the different stakeholders will likely receive different multiples of returns as they invested in different phases and valuations. However, for the purpose of this study the magnitude of returns is a sufficient proxy for establishing trends in behavior, as the trends are more important that the actual thresholds. Future case studies can delve into the actual thresholds, balanced by a wider range of influences.

Using visualization to capture the systemic patterns (Eppler & Platts, 2009), the mapping was done in a matrix drawn on a whiteboard, where the respondents were asked to fill in each square of the matrix with their estimations of post-exit behavior for each agent in each scenario. The matrix had only pre-written two obvious choices for each agent, (1) try again in same role or (2) stop acting in present role and leave the EE, adapted to each agent type. Respondents were encouraged to introduce new choices and select the choices that were most probable for the agents in each scenario. Finally, respondents were asked to distribute 100% probability between their choices for each agent in each scenario. It is import to clarify that this study was qualitative and conceptual in nature, despite the use of percentages. The percentages were not used for statistical analysis, as the sample was too small to allow for this, but rather as a method for

assigning level of importance, clarifying contrast and establishing trends in answers across respondents. Rather than asking respondents if an action in a certain scenario was more or less likely, the use of percentages allowed us to understand the relative increase of likelihood for different actions that respondents perceived across scenarios. Table 1 below shows the matrix as presented to the respondents at the start of interview.

Table 1: Expected post-exit behavior of participatory agents in an EE dependent on financial exit success, pre-interview template

Post-exit behavior of agents	Entrepreneur (single exit)	%	Business Angel (batch exit)	%	Venture Capitalist (total fund)	%	Key employee (stock options)	%
Failure, no profit	Found another startup		Invest again in startups		Raise new similar fund		Work in new startup	
	Normal employment		Stop investing in startups		Normal employment		Normal employment	
Slight financial gain	Found another startup		Invest again in startups		Raise new similar fund		Work in new startup	
1.5x return on investment	Normal employment		Stop investing in startups		Normal employment		Normal employment	
Good financial gain	Found another startup		Invest again in startups		Raise new similar fund		Work in new startup	
3x return on investment	Normal employment		Stop investing in startups		Normal employment		Normal employment	
Great financial gain	Found another startup		Invest again in startups		Raise new similar fund		Work in new startup	
10x return on investment	Normal employment		Stop investing in startups		Normal employment		Normal employment	
Extreme financial gain	Found another startup		Invest again in startups		Raise new similar fund		Work in new startup	
100x return on investment	Normal employment		Stop investing in startups		Normal employment		Normal employment	

The instructions were that all agents were nascent, i.e. having their first experience in the respective role. In other words, the respondents had to consider entrepreneurs who had just completed their first startup exit, business angels who had exited their first batch of investments, venture capitalists who had closed their first fund and key employees who had concluded their first employment in a startup. Since business angels and venture capitalists invest on a portfolio basis, business angels were expected to act based on the returns of their first batch of investments and venture capitalists based on the returns of their first fund. All agents were in a position to change employment if they so wanted; the scenarios assumed no lock-up periods for any of the agents. An agent could only fill one role at one time, determined by how they spent the majority of their time, so a business angel dabbling in philanthropy would still only be an angel. If an entrepreneur or key employee remained with their firm post-exit, for the purpose of this study they chose normal employment since the firm was no longer a startup. Finally, probabilities assigned to choices were to reflect not only intent but also likelihood for successfully accomplishing the choice. For instance, a venture capitalist who was unsuccessful in their first fund may want to raise another fund, but may find it hard to so.

An interviewer was present during the interview, guiding the respondents through the steps of the interview with instructions, assisting the respondents with filling in the matrix if the respondent so asked and clarifying if there were questions. The presence of the interviewer was judged necessary for achieving a high response rate and complete answers. In pre-study testing, respondents were asked to fill out a questionnaire by themselves, but the response rate and willingness to participate was frustratingly low. Introducing an interviewer to the room increased both the amount and quality of data collected. Respondents required 30-60 minutes to complete their matrices and asked multiple questions during this time. The interviewer

further asked the respondents at times to explain their estimations or clarify when they introduced a new role, gathering complementary qualitative data. The completed matrices on the whiteboard were photographed and the interviews were taped for analysis. The respondents' matrices were analyzed post-interview for similarities across respondents and summarized into descriptive statistics.

Results

The completed matrices for the seventeen respondents were aggregated in Table 2 with mean, median, max and min values for each alternative. Due to the relatively low sample size, further analysis was based on the median value to mitigate the impact of outlier values. The two pre-written expected choices, for each agent in each exit scenario, provided a guideline for the respondents to start filling out the matrix. As the respondents progressed in filling out the matrix, they inserted their own expected choices, which for some agents became the dominant choices in some exit scenarios. As the respondents at times used synonyms for the same inserted choices, our subsequent analysis combined these using the most common wording. These expected choices inserted by the respondents are marked in *italics* in Table 2 below.

Table 2: Expected post-exit behavior of participatory agents in an EE dependent on financial exit success, with mean, median, max and min percentages assigned by interviewees

Post-exit behavior of agent	Entrepreneur (single exit)	mean	median	max	min	Business Angel (batch exit)	mean	median	max	min	Venture Capitalist (total fund)	mean	median	max	min	Key employee (stock options)	mean	median	max	min
Failure, no profit	Found another startup	56	60	90	5	Invest again in startups	40	40	80	2	Raise new similar fund	14	10	50	0	Work in new startup	36	50	75	5
	Normal employment	44	40	95	10	Stop investing in startups	60	60	98	20	Normal employment	86	90	100	50	Normal employment	61	50	95	25
																Entrepreneur	2	0	10	0
Slight financial gain	Found another startup	69	75	95	30	Invest again in startups	68	70	100	25	Raise new similar fund	32	30	90	0	Work in new startup	47	50	90	10
1.5x return on investment	Normal employment	31	25	70	5	Stop investing in startups	32	30	75	0	Normal employment	66	70	100	10	Normal employment	43	40	90	10
											Angel	1	0	18	0	Entrepreneur	9	0	40	0
											Larger fund	1	0	20	0					
Good financial gain	Found another startup	76	80	100	40	Invest again in startups	79	80	100	50	Raise new similar fund	26	30	70	0	Work in new startup	49	50	90	10
3x return on investment	Normal employment	22	20	60	0	Stop investing in startups	20	20	50	0	Normal employment	26	30	60	0	Normal employment	32	20	90	10
	Angel	2	0	15	0	VC	1	0	15	0	Larger Fund	47	50	90	0	Entrepreneur	19	20	60	0
											Angel	1	0	20	0	Angel	1	0	10	0
Great financial gain	Found another startup	48	50	80	20	Invest again in startups	74	70	100	50	Raise new similar fund	9	0	60	0	Work in new startup	39	30	80	10
10x return on investment	Normal employment	14	10	70	0	Stop investing in startups	11	10	30	0	Normal employment	7	0	40	0	Normal employment	25	20	90	0
	Angel	28	20	70	0	Angel Group	7	0	50	0	Larger Fund	82	80	100	50	Entrepreneur	26	20	70	0
	VC	5	0	40	0	VC	6	0	30	0	Angel	5	0	40	0	Angel	8	0	35	0
	Retire	4	0	35	0	Philanthropy	2	0	20	0	Retire	2	0	10	0	Retire	1	0	25	0
	Philantrophy	1	0	15	0							Philanthropy	0	0	5	0	VC	0	0	5	0
Extreme financial gain	Found another startup	21	20	70	0	Invest again in startups	54	40	90	10	Raise new similar fund	2	0	33	0	Work in new startup	16	15	50	0
100x return on investment	Normal employment	6	0	60	0	Stop investing in startups	3	0	20	0	Normal employment	0	0	0	0	Normal employment	10	0	80	0
	Angel	35	30	70	0	VC	14	10	40	0	Larger Fund	63	70	100	10	Entrepreneur	30	30	75	0
	Philanthropy	16	10	50	0	Angel Group	12	0	50	0	Angel	14	0	70	0	Retire	13	5	80	0
	VC	12	10	40	0	Philanthropy	11	5	50	0	Retire	11	5	50	0	Angel	23	20	70	0
	Retire	11	0	70	0	Retire	3	0	30	0	Philanthropy	7	5	33	0	Retire	13	5	80	0
						Family Office	2	0	30	0	Family Office	3	0	50	0	Philanthropy	6	0	30	0
						Entrepreneur	1	0	10	0						VC	2	0	20	0

We focused the initial analysis on categorizing the post-exit behavior for each agent in terms of (1) transitioning to a new participatory role, (2) remaining in the same role or (3) leaving the ecosystem as a function of the financial exit, as seen in Table 3 below. The results suggest that failed exits lead to expectations of agents leaving the ecosystem, medium levels of successful exits lead to agents remaining in their roles and high levels of success facilitate transitions to new roles in the ecosystem. The exception were venture capitalists, for whom the expected outcomes was predominantly binary in nature. The overall pattern validated our underlying assumption that successful exits drive role transitions, as a respondent framed it: '*Wealth drives what you do with your time. Everyone needs their income to sustain their lifestyle. Once you don't have to worry about income, you start doing whatever you want, may it be philanthropy, investing, running your own company or writing books.*'

Table 3: EE participatory agents' post-exit role changes dependent on financial exit success, median percentages assigned by interviewees with dominant response in grey shade

Agent transitions (median)		Failure	1.5x	3x	10x	100x
	New role	0	0	0	20	40
Entrepreneur	Same role	60	75	80	50	20
	Leave	40	25	20	10	10
	New role	0	0	0	0	10
Business Angel	Same role	40	70	80	70	40
	Leave	60	30	20	10	5
	New role	0	0	50	80	70
Venture Capitalist	Same role	10	30	30	0	0
	Leave	90	70	30	0	10
	New role	0	0	20	20	50
Key Employee	Same role	50	50	50	30	15
	Leave	50	40	20	20	5

As seen in Figure 2, the expectation was that entrepreneurs were too stubborn to give up. Even if they failed, most entrepreneurs were expected to keep venturing until they reach a high level of success. One of the respondents explained this tendency to keep trying as: '*If you're an entrepreneur and have experienced running your own firm, going back to an ordinary job will be difficult.*' Those leaving with success, were expected to become primarily business angels and in rare cases VCs and philanthropists. A respondent elaborated on this reasoning in the following manner: '*Wealthy people do what they want. If they want to become philanthropists they do that, but most just want to invest their money and enjoy life.*'
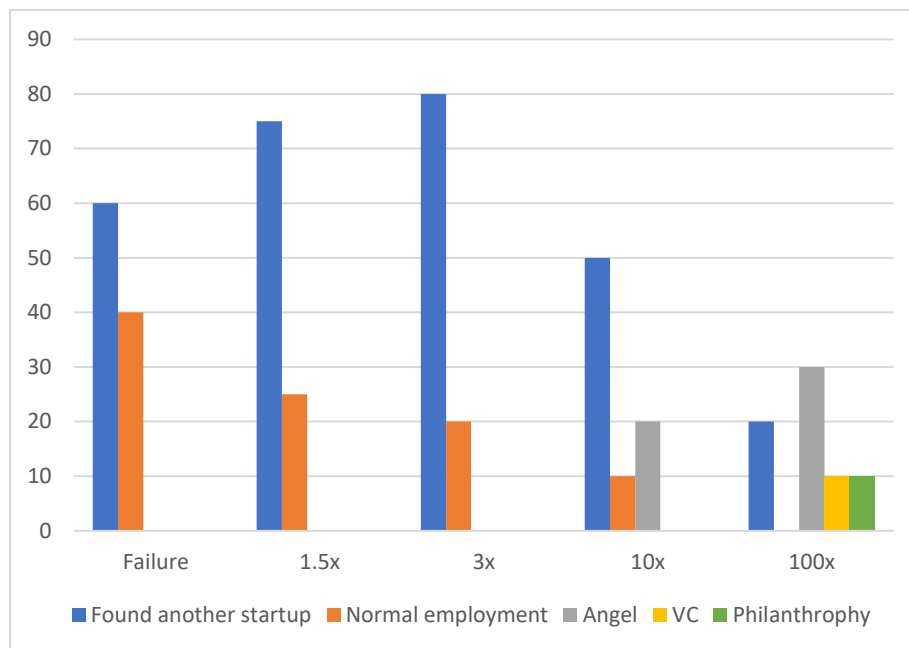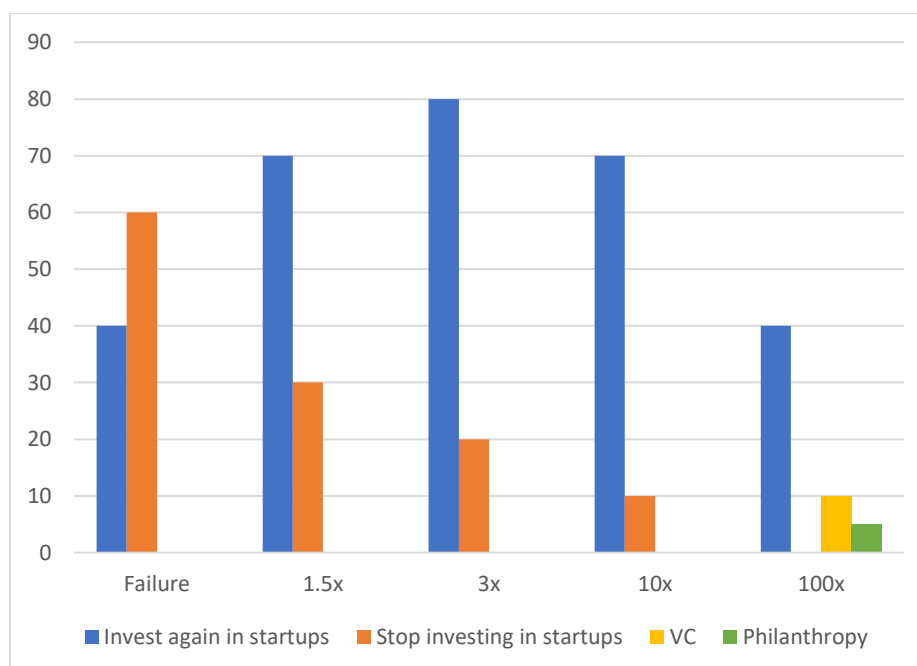
Figure 2: Entrepreneurs expected post-exit transitions, dependent on financial exit success, median percentages assigned by interviewee

Business angels were in comparison expected to be more sensitive to failure, as seen in Figure 3 below. If their initial investments failed, a majority were expected to stop investing in startups. Two respondents explained this behavior as: '*Angels keep investing and increasing the stakes as long as they win, but if they get burned they usually stop*' and '*Angels that have enjoyed some good exits can take some bad ones and keep going. But not new angels, if their first experience is bad - they quit.*' With success, angels were expected to continue investing, and in rare cases become VCs and philanthropists.

Figure 3: Business Angels' expected post-exit transitions, dependent on financial exit success, median percentages assigned by interviewee

Venture capitalists were expected to be the most sensitive to failure, as seem in Figure 4. Unless they reached a high level of success they were not expected to continue as venture capitalists. This likely reflects the inability to raise a new fund with a lack of requisite track record, as two respondent explained: '*Most VCs want to keep going, but few that don't meet their goals are given the opportunity to keep going*' and '*There is a threshold around 3x returns on the fund, where you're given the opportunity to raise another fund*'. If they reached the required level of success, they were however expected to raise larger funds and transition to later investment stages, as a respondent explained: '*VCs want to scale up with success and set up larger funds, and more capital means larger investments in later phases.*' In rare cases of extreme success, VCs were expected to retire or become philanthropists, although expectations for philanthropy were the lowest among the agents.
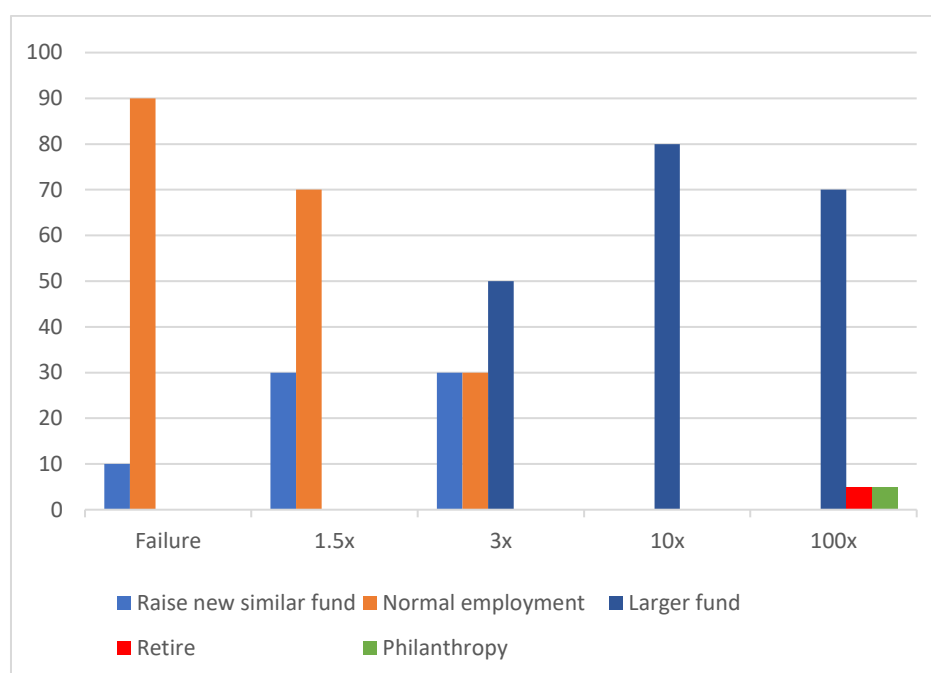

Figure 4: Venture Capitalists' expected post-exit transitions, dependent on financial exit success, median percentages assigned by interviewee

Key employees were expected to be more sensitive to failure than entrepreneurs, but less than angels, as seen in Figure 5. If their first startup failed, they were expected to equally likely take a new employment with another startup or take a normal employment with a non-startup. If their startup was successful enough to survive, the expectation was that the key employees continue working for startups. The expectation of the employees becoming entrepreneurs were overall low, as one respondent framed it: '*If they were really entrepreneurs, they would have started their own business from the beginning and not gone to work for others*'. With increasing levels of success, the expected likelihood of the employees becoming entrepreneurs also increased, until they reached high levels success where they were expected to become angels and, to a lesser degree, retire early.
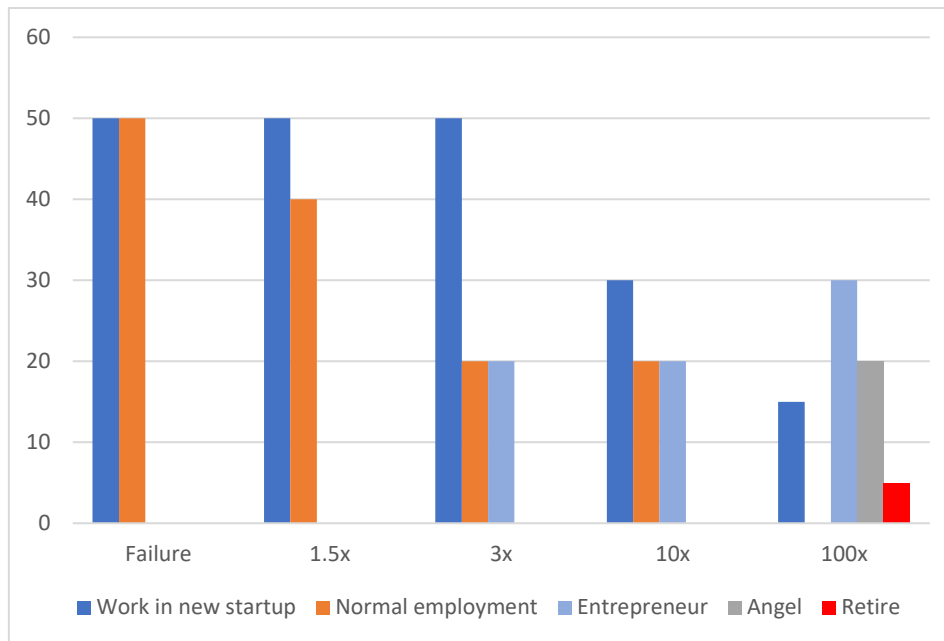
Figure 5: Key employees' expected post-exit transitions, dependent on financial exit success, median percentages assigned by interviewee

The pattern of expected post-exit behavior were relatively consistent for the exits from failure up to 10x. The post-exit expected behavior patterns was more scattered for the 100x exits. We expected that the extreme 100x exit scenario would have the lowest reliability and among the exits it is the least important. Due to the rarity of 100x exits, the interviewed veterans had limited experiential data to base their assessments on, so it should have the most speculative outcome. An ecosystem would be fragile if it built expectations of growth on a rare occurrence such as a 100x exit. For sustainability and resilience an EE needs to rely on the bulk of 1.5x-10x success to drive the ecosystem forward.

Discussion

The empirical data of expected post-exit behavior serves to substantiate and illustrate the concept of EEs as a circular three layer system with startup exits driving its evolution over time. The repopulation of an EE from within is primarily done by key employees becoming entrepreneurs and entrepreneurs becoming angels and to a lesser degree VCs. This is in line with what earlier case studies (Mason & Harrison, 2006) have indicated. With a lack of successful exits, the EE will stagnate and eventually depopulate, as all but the entrepreneurs and some employees are expected to leave the EE. With a sufficient number of 1.5x and 3x exits, most entrepreneurs, angels and key employees are expected to continue in their roles making the EE sustainable, if lacking in growth. Successful exits likely produce multiple new start-ups as various members of the management team and employees recycle their wealth and knowledge in the ecosystem. Accomplishing some 10x exits would increase the expected transition rates and results in a growth trajectory of the EE. Some rare 100x exits would further accelerate transitions and increase growth further.

However, the expected post-exit transitions for VCs are less stable, with a binary split between grow (3x-100x exits) or leave (failure-1.5x exits) and little middle ground of continuing with the same fund (1.5x-3x). This may be an artifact of the Swedish EE, but it largely reflects the inherent operation of VC funds: once a fund is fully invested, continuing operation as a VC requires the raising of a new fund, which in turn requires an attractive track record. This is evident in the boom-and-bust cycles of venture capital investing. During the bubble years in the 2000s with successful exits, in Silicon Valley the number of VCs multiplied and fund sizes grew, but when bubble burst VC numbers dwindled and those that remained scaled down. A similar pattern can be traced today with an increase in VCs and fund sizes, not just in Silicon Valley.

Maintaining a stable and sustainable VC community in an EE may therefore be challenging given the grow-or-perish dynamics of VC investing. These dynamics could in part explain the early stage funding gap and that EEs have been struggling with (Murphy & Edwards, 2003; Barr et al, 2009; Duruflé et al, 2017). If early stage venture capitalists are prone to transition, if unsuccessful by closing down and if successful by transitioning to later stages, there would need to be a consistent inflow of early stage VCs to fill the gap of those transitioning out. Furthermore, if the inflow of new VCs is proportional to the success of the EE, then the inflow of new early stage VCs would mainly occur if the EE was already in a growth trajectory. Policies aimed at establishing early stage venture capitalists in EEs may only offer temporary solutions to early stage funding gaps. Relying to a larger degree on business angels may be a more sustainable strategy long-term, as the pattern suggest that angels are less prone to transition to later stages with success.

In addition to illustrating the circular nature of EE evolution, our results serve to highlight key gaps for further empirical study and theoretical development. The empirical data of expected role transitions, as dependent on the relative success of the prior exits, maps role transitions within and out of the EE. However, the data does not examine inflow to the EE of new agents, nor later transitions of serial entrepreneurs and seasoned investors. At this point, it is reasonable to postulate that the inflow of new entrants is proportional to exit success, meaning that increased success leads to increased inflow and lack of success leads to little to no inflow. This reflects broader theoretical insights that track records of success over time build a reputation of success and a halo effect on an institutional level (Sine et al, 2003) via the signaling effects of liquidity events (Sorenson and Stuart, 2003). With a growing reputation, an increase in inflow of talent and investments would logically follow and the pattern for the non-nascent agents would likely follow similar patterns. Furthermore, the empirical data only map the expected transitions of the participatory agents, and not the accompanying investments. Although it would be logical to postulate that reinvestments and new investments follow the same patterns as the investors, further development of the framework EE needs to explore the sensitivity to the stage focus and size of investments.

Mapping out the recursive cycle of ecosystem evolution offers opportunities for theoretical development of EE as self-organizing systems. Drazin and Sandelands (1992) distinguish three levels to self-organizing structures: observed, elemental, and deep. The observed level is the

one at which an observer can make out a social fact such as an organization or, in our case, an ecosystem. At the elemental level, one observes the states and interactions of the actors that compose the observable structure. The elemental structure of an ecosystem thus consists of the actors we have identified and the ways they interact as part of start-up efforts. The deep structure is not observable, but is the one that reveals the engine of self-organization. It pertains to the (tacit) rules and positional information that drive the actions and interactions of the actors that create the elemental structure and, over time, give rise to the observed structure. These rules are simple but recursive in nature, i.e. they are applied repeatedly to the changing circumstances of the actor. The evidence we have presented can be seen as revealing the simple but recursive rules that ecosystem actors use to make their transition decisions.

Specifying the deep mechanisms that give rise to a macroscopic regularity – in this case the stable participation of the different ecosystem actors over time that ensures the longevity of the ecosystem – represents a qualitatively different, generative mode of explanation (Cederman, 2005). Fundamental to such explanation is the specification of the underlying process of how something works. This approach has been rigorously developed in computational social science, where the interest has been in explaining macroscopic social regularities from "the decentralized local interactions of heterogeneous autonomous agents" (Epstein, 1999). The related motto is "if you did not grow it, you didn't explain its emergence" (Epstein, 2006: 8). Our work thus opens the door to developing this type of explanation of EE evolution, affording opportunities to "grow" ecosystems in a computational lab by deploying the parameters we have set out and exploring how their systematic variation changes the long-term trajectory of the ecosystem.

In summary, our results enable us to postulate that successful exits shape the evolution trajectory of the EE via the transitions it triggers into, away from, and across participatory roles in the EE. This opens a gateway for further research along two main directions. First, empirical studies of other EEs can help ascertain whether expectations of post-exit behavior of participatory agents are similar across EEs, investigate the degree to which expected behavior accurately depicts actual behavior, and substantiate the causal mechanisms between startup exits and inflow as well as non-nascent role transitions. We suggest EEs comparable to Sweden in maturity and size, as well as iconic ecosystems such as Silicon Valley and Israel.

Second, the complexity of the feedback mechanisms across successive cycles of EE operation, exposes the limitations of empirical observations in that they represent contingent realizations of interdependent processes. Understanding these processes in all their counterfactual complexity requires a new set of analytical method. Our work can inform the development and application of agent-based modeling and simulation (ABMS) or system dynamics modeling (SD) to understand the critical conditions of evolutionary process of entrepreneurial ecosystems. In ABMS, researchers can generate heterogeneous agents, assign plausible behavioral rules, and perform repetitive simulations with diverse values of parameters that represent diverse environmental settings (Yang & Chandra, 2013). In turn, SD approaches focus on the feedback loops among the elements in a system, with a view of understanding how they contribute to positive or negative feedback in the evolution of the system over time. The current

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paper provides initial parameters on role transitions, based on which the evolution of an EE could be simulated with systematic variation of the frequency and magnitude of startup exits in the ecosystem. In this virtual entrepreneurial ecosystem, the observed sensitivities of the parameters can help determine the critical conditions for the flourishing or demise of the ecosystem.

Conclusions

Our work makes an important step towards the development of theory of entrepreneurial ecosystem (EE) evolution. Such theory requires a generative understanding of the phenomenon in question, based on the recursive mechanisms at play (Cederman, 2005; Drazin & Sandelands, 1992). Our framework of EE as a circular three layers system and our empirical insights that illustrate the interconnections among the layers lay the groundwork for theory in the form of a simple dynamic system of EE evolution.

There are significant policy implications of our work. Growing entrepreneurial ecosystems requires successful exits. Without successful exits, it is only a matter of time until ecosystems stagnate and depopulate. Interjecting and reversing this process presents a pressing policy challenge and our work demonstrates some of the levers that could be utilized for this purpose. Furthermore, the binary post-exit continuation of VCs imply that policies aimed at bridging early stage funding gaps with early stage VCs may only be temporary solutions.

In conclusion, our work illustrates important patterns in the expected post-exit behavior of the four key participatory agents in an EE. It lays the groundwork for future research to (1) substantiate and expand upon these patterns by empirical studies in additional EEs; (2) examine the connection between startups exits and inflow to the EE, non-nascent post-exit transitions of the agents and how investment flows correlate to transition of agents; (3) develop theory of EE as dynamic systems using agent-based modeling and simulation (ABMS) and system dynamics modeling (SD) to understand the critical conditions of evolutionary process of entrepreneurial ecosystems.

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