CHALMERS

Exit Value Study Third Stage (EVS 3) Research Project

Summary Report

November 2024

CHALMERS UNIVERSITY OF TECHNOLOGY

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Executive Summary

This report summarizes of the third stage of the Exit Value Study project (EVS 3) for practitioners, as part of a series of research studies into what happens to venture capital funded startups in the long run, and why. EVS 3 specifically studies European Health Science and Cleantech startups, as well as Swedish second tier stock exchanges.

Survival among European Health Science and Cleantech startups vary across clusters, but not sub-categories. Highest survival is in Western Europe, with Swedish clusters having highest survival, likely related to frequent IPOs on Swedish second tier stock exchanges. Swedish second tier stock exchanges tend to be used as a 'dumping ground' by venture capitalists for portfolio startups without acquirer. However, these exchanges are surprisingly robust and offer a second chance for growth and success for these startups.

Health Science and Cleantech startups are primarily funded by European venture capital (VC), with the vast majority of startup exiting through acquisitions. Pharma companies have slightly more IPOs, but are often later acquired as public companies. The more highly valued a startup is, the more likely it is to be acquired to private or public ownership in the USA. VC investments from US are statistically related to acquisitions by US incumbents, indicating that venture capitalists act as sourcing agents for incumbents.

There are considerable differences in fundraising and valuations across Europe. Some differences are expected due to concentrations of capital, customers and talent to large metropolitan areas. There is evidence of rare localized high density hotspots, with synergies similar to Silicon Valley. However, there are also indications of skewed localized supply and demand in capital, with an unwillingness to invest and fundraise across borders, creating national and local funding silos.

Implications for practice is that in most modern ecosystem, equity funding is unavoidable, and so are startup exits. Equity funding comes with strings attached, usually pulling towards acquisitions. The majority of acquired startups are absorbed, to fuel incumbents' continued innovation, growth and competitiveness. Venture capitalists play a crucial role as sourcing agents for incumbents. Money has a geographical gravity that pulls in startups, and the more successful a startup is the stronger the gravitational pull. Founders that pursue venture capital should do so with open eyes regarding what to expect from venture capitalists. Policy makers and investors should consider longer investment horizons, fifteen years fund lifetimes or evergreen funds, for greater returns and more startups remaining in Europe in the long run.

Preface

This is the summary report for the third stage of the Exit Value Study research project (EVS 3). The project was conducted 2020-2024 at Chalmers University in collaboration with, and support from, Gothenburg University, Vinnova, Carl Bennet AB, Västra Götalandsregionen (Region of Western Sweden), AstraZeneca BioVentureHub and Business Region Gothenburg. The intended audience of this report are practitioners and government agencies engaged in the creation, financing and support of startups. The emphasis in this report is to summarize the research questions, findings and conclusions of the conducted studies, and discuss their implications for policy and practice. The terminology and format of this report is tailored for this intended audience.

Understanding of the studied phenomenon has been built cumulatively over the EVS projects, as the results from one project provided the starting point for the next project. Hence, this report begins by explaining the origin of the EVS studies, and the results of the EVS 2 study, to provide a context and premise for better understanding the EVS 3 results and implications. Readers who wish to go straight to the EVS 3 results may go straight to page 13, and readers who wish to go straight to the EVS 3 implications for policy and practice may find them on page 37.

For readers new to the project, it may be useful to explain the origins of this research, and how the research project was conducted. The original Exit Value Study (EVS 1) was co-created in 2016 by serial entrepreneur Per Hulthén and Chalmers professor Mats Lundqvist. EVS 1 was a pre-study conducted by Per and supported by Mats to understand the puzzle of the different literature streams and experiments into trying to map the life cycle of startups with venture capital funding. The pre-study was co-financed by Vinnova and Region of Western Sweden and conducted in 2016. The pre-study further outlined a research agenda and methodological approach for delving into the research question of what happens long-term to venture capital funded startups and why.

Based on the EVS 1 recommendations, continued funding was provided by Vinnova and Region of Western Sweden to pursue this research agenda in a second stage (EVS 2). EVS 2 was formally acknowledged as a research project at Chalmers, conducted by Per Hulthén, now accepted as an Industrial PhD candidate working through the IMIT Foundation. The project was conducted during 2017-2020 and resulted in a summarized research report for practitioners, similar to this report, as well as a licentiate thesis[1] for Per Hulthén in 2019.

[1] Hulthén, P., Venture capital as a tool for regional development: Exit patterns and long-term consequences, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden 2019

Preparations for EVS 3 started in early 2020, after EVS 2 results received considerable interest. There was a shared interest among practitioners, policymakers and scholars in further studying the phenomenon. A partnership of universities, agencies and companies was formed to finance and support the EVS 3 project. Partners included Chalmers University and Gothenburg University as academic partners, Vinnova, Region of Western Sweden and Business Region Gothenburg as agencies, and Carl Bennet AB and AstraZeneca BioVentureHub as private companies.

The EVS 3 project experienced some hurdles along the way. Firstly, due to the global outbreak of Covid, it was the formal start of the project was delayed until the very end of 2020. Secondly, team members were severely affected by Covid, which delayed progress until they had recovered, and some team experienced post-Covid afflictions for several years. Thirdly, the original research questions were revised in 2021, and additional avenues of inquiry added in 2023, until the project was finally concluded in autumn of 2024.

In addition to our partners, the authors of this report wish to acknowledge crucial contributions of team members in conducting the EVS 3 studies, namely co-creator Professor Mats Lundqvist, research assistants William Berntsson, Marcus Silkisberg and Edvin Andersson, and EVS 3 steering group members Kjell Håkan Närfelt, Marie Wall, Magnus Björsne, Agneta Holmäng and Jenny Almkvist.

For scholars with more theoretical and methodological interest in the research project, the intent is for the working papers summarized in this report to be made available online, and in time published in a doctoral thesis and journals articles. For access to EVS 3 working papers, please contact per.hulthen@chalmers.se.

With sincere hope that this report of value to you,

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Table of Contents

1 Introduction: Motivations for the Exit Value Studies

The Exit Value Studies address the overarching question of what happens to venture capital funded startups in the long run, and why. There is shared interest among entrepreneurs, angel investors, venture capitalists, incubators and agencies about what happens to those startups that are created every year, but in subsequent years drop off the map. While there is anecdotal evidence of what happens to startups of notoriety, such as being acquired or successfully conducting an IPO, a majority just disappear and are often hard to track down. The causality of (or reasons for) why some startups survive and others disappear is even more obscured.

Yet, few scholars study the fate of startups in the long run. Within entrepreneurship, one stream of literature, entrepreneurial exits, studies how entrepreneurs tend to end their entrepreneurial journeys.[2] Their focus of analysis is, however, typically on the entrepreneur as an individual, and not on the startup as an organization. Many successful startups continue to live and prosper after their founders leave. Hence, the usefulness of this literature is limited in trying to understand what happens to startups themselves in the long run.

Venture capital scholars study what happens to startups funded by venture capital, from a finance perspective.[3] However, since their interest is primarily in the returns these startups provide to investors, their interest generally stops at the investors' financial exit, when investors sell their shares in the startups. Investors such as venture capitalists tend to remain engaged in startups longer than the founders, and thus offer a slightly longer-term perspective on what happened to those startups. However, once the investors sell their shares, often through the startup being acquired or listed on a stock exchange, the trail ends in this literature stream.

Scholars of regional economic development study what happens to acquired companies in the long run, and finance scholars focus on listed companies. However, with some exceptions[4], these literatures seldom look at startups. Apart from startups of notoriety, that end up as the subject of case studies, it is not clear how or why most startups fail or survive, or even thrive as subsidiaries or listed companies.

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[2] Wennberg, Karl, and Dawn R. DeTienne. "What do we really mean when we talk about 'exit'? A critical review of research on entrepreneurial exit." *International Small Business Journal* 32.1 (2014): 4-16.

[3] Gompers, Paul, and Josh Lerner. "The venture capital revolution." *Journal of economic perspectives* 15.2 (2001): 145-168.

[4] Mason, Colin M., and Richard T. Harrison. "After the exit: Acquisitions, entrepreneurial recycling and regional economic development." *Regional studies* 40.1 (2006): 55-73.

Growth scholars study which factors are correlated with firm growth.[5] However, these studies often focus on periods of growth while firms are young and small, rather than growth over the entire life cycle of the firm. When combining all these different literature streams, there are considerable gaps in explaining what happens to startups in the long run, and circumstances that may influence preferred outcomes such as firm survival and growth.

Venture capital funded high-tech startups are often cited as drivers of economic impact and catalysts of regional growth.[6] Thus, public support of high-tech startups and venture capital has been a popular focus for public policy globally in the past decades. The most successful startups have a disproportionally large economic impact, making them more prioritized to study from a policy perspective.[7] Furthermore, venture capital financed startups are somewhat easier to study, as there is more data on them, provided by private equity databases such as CB Insights (formerly VentureSource) and PitchBook.

The selection process of venture capitalists marks these startups as a more coherent subset of startups with an ambition and ability to grow. Finally, as venture capitalists require considerable financial returns within a limited time frame, this also requires their startups to rapidly grow in valuation within this time, to deliver a financial exit on average five years from first VC investment. Thus, the venture capitalists' exit requirements force startups that accept venture capital funding to conform to a condensed life cycle of rapid growth over five to ten years resulting in an acquisition or public listing at the end of this time.[8]

The original pre-study, Exit Value Study 1, gives insight into the life cycle of venture capital funded startups, with variations based on geography and industry, across Sweden, USA, and Israel. Interviews with founders and investors summarize the causality as "Founders primarily influence if a startup is successful, while the investors primarily influence what happens to the successful startup long term, such as if it is sold or listed, and to whom it is sold." These insights form the starting point for the EVS 2 project's research questions.

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[5] Davidsson, Per, Frederic Delmar, and Johan Wiklund. "Entrepreneurship as growth: growth as entrepreneurship." *Strategic entrepreneurship: Creating a new mindset* (2017): 328-342.

[6] Samila, Sampsa, and Olav Sorenson. "Venture capital, entrepreneurship, and economic growth." *The Review of Economics and Statistics* 93.1 (2011): 338-349.

[7] Shane, Scott A. *The illusions of entrepreneurship: The costly myths that entrepreneurs, investors, and policy makers live by*. Yale University Press, 2008.

[8] Cumming, Douglas, and Sofia Atiqah binti Johan. "Preplanned exit strategies in venture capital." *European Economic Review* 52.7 (2008): 1209-1241

2 Explorations of startup exit dynamics (EVS 2)

A major reason why few scholars study what happens to startups in the long run are the difficulties in tracking startups through organizational changes. Part of the problem involves changes in legal names and incorporation, often in connection with mergers and acquisitions. Another part of the problem is understanding the intricacies of financing rounds in tracking ownership and valuations. Yet another problem is understanding what happened to startups after acquisition, which some scholars have gone as far as to say are impossible to study, due to methodological limitations.

Overcoming these difficulties requires the development of methods for tracking startups through mergers and as subsidiaries, and finding ways to correct for inherent biases, flaws and limitations in the data. Developing new methodologies is thus at the heart of the research agenda for the second stage of the Exit Value Study (EVS2). However, these methodological advances are of more interest to scholars than practitioners, so they will not be documented in this summary report of results and recommendations. The EVS 2 comprised of five studies that were documented as working papers, and four of these papers were included the licentiate thesis 2019. In this chapter, we will explain their importance in framing the EVS 3 studies and complement their results in framing the findings and implications of this report.

The first paper[9] tracks startups in five regions over almost three decades. The premise for the study is that how venture capital investors choose to exit their investment, such as by a merger and acquisition (M&A) or initial public listing (IPO), influences the long-term growth trajectory and even the regional outmigration of startups. Another part of the premise is that differences in exit patterns explain Silicon Valley's success and why other regions find it so difficult to replicate.

The five regions investigated are (1) Silicon Valley, (2) Colorado, (3) North Carolina, (4) Israel and (5) Sweden. 10,593 startups, founded 1992-2011, are analyzed by descriptive statistics and regression tests. Methodological improvements are made in establishing actual exit format and handling survival bias. Exit patterns that are examined include survival ratios, exit routes, exit transactions amounts and transitions of ownership or financial control to other regions. Results are discussed by contrasting objectives of venture capital with objectives of regional development, to understand the startup exits from the perspectives of different stakeholders.

Exit patterns are generalizable on a regional level for venture capital funded startups, with M&As as the dominant exit route. To the degree that IPOs occur, they are rare and occur at a somewhat

[9] Hulthén, P. and Graff, G., Migration patterns of venture capital funded startups, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden 2019

higher rate in Life Science related industries. The differences among the five regions are mainly in founding rates, exit transaction amounts, and ownership migration. 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 in which they originated after the VCs exit.

Exit patterns explain at least a part of Silicon Valley's success. The most valuable startups are founded within Silicon Valley and exit locally within Silicon Valley or are acquired by corporations from other regions. Of those startups founded in other regions, the most valuable migrate and only a small portion of the overall value of the startups founded in those regions remains owned in the region of origin. This gravitation toward Silicon Valley is strongest in the traditional Silicon-Valley industries, however the trend of agglomeration is evident across all industries, forming an advantage which begets further advantage. It would be close to impossible for other regions to replicate the success of Silicon Valley, given their most valuable startups consistently relocate away from their region, with the best often moving specifically to Silicon Valley.

The results of M&As dominating exit returns, in part, contradict the often-cited belief in IPOs as 'the gold standard of exits'. 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 large corporations, revitalizing existing industry incumbents, rather than as midwives of new public companies and new industry clusters.

The interdependence between regions and entrepreneurial ecosystems, as evident in exit patterns, are underestimated in present literature. Silicon Valley and the other regions can 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 the development and commercialization of new technologies. Other regions in this supply chain effectively serve as supply nodes, which incubate and cultivate promising startups, from which the best and brightest are later sourced for integration into the technology commercialization machinery comprising Silicon Valley.

Regions with aspiring hubs should expect to over time lose their most successful startups. To compensate for these expected losses, regions may consider developing strategies to keep their startups as long as possible, maximize the value these startups create before out migrating and prepare for the return of key talent to the region, to found, finance, and lead new generations of startups, referred to as entrepreneurial recycling.

While the first paper reveals the dominance of acquisitions as an exit route and concentration of ownership of the most valuable startups to the technology cluster in Silicon Valley. This raised the question of to what degree ownership mattered to the long-term spatial organization of operations for startups turned subsidiaries. Were subsidiaries consolidated over time to the region where the parent corporation was located, effectively migrating the value they represent and generate to the region of the acquirer, and away from the region of origin of the startup? To what extent do venture capital funded startups stay and grow in their region of origin, depending on if and how they were acquired and listed?

To answer these questions, the second paper[10] uses annual reports to conduct a nation-wide exploration of the post-exit performance of venture capital funded startups. The sample consists of 273 venture capital funded startups founded in Sweden 1992-2010 and exited by IPOs and M&As in 2002-2017. In exit routes, there is a distinction between IPOs on larger regulated stock exchanges and smaller stock exchanges, so called 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.

The analysis finds that pre-exit performance of the startups directly relates to exit route. The top three percent of startups exit by IPO on large stock exchanges. Among the remaining startups, most of the best performers go first to foreign acquirers, then to domestic acquirers and most of the lowest performers go to small stock exchanges (MTFs). Different exit routes have divergent post-exit growth trajectories. IPOs, on large and small stock exchanges, result in the strongest post-exit performance. Foreign and domestic acquired startups experience 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, domestic and foreign, are closed down as independent subsidiaries post-exit. This supports the assumption in the first study, that acquired startups are consolidated over time to the region where the parent corporation is located. This supports that exit routes directly influence the long-term economic impact of startups. Regional economic policy for startups should consider their region's startup exit patterns, and if unfavorable consider exit-centric policies. MTFs offer a promising lower threshold exit route for startups going public, as startups that exit by IPO on MTF have the largest relative growth post-exit.

[10] Hulthén, P., Glücksman, S., Lundqvist, M. and Isaksson, A. Growth of Swedish venture capital financed startups after IPO and acquisition - the case for exit-centric policy? Paper presented at Entrepreneurial Finance conference, Trier, Germany, July 2019.

As exit routes are so important for long-term economic impact, the question arises of who decides on exit route for a startup and on what basis. Prior studies indicate that venture capitalists often decide on exit, plan for the exit from the initial investment and ensure they have contractual control of the exit decision. However, it remains unclear on what basis the exit decision is made.

Therefore, the third paper[11] investigates how venture capitalists (VCs) choose exit routes for startups, which factors they consider and these factors relative importance. Qualitative structured interviews conducted with VCs, step through their preferences in deciding between Initial Public Offerings (IPO) and mergers and acquisitions (M&As), as well as domestic and foreign exits. 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 across the respondents.

The study finds that the factors considered by the VCs are uniform, but the perceived importance of these factors strongly diverges. VCs perceive themselves to be the 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 is dependent on individual VCs familiarity with IPOs, loss of control issues and loss aversion. This offers an explanation for the over-representation of M&As as exit route. Furthermore, the relatively low threshold to foreign acquisitions offers an explanation of the high number of foreign acquisitions in Sweden and that bulk of the most valuable startups exit by foreign acquisition.

Implications for policy are 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 are that the VC's aversion towards IPOs and limited time to wait for an optimal exit timing may be limiting earnings for all startup shareholders. Previous studies have found that regions outside of Silicon Valley should be prepared for the likely outcome that the most valuable startups in their entrepreneurial ecosystems will be acquired and migrate away from their regions in the long run. This realization highlights the crucial importance of post-exit recycling of capital and talent within the ecosystem. An ecosystem may thrive even though the majority of their successful startups leave, provided that enough of the profits and experienced startup professionals return to the ecosystem to found, finance and support new startups, thereby creating a circular effect that best case grows and strengthens over time.

[11] Hulthén, P., Venture capitalists' exit choice: Deciding the fate of successful startups. Paper presented at Entrepreneurial Finance conference, Trier, Germany, July 2019.

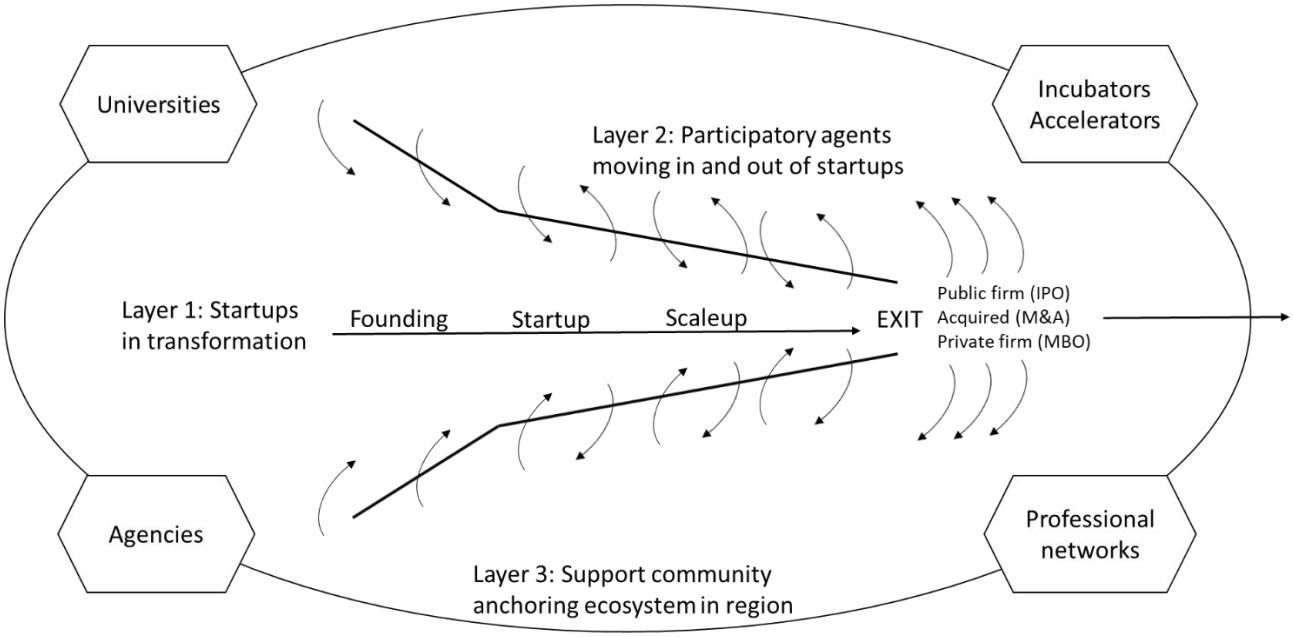

Figure 1: Entrepreneurial Ecosystem (EE) as a circular three-layer system

The fourth paper[12] 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 is 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 engines of the ecosystem are the startups in conjunction with their directly participating agents. The study examines 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 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

[12] Hulthén, P. and Dimov, D., Startup exits and the evolution of entrepreneurial ecosystems: Exploring divergent paths. Paper presented at the Australian Center for Entrepreneurship Research Exchange (ACERE) conference, Sydney, Australia, February 2019.

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.

The expected continuation of VCs is in comparison less stable. There is almost a binary split, with VCs who are successful raising larger funds and transition to later investment phases and eventually leave the ecosystem, while unsuccessful VCs often fail to raise another fund and thus also leave the ecosystem. There is little middle ground of VCs continuing with the same fund size in the same investment phase. 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.

If early-stage venture capitalists are prone to transition, if unsuccessful by closing down their firm and if successful by transitioning to investing in later stages, there would need to be a consistent inflow of early stage VCs to fill the gap as existing VCs transitioning out. 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 thus 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 via the signaling effects of liquidity events. With a growing reputation, an increase in inflow of talent and investments would logically follow. Our results enable us to postulate that successful exits shape the evolution trajectory of the EE. Growing EEs requires a minimum level of successful exits. Without successful exits, it is only a matter of time until EEs stagnate and depopulate.

While the four studies map out the life cycle of startup until exit, and some years after exit as listed companies and subsidiaries, it remains uncertain how the former startups continue to grow and develop beyond the observations of the second study.

Hence, a fifth paper[13] goes further in studying the continued survival and growth of Swedish startups as listed companies and subsidiaries, as seen by the founders of the startups. In total,

[13] Hulthén, P. and Lundqvist, M. Economic impact of startups after IPO and M&A: The founders' perspective, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden 2020.

106 founders are interviewed, of which 36 founders of startups public (IPO) and 70 founders of startups acquired by foreign or domestic acquirers (M&A).

The study substantiates the findings of the previous studies in that startups with different exit routes followed diverging growth trajectories. The context of this study is a smaller country, hence the designations used for geographical differences in actors involved are domestic and foreign. In the case of a larger country, such as the USA, domestic be interpreted as within the region or state (intraregional), and foreign for outside of the region or state (extra regional). Startups that go public have considerably higher domestic economic impact than acquired startups, with statistical significance. Startups with foreign acquirers have only slightly higher mean economic impact than startups with domestic acquirers, although the difference is small.

Furthermore, this study provides some explanations as to why exit routes lead to diverging growth trajectories. Large corporations continuously source new products for their distribution pipelines by acquiring startups. These startups are relocated and consolidated over time for synergies and economies of scale. This consolidation leads to an outflow process of resources from the acquired startup, which over time overtake the inflow process of resources gained becoming part of a larger corporate structure. Over time, this may lead to stagnation and eventually closing down of the acquired startup. This consolidation process occurs for startups with both foreign and domestic acquirers, with the difference being if the outflow is to a local (domestic) or distant (foreign) location. Startups that go public do not have the same consolidation and outflow process, and instead continue to grow with funding provided by the stock exchange, thereby over time resulting in higher intraregional (domestic) economic impact compared to acquired startups.

Finally, the study confirms that investors often control the exit, have an acquisition bias and may take the exit decision by themselves without the founders. The primary motivation for acquisitions is exclusive access to unique technology assets. Foreign acquirers generally pay better for new technology than domestic acquirers. As venture capitalists control the exit decision, and prefer foreign acquirers as they pay better, they effectively drive foreign acquisitions of startups, which in turn relocate the startups' assets and operations long-term to other regions. Policies promoting venture capital funding of startups may be unlikely to deliver on the long-term expectations of decentralized economic impact. Future policy should consider being exit-centric, lower barriers to IPOs and support a range of funding alternatives for startups.

Combing these findings of the studies form a causal chain of events for startup exits, originally presented in the licentiate thesis[14]. The causal chain of events serves three purposes. First, it illustrates how the decisions made in each step lead 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 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. Venture capitalists often have an exit strategy formulated for the startup from the point of their initial investment. Deviations are rare, but not unheard of, that founders can avoid giving contractual control of the exit to venture capitalists. If business angels also invest in startups, 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. If venture capitalist do not have contractual control, the 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 routes and the risks and uncertainties associated with each exit route. There is a bias in this decision making towards acquisition exits, with a low threshold to selling the startup to acquirers in other regions, and comparably high threshold to taking a startup public due to uncertainties associated with the lock-in period. The characteristic 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. The remaining startups are acquired locally or, if available in their region, go public on local low threshold stock exchanges. Industry also influences exit route, with startups in life science, biotech, pharma and cleantech, more likely to exit by going.

[14] Hulthén, P., Venture capital as a tool for regional development: Exit patterns and long-term consequences, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden 2019

4. Post-exit consequences, by exit route. Acquired startups turned subsidiaries are, regardless of the location of their acquirer, to a large extent consolidated and absorbed by their parent firms. If the parent firm is based in another region, the consequence is that the subsidiary's operations are consolidated to another region, while a local acquisition entails a local consolidation within the region. The remaining acquired startups, now fully owned subsidiaries, experience a relative reduction in growth, employees and ownership of intellectual property post-exit as subsidiaries of larger firms. Startups that go public, on large or small stock exchanges, experience continued higher post-exit growth, compared to the acquired startups that continue as subsidiaries.

The entire chain of events 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. Without venture capital, the founder's startups would likely grow slower, but the founders would also be in sole ownership and control of their startups. A study comparing growth of new firms with and without venture capital investments found that startups with venture capital 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. The most important difference was the time to exit, not reward at exit. We should remember that venture capital is not a requirement to successfully grow a startup; it accelerates growth but at a price.

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 they may be more flexible on the circumstances for the exit. Venture capitalists invest other people's money by 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 the 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 if 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 could act differently.

There are examples of savvy founders that receive venture capital investments, but avoid giving away contractual exit control. However, there is little research on how they accomplish this, and

one can only speculate that it is due to exceptional expertise and unusual 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 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, and local 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 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 the chain of events. Regions could bolster the accessibility of local stock exchanges and encourage local acquisitions through matchmaking.

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

3 Analyses of European startup exits (EVS 3)

The preceding studies show that survival, exit and ownership migration patterns are to a significant extent generalizable across regions in USA, Israel, and Sweden. One of the more important findings is that ownership and financial control of the more valuable startupsis more likely is to migrate to Silicon Valley via exit transactions. To the degree that there are variations in these generalized trends, they are primarily dependent on industry of the startups. To further confirm or refute these trends, test hypotheses and expand our understanding, a larger and more representative sample is required. Yet, as life cycle dynamics are dependent on industry and environment, it makes sense to choose the European setting for expanded study, as Sweden is a part of Europe.

Furthermore, it makes sense to focus on startups in sectors of strategic and economic importance to Europe and, guided by on consultations with stakeholders, the analysis is thus focused on two key sectors: startups in the Health Sciences and startups in Sustainability or Cleantech. With the Covid-19 pandemic, the strategic importance of Health Science startups has never been more apparent. Likewise, startups within Sustainability or Cleantech would be of vital importance to reach the climate goals set in Sweden and Europe. Startups in Health Sciences and in Sustainability/Cleantech cover a wide range of industries from healthcare to biotech, food, agriculture and energy that directly impact our health and environment. Additionally, the ongoing fusion of traditional biotech with software and digital services, and the emergence of new fields such as digital health and precision agriculture, are expected to yield future high growth opportunities. This fusion of industries is by itself of particular interest, as it may provide insights into what to expect from future fusions in what is becoming referred to as Deeptech industries, defined broadly as the intensive application of science to the creation of disruptive cutting-edge technologies.

Finally, the previous analysis of exit migration patterns[15] found that Life Science startups have among the highest long-term survival ratios, while Sustainability/Cleantech startups have the lowest long-term survival ratios. Analysis of these extremes may yield interesting answers as to why some startups survive, while others do not. The higher survival ratio of Life Science startups may be in part related to these startups also being among the most likely to be publicly listed. The same study also reveals that Sweden has the highest percentage of IPOs among venture capital funded startups among the studied regions (which included Silicon Valley). This is likely due to the listing of startups on second-tier stock exchanges having become a popular exit route for Swedish startups in recent years. Startups listed on second tier stock exchanges are among the smallest

[15] Hulthén, P. and Graff, G., 2019. See footnote 9.

startups that survive to exit, while the larger startups almost always are acquired. However, after listing on the second tier exchanges these startups outgrow, in relative and sometimes also in absolute terms, the majority of the acquired startups. Second tier stock exchanges may thus be a new tool for policy makers to accelerate long-term regional growth, while also having fewer startups leave their regions of origin. Thus, listed startups, regardless of origin, are of special interest.

Two main analyses focus on establishing a broader understanding of the life cycles of startups in the Health Sciences and in Sustainability or Cleantech in Europe, respectively. Private equity database Pitchbook is used to gather a comprehensive sample of approximately 25,000 startups, divided into Health Science and Cleantech. The sample firms are tracked from first funding until last known status, including those startups that undergo multiple exits. Methods introduced in previous work[16] are further developed to allow tracking of startups through multiple shifts in ownership. Expectations are that descriptive statistics for European Health Science and Cleantech startups may identify regions in Europe where startups have higher survival rates and more desirable outcomes. These analyses are documented in two working papers, one for Health Science[17] and one for Cleantech.[18]

A smaller analysis further investigates second tier stock exchanges, to better understand to what extent startups listed on these stock exchanges are financially sustainable as businesses and attractive as investments. For second tier stock exchanges to become a viable as a policy tool, they need to deliver financial return for shareholders that are comparable, adjusted for risk, to alternative investments, such as index funds or bonds. A working paper documents the rise and robustness of the Swedish second tier stock exchanges.[19]

The end goal is to better understand trends and factors influencing long-term survival and growth of startups in Europe's strategically important Health Science and Cleantech sectors, that may provide policy recommendations to help attain desirable end outcomes. Future studies may generalize these findings further, to be applicable for additional industries and across additional geographies.

[16] Hulthén, P. and Graff, G., 2019. See footnote 9.

[17] Hulthén, P. and Graff, G., The financing lifecycle and exits of Europe's pharma, biotech, and health science startups, Chalmers University of Technology, Gothenburg, Sweden 2024.

[18] Hulthén, P. and Graff, G., The financing lifecycle and exits of Europe's cleantech startups, Chalmers University of Technology, Gothenburg, Sweden 2024.

[19] Hulthén, P., The rise and robustness of Sweden's second tier stock exchanges, Chalmers University of Technology, Gothenburg, Sweden 2024.

Core research questions:

1. What happens to Health Science and Cleantech startups in Europe in the long run, in terms of survival and end outcomes?
2. How does financing, ownership, exit route and industry affiliation relate to the survival and long term outcomes for these firms?
3. How do survival, exit, financing type, and ownership patterns for Health Science and Cleantech startups in Europe converge and diverge from patterns found in previously studied regions?
4. Can subcategories, such as pharma, biotech, and medical devices in Health Sciences, or agriculture, food, energy, and environment in Cleantech, explain differences in survival, exit route, end outcome, financing and ownership, and if so, how?
5. Are some regions significantly more successful in growing and retaining their Health Science and Cleantech startups in the long run, and if so, why?
6. What happens to Health Science and Cleantech firms listed on second tier stock exchanges, to what degree do they grow, remain listed, become acquired or go bankrupt long-term?
7. What commonalities, for instance in financing and background characteristics, are observed between the best and worst performing startups listed on second tier stock exchanges?

Supplemental research questions:

1. Are there variables that increase or decrease the likelihood of an ownership exit from Europe, referred to as out-migration (as opposed to stickiness)?
2. Are there notable funding and valuation differences within Europe, and specifically Sweden?

This section next gives an overview of the three main areas of the study through descriptive statistics and interpretation of observed trends. It then proceeds to answer each research question in a summarized manner.

3.1 Overview of European Health Science startups

In conducting theanalysis of Health Science startups, there is an initial need to define the scope of the Health Sciences. Thus, the focus is placed on technologies directly addressing human health, with the exclusion of aquatic “blue” Life Sciences and agricultural “green” Life Sciences. Health sciences is also allowed to encompass medical devices, software, and digital health platforms, as well as a range of health related products and services with the exclusion of firms that have no discernable technology based innovations, such as new hospitals or clinics. With these definitions, the first step is to provide an overview of the studied phenomenon with descriptive statistics.

The number of European Health Science startups increase over the tracked period, as can be seen below in Figure 2. The lower rate of startup founding in recent years, 2016-2020, is due the delays in reporting. Startups often only register in private equity databases after they have completed a reported financing round involving equity funding. As startups may go for years after founding before their complete their first financing round involving professional investors, there is often a delay in reporting. There is no reason to believe the founding of new Health Science startups has declined in recent years.

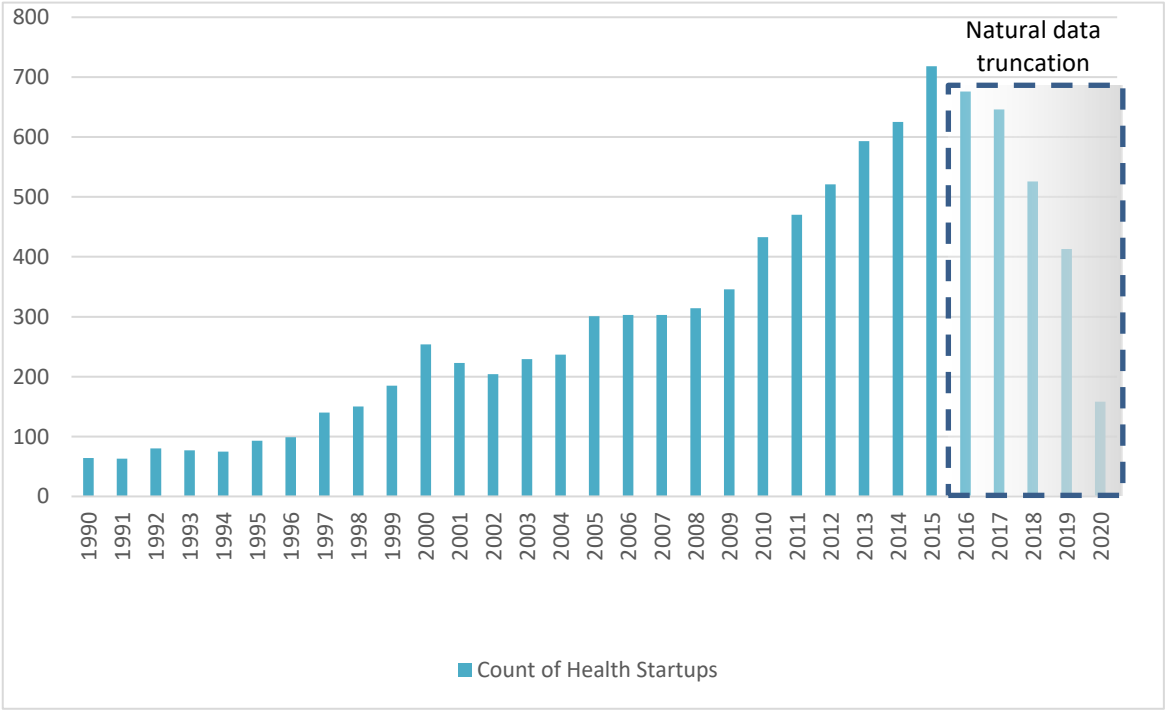

Figure 2: Health Science startups founded in Europe, by founding year.

Cluster	Pharma	Biotech	Devices	Software	Other Health Products	Other Health Services
London	90	78	118	163	56	148
Paris	73	63	103	92	37	71
Stockholm	54	29	64	42	19	35
Berlin	17	29	59	57	28	40
Cambridge	76	55	34	33	3	16
Copenhagen	45	39	53	37	11	19
Malmo	43	29	46	19	14	15
Dublin	28	17	53	36	12	18
Barcelona	35	28	39	20	9	25
Munich	31	24	33	25	13	18
Oxford	42	33	35	17	4	5
Zurich	33	12	42	21	2	10
Helsinki	13	12	32	28	9	25
Amsterdam	17	17	18	34	3	22
Lausanne	12	20	49	12	3	6
Moscow	16	19	18	14	5	22
Lyon	20	21	19	16	8	8
Madrid	10	17	22	14	8	21
Gothenburg	18	13	20	14	12	9
Milan	20	9	24	9	7	15
Vienna	21	19	12	13	6	11
Basel	34	20	13	7	6	1
Manchester	14	5	26	11	3	15
Oslo	19	12	14	12	3	12
Hamburg	13	8	16	13	6	14
Brussels	11	9	21	10	4	13
Aarhus	17	11	17	15	4	4
Geneva	15	12	17	7	2	7
Utrecht	17	11	14	12	1	4
Galway	5	1	39	3	5	3
Uppsala	22	4	20	4	5	1
Marseille	12	12	6	11	5	9
Edinburgh	18	11	11	5	4	5
Warsaw	12	3	11	7	5	16
Liege	10	13	13	6	3	4
Toulouse	7	8	12	6	5	7
Liverpool	2	5	11	10	7	8
Montpellier	7	7	12	6	3	7
Budapest	6	5	9	7	4	10
Glasgow	2	8	9	8	3	9

Figure 3: Health Science startups in Europe, by cluster and industry categorization.

Figure 3 above lists the largest regional clusters of Health Science startups in Europe (based upon OECD definitions of Functional Urban Areas) in order of number of startups and separated out by industry subcategories. As evident from Figure 3, clusters have some degree of specialization, with some more focused on certain industries. However, most clusters have representation of all different kinds of Health Science startups.

As is visualized in Figure 3 above and in Figure 4 on the next page, Health Science startups are concentrated within certain regions across Europe. Figure 5 shows the same map as Figure 4, adjusted for the amount of capital raised by the startups in each regional cluster. As evident from these Figures, there is a disproportionate amount of capital raised in the largest clusters. The capital concentration within clusters in the UK, Ireland, and Benelux countries, in Figure 6, and in western continental Europe, in Figure 7, is largely limited to a few urban regions with applied universities, established mature Life Science corporations, and financial centers.

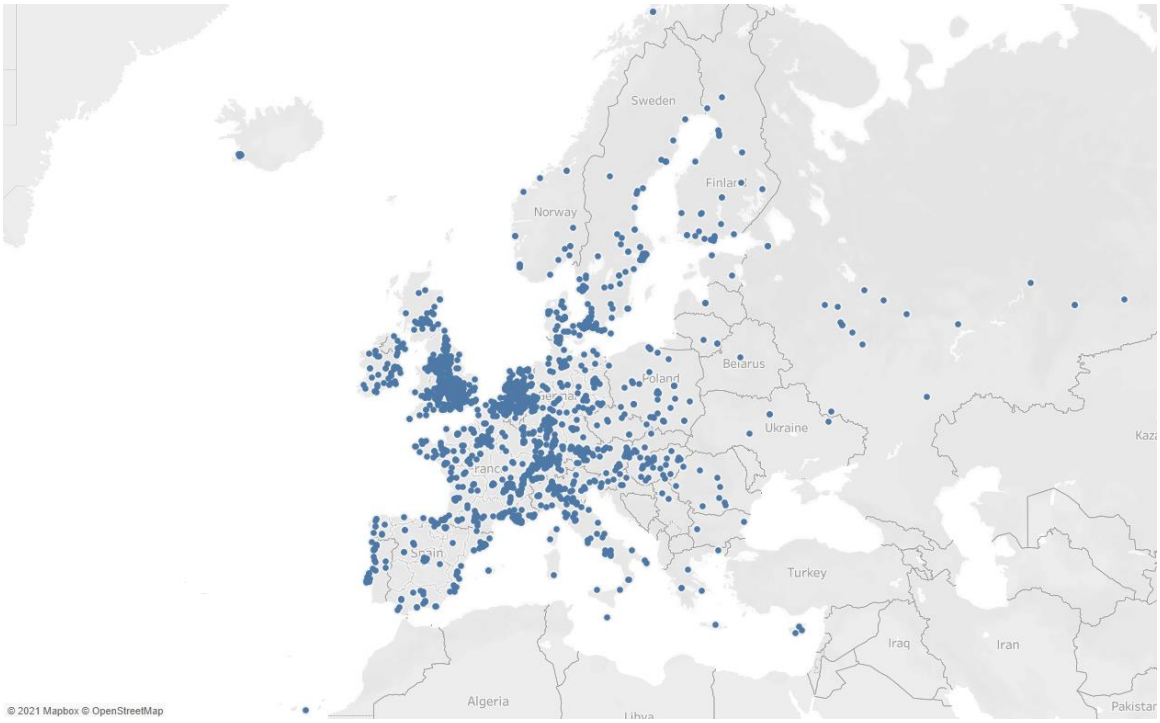

Figure 4: Health Science startups in Europe, one dot per startup.

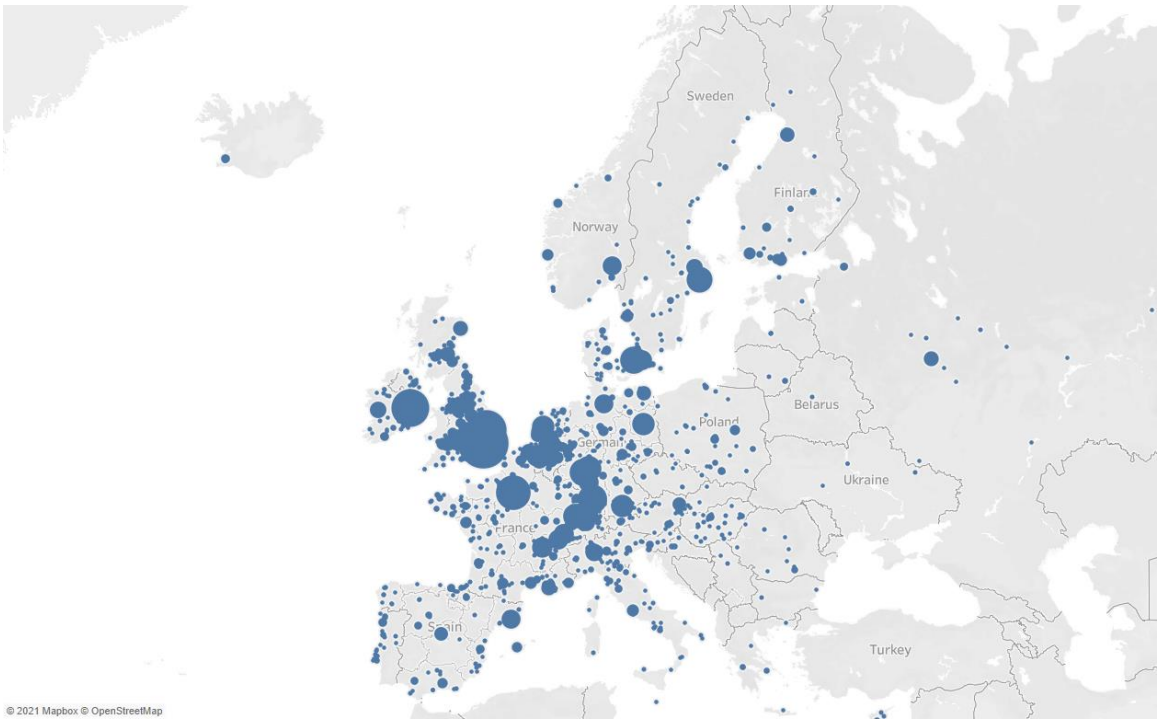

Figure 5: Health Science startups in Europe, dot adjusted by capital raised.

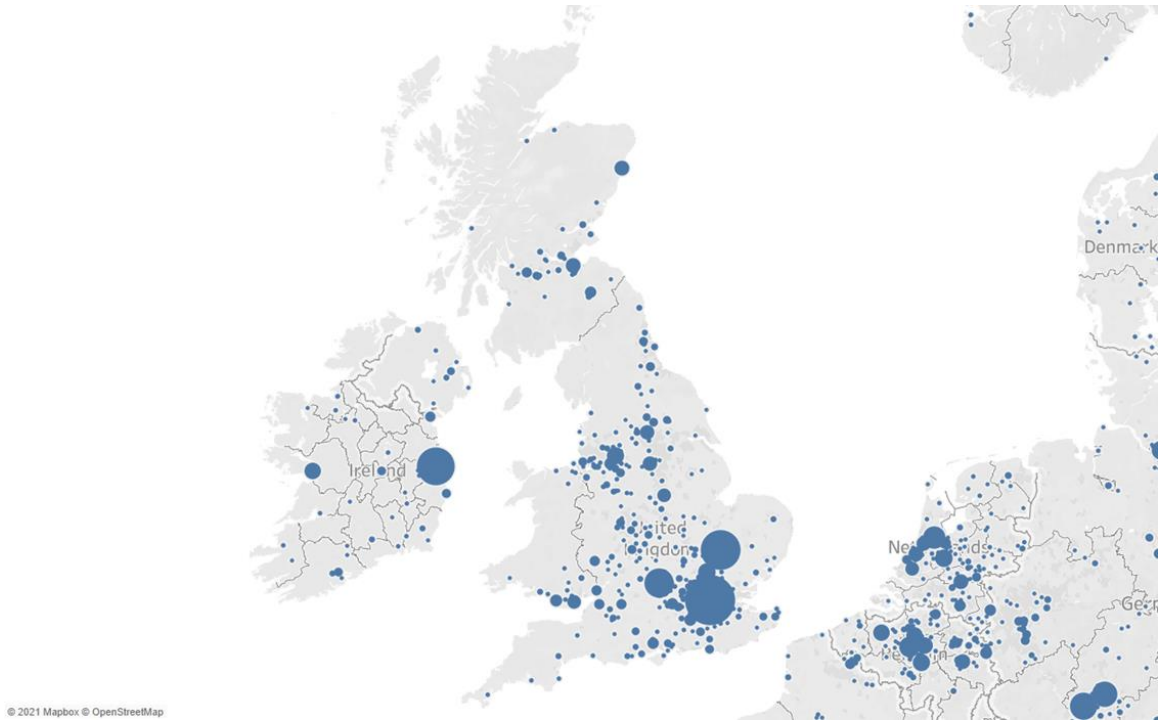

Figure 6: Health Science startups in UK, Ireland and Benelux, dot adjusted by capital raised.

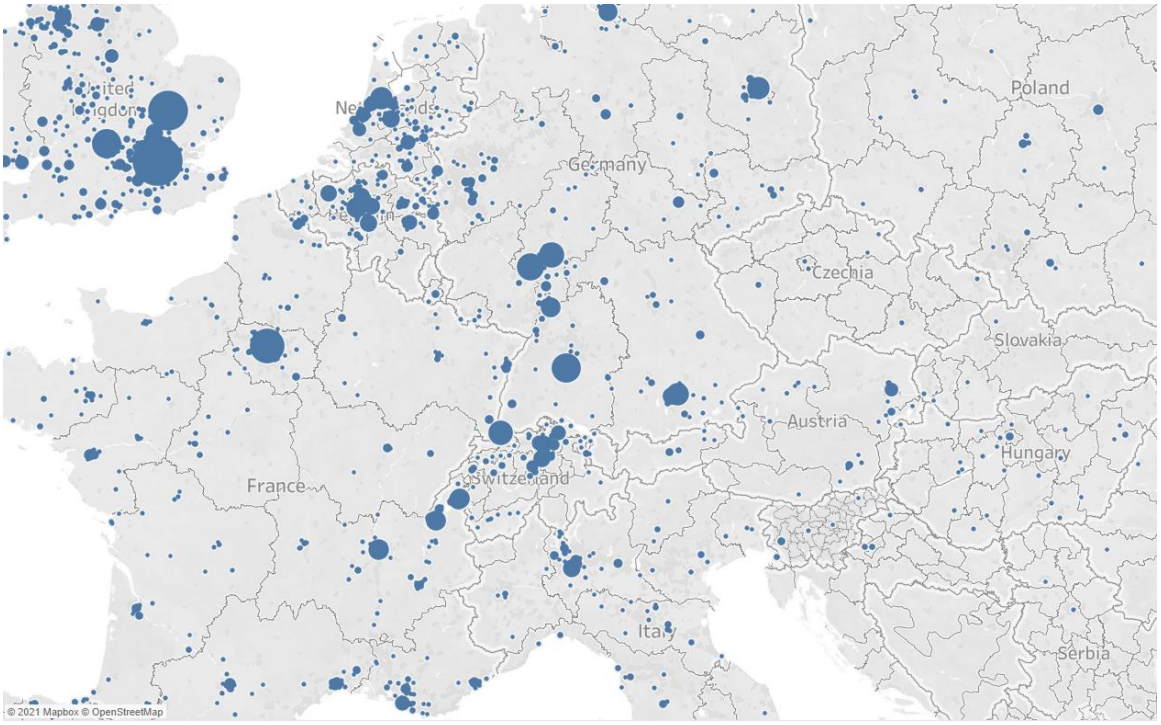

Figure 7: Health Science startups in Western continental Europe, dot adjusted by capital raised.

	London	Paris	Stockholm	Berlin	Cambridge	Copenhagen	Malmo	Dublin	Barcelona	Munich	Oxford	Zurich	Helsinki	Amsterdam	Lausanne	Moscow	Lyon	Madrid	Gothenburg	Milan
Number of total startups	654	440	243	230	217	204	166	164	156	144	136	120	119	111	102	94	93	92	86	84
Number of successful exits	**117**	**109**	**104**	**50**	**47**	**53**	**65**	**41**	**22**	**37**	**40**	**19**	**27**	**26**	**14**	**7**	**26**	**16**	**29**	**21**
as percent of total successful exits in the sample	4.9%	4.6%	4.4%	2.1%	2.0%	2.2%	2.7%	1.7%	0.9%	1.6%	1.7%	0.8%	1.1%	1.1%	0.6%	0.3%	1.1%	0.7%	1.2%	0.9%
Number of successful exits with deal size reported	56	41	57	15	26	30	39	19	9	15	26	6	6	4	7	2	12	6	14	10
Percent with deal size reported (for the cluster)	*48%*	*38%*	*55%*	*30%*	*55%*	*57%*	*60%*	*46%*	*41%*	*41%*	*65%*	*32%*	*22%*	*15%*	*50%*	*29%*	*46%*	*38%*	*48%*	*48%*
Sum of exit deal sizes reported (€ million)	**€ 6991**	**€ 2092**	**€ 2932**	**€ 740**	**€ 11458**	**€2915**	**€394**	**€1815**	**€1097**	**€2221**	**€3956**	**€563**	**€260**	**€1337**	**€671**	**€208**	**€455**	**€135**	**€442**	**€2620**
as percent of total exit deal sizes reported	5.3%	1.6%	2.2%	0.6%	8.7%	2.2%	0.3%	1.4%	0.8%	1.7%	3.0%	0.4%	0.2%	1.0%	0.5%	0.2%	0.3%	0.1%	0.3%	2.0%
Median exit deal size (€ million)	€28	€30	€11	€19	€66	€29	€2	€35	€72	€44	€63	€92	€28	€168	€59	€104	€19	€6	€5	€137
Mean exit deal size (€ million)	€125	€51	€51	€49	€441	€97	€10	€96	€122	€139	€152	€94	€43	€334	€96	€104	€38	€22	€32	€262
Maximum exit deal size (€ million)	€1890	€370	€642	€330	€5924	€765	€64	€624	€430	€500	€854	€167	€97	€1000	€302	€202	€171	€60	€201	€1100

Table 1: Exits of the top 20 Health Science startup clusters in Europe.

The maps reveal the largest clusters in terms of the number of startups founded and the clusters that raise the most capital. However, the more pertinent question is how successful the startups in these clusters are, measured in terms of successful exits and exit valuations. The exits of startups in the top 20 Health Science startup clusters (by number of startups founded) in Europe are listed in Table 1 on the previous page. The table shows that the largest clusters do not necessarily have the highest max, mean and median exit valuations.

It is not uncommon for the largest exits to attract public attention, considering the contemporary obsession with "unicorns". However, for a cluster to prosper, it should arguably be more important if the cluster consistently, over time achieves sizable exits, rather than a single major exit. According to this argument, high mean and median exit valuations together with a high number of exits (see Table 1), are the indicators that determine if a cluster is creating repeatable success. It is a question of preference whether mean or median exits are more important. Is a cluster a "heavy hitter", in terms of achieving impressive exits that elevate the mean, or "frequent hitter" in terms of achieving exits that consistently are of an adequate size and elevate the median?

Taking into account the mean, median and number of exits of the clusters, there are few clusters that stand out in all aspects. Cambridge, Milan, Amsterdam and Oxford are those that stand out the most, in achieving repeatable success. The next clusters to stand out are Barcelona, Munich and Zurich, which also rank quite high in most comparisons. Moscow is a special case in several aspects. Moscow has sizable exits, but only two. Moscow also has one of the lowest survival rates of startups among all clusters. Hence, Moscow is not a cluster that has achieved repeatable success. A number of European clusters achieve repeatable success, in terms of max, mean and median exits, including Lausanne, London, Helsinki, Dublin and Copenhagen. As previously mentioned, the largest and most capitalized clusters are not necessarily the most successful clusters in terms of mean and median exits. Thus, the question arises of how to measure and explain the success of clusters.

One plausible explanation is proximity to leading universities and capital networks. However, many of the clusters in the top 20 share these advantages. Hence, while this may separate the top 20 from the remaining long tail of clusters, it may not adequately explain what distinguishes the top 5. The best answers might not be found by analyzing the regional clusters, but instead by going deeper into analyzing those firms that were sold for the highest amounts. Shared characteristic among the startups with the highest exit valuations are that they often come from research institutions (universities or institutes), are relatively old at the time of exit (as compared to other startups in the sample), and have sizable venture capital investments and high valuations beginning from their first financing round. Since they are often based on research their technologies and founding teams are incubated for several years before being incorporated. Their first

financing round has participation of several venture capitalists and the invested amount and valuation is comparable with late rounds for many other startups. In short, institutions finance and incubate them for several years, so when they start their startup lifecycle they are relatively mature and well-prepared. This is as far as the methodology employed here allows us to investigate. To go further requires different methods, such as qualitative case studies or a "mixed methods" approach.

The next obvious question is how, and to where, Health Science startups exit. Among the top 20 clusters, acquisitions are by far the dominant exit. The exceptions are Swedish clusters, that have somewhat higher listing rates than any other clusters, likely due to Swedish second tier stock exchanges. Most European Health Science startups are acquired by Europeans. However, the more valuable Health Science startups are frequently acquired by industry incumbents in the United States. As can be seen below in Table 2 below, US based companies acquire 30 percent of European Health Science startups, and those 30 percent of startups represent 62 percent of the total reported exit valuations. (It should be noted that there may be some bias towards reporting exit values for international acquisitions, while exit values for domestic acquisitions may not be disclosed as frequently.)

	Total	**Acquired by European**	**Acquired by non-European…**	**…of which acquired by US**
By count	1084	661 (61%)	423 (39%)	327 (30%)
By value (in € billions)	€ 138	€ 34 (25%)	€ 94 (68%)	€ 85 (62%)

Table 2: Acquisitions of European Health Science startups, by valuation and location of acquirer.

3.2 Overview of European Cleantech startups

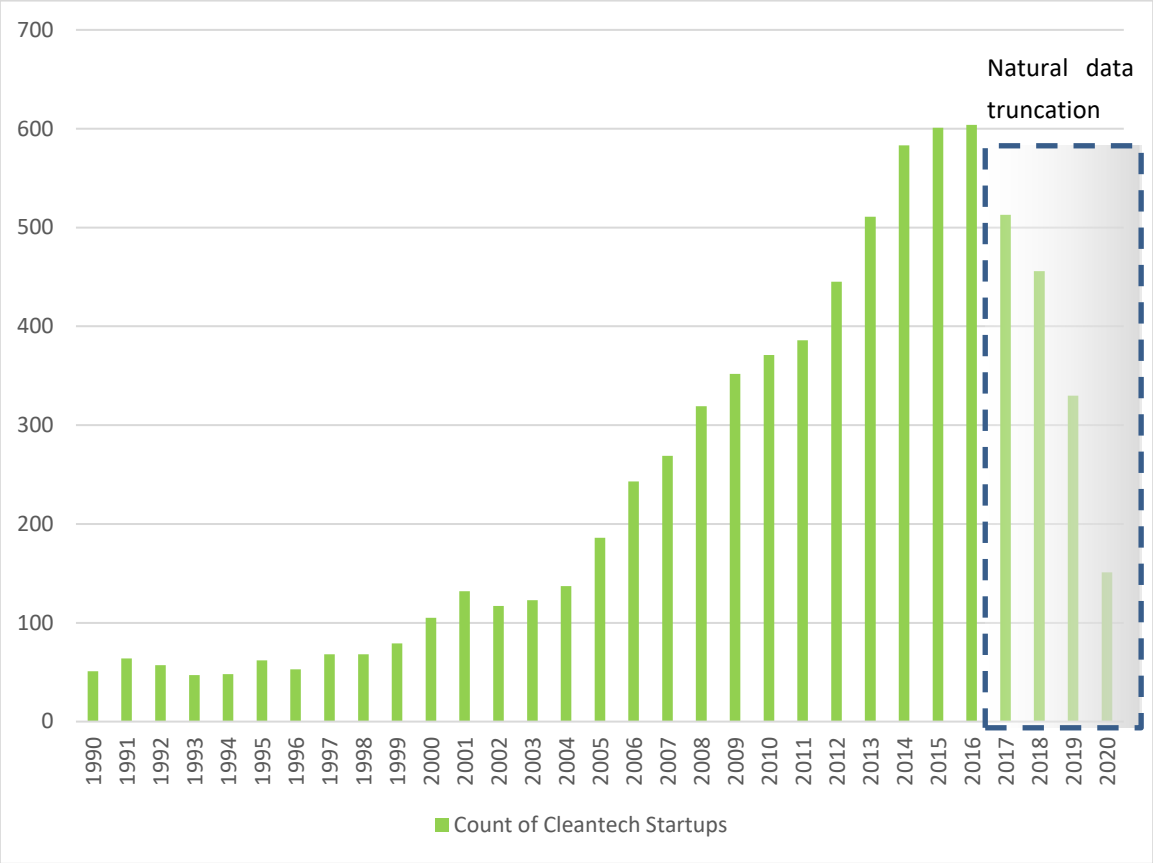

Figure 8: Cleantech startups founded in Europe, by founding year.

The number of European Cleantech startups has increased dramatically since the early 2000s and continues to rise, as can be seen in Figure 8 above. There is a lag in reporting, as seen in the Health Science startups, resulting in natural data truncation that explains the lower number of Cleantech startups reported for 2017-2020. Compared to the Health Science startups, Cleantech startups are younger on average, with numbers growing rapidly since 2005. However, as is evident in the following Figures and Tables, Cleantech as an investment category is quite diverse and is only starting to mature. Venture capital investments and exits are in a relatively early phase. Although the number of Cleantech startups may surpass Health Science startups in the next few of years, it will take considerably longer until similar levels of venture capital investments and exits are reached.

Figure 9, below, lists the Cleantech clusters within Europe (again, based upon OECD definitions of Functional Urban Areas) in order of total number of Cleantech startups founded in each cluster,

separated out across seven industry subcategories. Like the findings in Health Science, clusters have a limited degree of specialization, with some clusters more focused on certain industries, but most clusters have some representation of all kinds of Cleantech startups. However, the differences in size between the largest and smallest clusters are comparably greater than observed in the Health Sciences. This is likely a consequence of Cleantech being a less mature category and thus not as widely spread across Europe. Many of the Cleantech clusters are only getting started.

Cluster	Energy	Materials/ Chemicals	Transport/ Logistics	Software/ devices	Environment/ Resources	Agriculture	Food/Beverage/ Consumer Products
London	113	10	26	130	51	32	156
Paris	73	15	24	86	50	37	112
Berlin	45	2	13	59	12	8	63
Stockholm	35	11	7	28	19	4	46
Amsterdam	27	9	12	32	9	9	21
Madrid	28	7	5	26	6	9	30
Munich	29	3	16	23	10	8	20
Barcelona	22	6	7	21	11	7	25
Copenhagen	20	3	3	19	15	9	27
Helsinki	21	7	5	23	17	6	13
Milan	27	5	2	24	7	5	19
Dublin	22	4	2	29	9	2	16
Gothenburg	24	5	4	13	13	3	11
Brussels	17	5	2	12	5	9	16
Oslo	25	7	4	11	7	7	5
Cambridge	17	5	3	7	9	6	13
Zurich	10	1	6	12	10	3	17
Moscow	11	5	3	13	2	8	14
Malmo	10	5	3	5	10	3	19
Hamburg	12		6	6	9	1	17
Vienna	10	2	2	8	3	7	18
Lyon	15	3	5	8	5	4	10
Edinburgh	17	3		7	5	9	7
Toulouse	11	4	2	4	10	8	8
The Hague	16	4	3	5	7	3	8
Lisbon	5	3	1	13	6	5	10
Turin	6	4	1	4	10	4	8
Aarhus	10	3	1	5	6	3	9
Valencia	10	5	1	7	4	3	6
Lausanne	10	4	2	7	4	3	5
Rotterdam	11	1	1	4	10	2	5
Liege	10	4	1	2	8	1	6
Lille	7	1	1	5	4	4	10
Bordeaux	11	2	2	6	2	2	6
Cologne	6	2	2	9	4	2	5
Warsaw	9			7	3	1	9
Nantes	14		1	5	2	3	4
Antwerp	6	1	2	7	7		6
Grenoble	9	4		4	10		2
Oxford	8	4		5	4	3	4

Figure 9: Cleantech startups in Europe, by cluster and industry affiliation.

Figure 10, on the next page, maps the distribution of Cleantech startup clusters in Europe, while Figure 11 shows the capital raised by the Cleantech startups in these clusters. The largest clusters raise more capital than the smaller, but the distribution is less skewed than in Health Sciences. This indicates that startups in the largest clusters are still only getting started in raising capital.

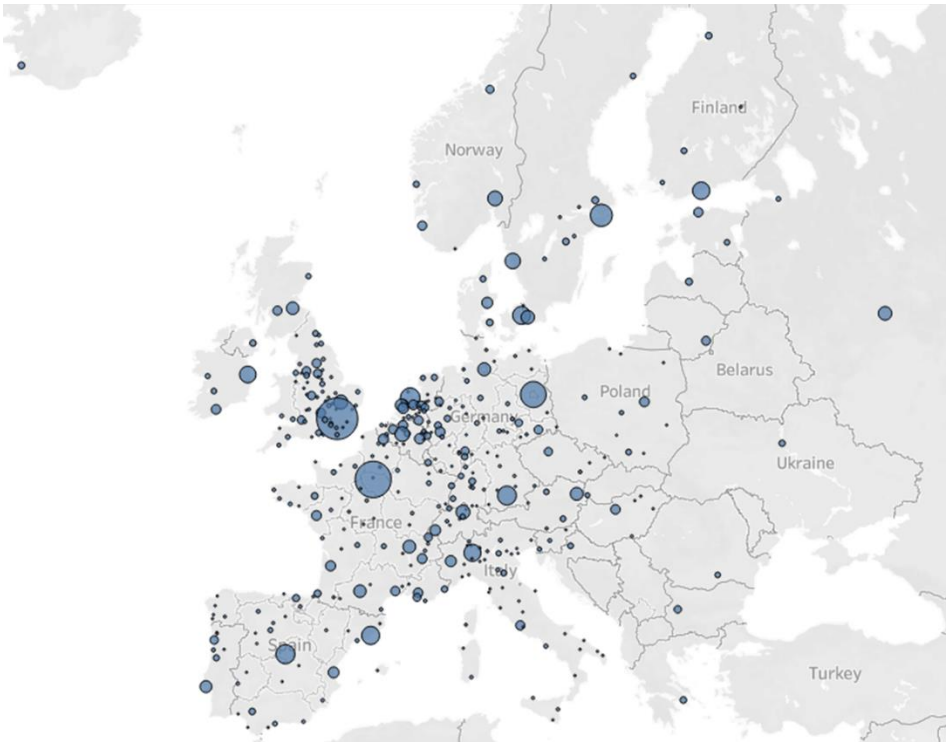

Figure 10: Cleantech startups in Europe, dot size corresponds to number of startups.

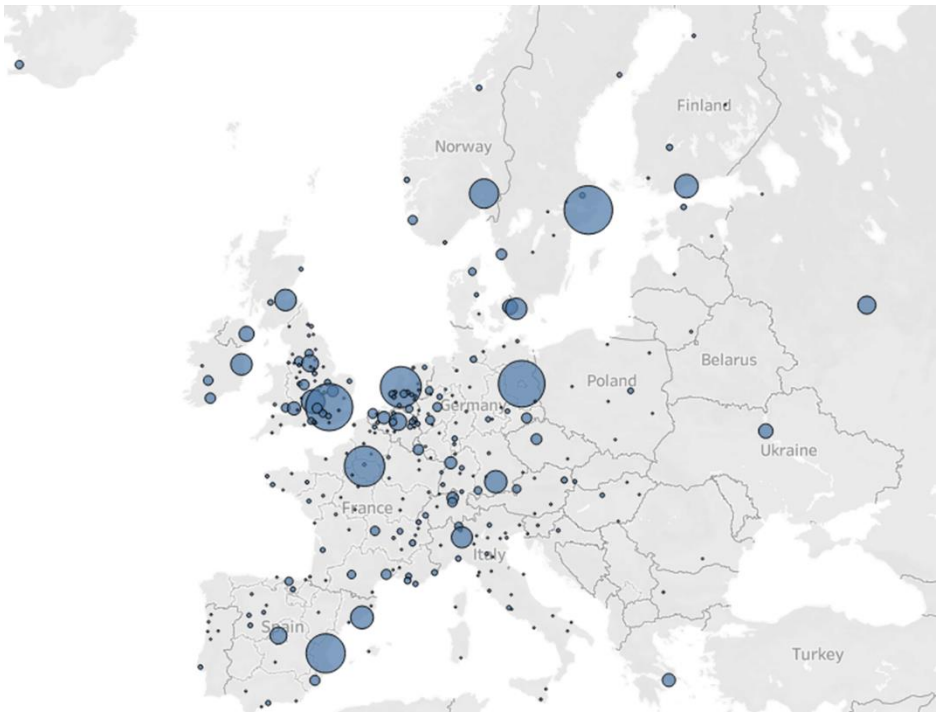

Figure 11: Cleantech startups in Europe, dot size corresponds to capital raised.

	London	Paris	Berlin	Stockholm	Amsterdam	Madrid	Munich	Barcelona	Copenhagen	Helsinki	Milan	Dublin	Gothenburg	Brussels	Oslo	Cambridge	Zurich	Moscow	Malmo	Hamburg
Number of total startups	518	397	202	150	119	111	109	99	96	92	89	84	73	66	66	60	59	56	55	51
Number of successful exits	**62**	**57**	**37**	**18**	**18**	**22**	**12**	**11**	**14**	**11**	**19**	**8**	**11**	**9**	**13**	**6**	**4**	**9**	**6**	**7**
as percent of total successful exits in the sample	*1.2%*	*1.4%*	*0.8%*	*0.7%*	*0.9%*	*0.7%*	*1.2%*	*0.5%*	*0.7%*	*0.6%*	*0.8%*	*0.4%*	*0.3%*	*0.6%*	*0.4%*	*0.5%*	*1.2%*	*1.4%*	*0.8%*	*0.7%*
Number of successful exits with deal size reported	19	9	4	9	5	14	5	4	3	1	8	3	5	2	3	3	2	4	0	1
Percent with deal size reported (for the cluster)	*31%*	*16%*	*11%*	*50%*	*28%*	*64%*	*42%*	*36%*	*21%*	*9%*	*42%*	*38%*	*45%*	*22%*	*23%*	*50%*	*50%*	*44%*	*0%*	*14%*
Sum of exit deal sizes reported (€ million)	**€8324**	**€1,432**	**€85**	**€777**	**€543**	**€7976**	**€688**	**€172**	**€395**	**€10**	**€1212**	**€1169**	**€213**	**€167**	**€139**	**€117**	**€137**	**€144**		**€2300**
as percent of total exit deal sizes reported	*16.8%*	*2.9%*	*0.2%*	*1.6%*	*1.1%*	*16.1%*	*1.4%*	*0.3%*	*0.8%*	*0.0%*	*2.5%*	*2.4%*	*0.4%*	*0.3%*	*0.3%*	*0.2%*	*0.3%*	*0.3%*		*4.7%*
Median exit deal size (€ million)	€31	€109	€14	€21	€72	€489	€50	€26	€180	€10	€58	€211	€13	€84	€8	€19	€68	€23		€2300
Mean exit deal size (€ million)	€438	€159	€21	€86	€109	€570	€138	€43	€132	€10	€152	€390	€43	€84	€46	€39	€68	€36		€2300
Maximum exit deal size (€ million)	€7429	€628	€54	€488	€356	€1588	€319	€120	€188	€10	€400	€913	€136	€157	€131	€78	€133	€91		€2300

Table 3: Exits of the top 20 Cleantech startup clusters in Europe.

The relative immaturity of the European Cleantech clusters is evident in the low numbers of successful exits achieved to date by cluster, as seen in Table 3 on the previous page, and very few of those exits report deal size. This makes it difficult to analyze which clusters may have found formulas for creating repeatable success. One Cleantech startup cluster that stands out is Madrid, with a larger number of startups exits reporting high mean and median exit valuations. London has significantly more startups and exits, but a comparable sum of reported exit deals. Paris, Stockholm, and Milan trail Madrid with promising exits. Amsterdam, Munich, Copenhagen, Dublin, Brussels, and Zurich are all emerging clusters that need more exits with higher mean and median valuations to see if they are on the right track.

The final indication that European Cleantech startups are still maturing is the relative lack of interest from non-European and especially US acquirers. As can be seen in Table 4 below, the vast majority of Cleantech startups in Europe are acquired by European incumbents. While in the Health Sciences, it is observed that US acquirers have been actively pursuing the most valuable European startups, in Cleantech US acquirers are less active in pursing European startups, having acquired 10 percent of the European Cleantech startups, which represented only 7 percent of total valuations across all European Cleantech exits.

It may be that US acquisitions may increase as European Cleantech startups mature. However, there is an important difference between the Health Sciences and Cleantech that may be a factor. European Health Science startups have for a long time received considerable US venture capital investments, especially in the later stage financing rounds. In contrast, US venture capital investments are considerably smaller in European Cleantech startups. To the extent that US venture capital investments generally precede US acquisitions, a plausible chain of events may be that as European Cleantech startups mature, they may start to attract more US venture capital investments, which in time could lead to more US acquisitions. This argument is further discussed later in the report.

	Total	**Acquired by European**	**Acquired by non-European…**	**…of which acquired by US**
By count	962	741 (77%)	158 (16%)	97 (10%)
By value (in € billions)	€ 30	€ 21 (70%)	€ 9 (29%)	€ 2 (7%)

Table 4: Acquisitions of European Cleantech startups, by valuation and location of acquirer.

3.3 Overview of Swedish Secondary Stock Exchanges

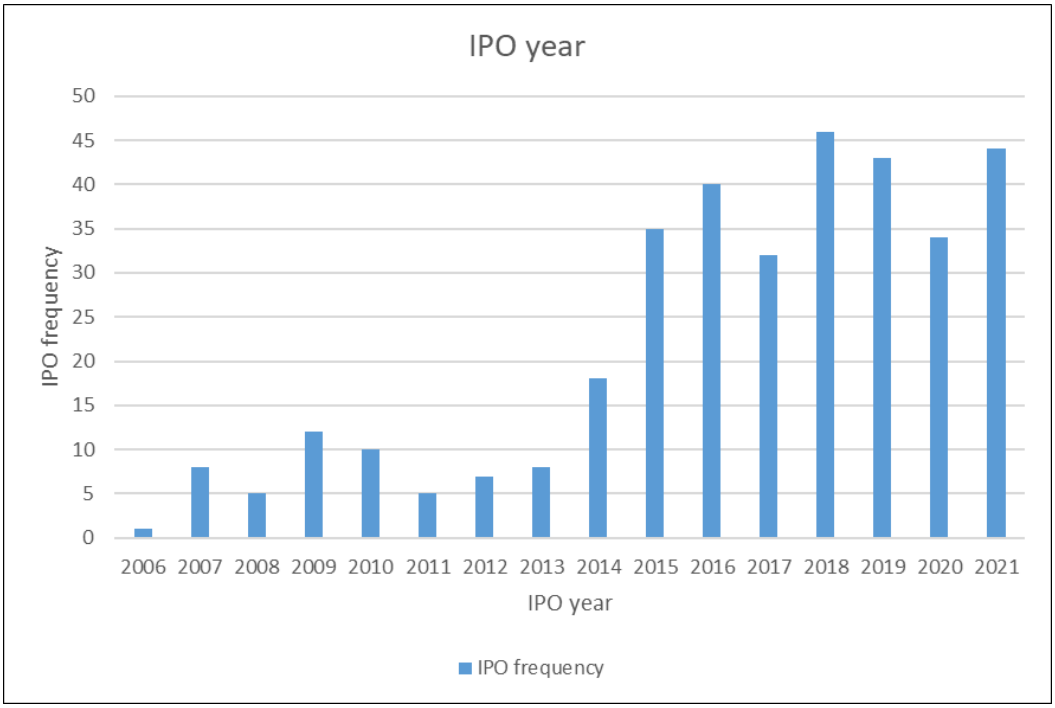

Figure 12: IPO frequency on Swedish secondary stock exchanges (MTFs) 2006-2021.

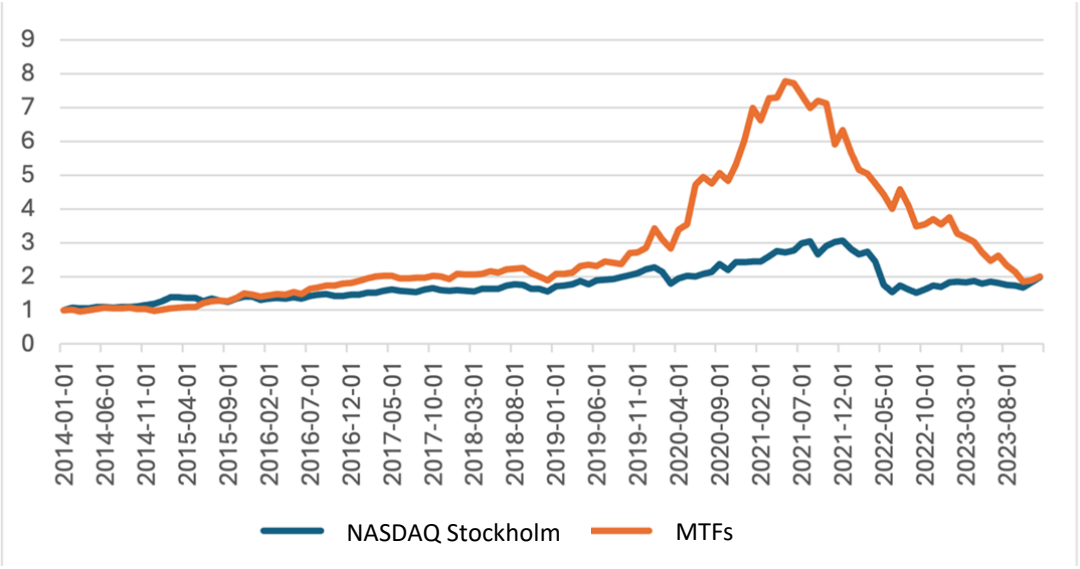

Figure 13: Market cap of NASDAQ Stockholm and MTFs, 2014-2023 relative to their respective values on 2014-01-01.

Initial public offerings (IPOs) on Sweden's secondary tier stock exchanges, also referred to as Multilateral Trading Facilities (MTFs), have surged in number since 2014, as can be inferred from Figure 12 on the previous page. The number of listings has continued despite the Swedish stock market crash in 2021. Figure 13 shows the growth (and decline) of the market cap of the second-tier stock exchanges (MTFs) compared to the first-tier Nasdaq Stockholm stock exchange from 2014 to 2023. The second-tier stock exchanges had a significantly higher rate of growth than the first-tier exchange from 2019 to the 2021 crash. In 2021-2023 both markets went into in decline until they began to recover in late 2023. The relative end points for the first- and second-tier stock exchanges are similar by the end of 2023, at about two times the market cap they began with in 2014. The second tier stock exchanges have considerably higher volatility than the first tier exchange. However, in terms of long-term market cap growth, they end start and end in similar places. This indicates that second-tier stock exchanges are robust and are not necessarily subpar to the first-tier stock exchange in long-term returns, if investors can tolerate their volatility. The greatest drawback of the second-tier stock exchanges is not necessarily high volatility, but rather the skewed distribution of returns, as illustrated in Figure 14. Figures 15-16 on the next page, indicate a significant difference in mean and median returns. A minority of high performing firms contribute most of the returns on the MTFs.

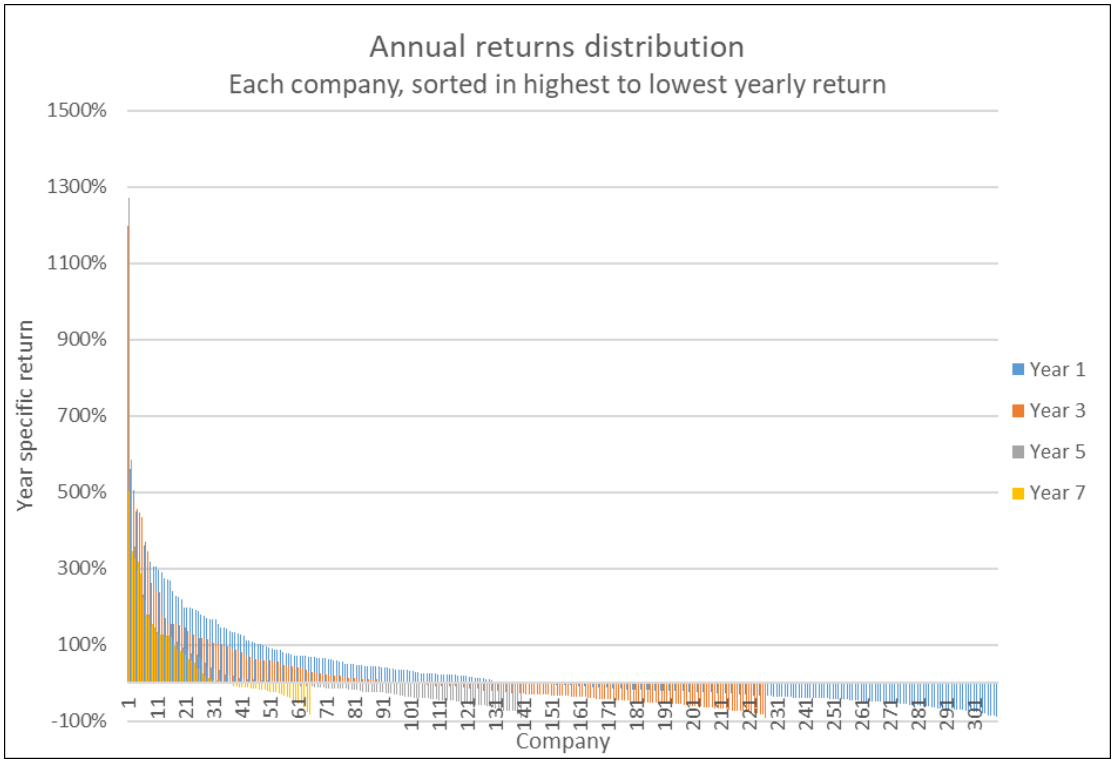

Figure 14 : Annual returns distributions on Swedish secondary stock exchange (MTF)s.

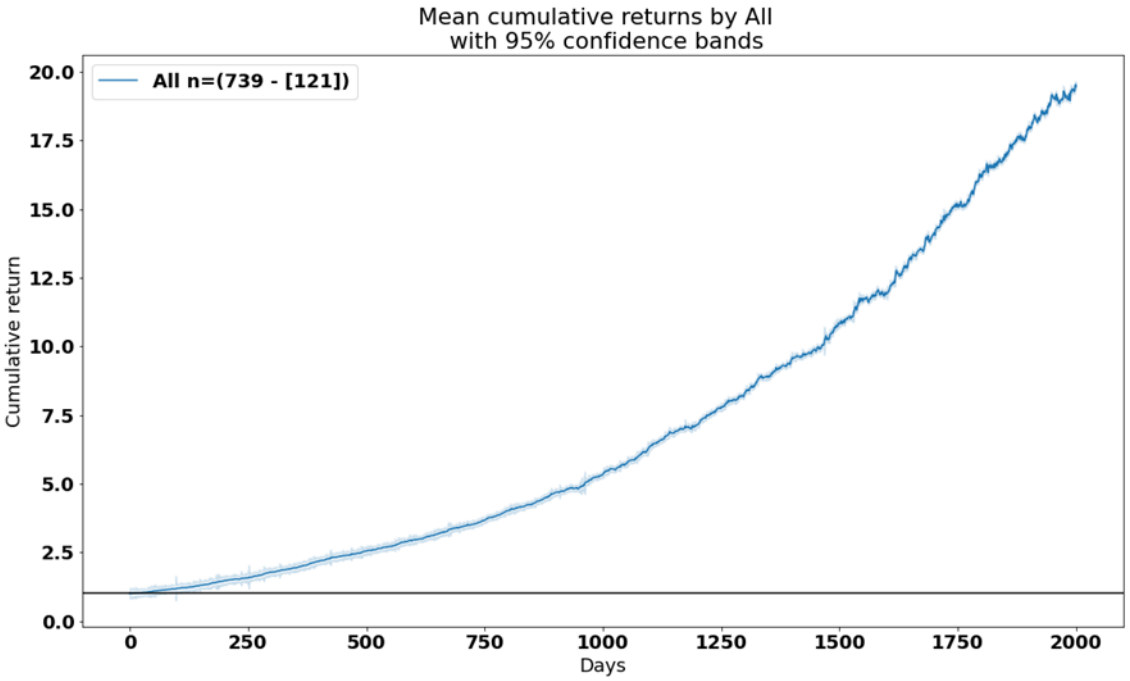

Figure 15 : Mean cumulative returns of firms on Swedish Secondary Stock Exchange (MTF)s

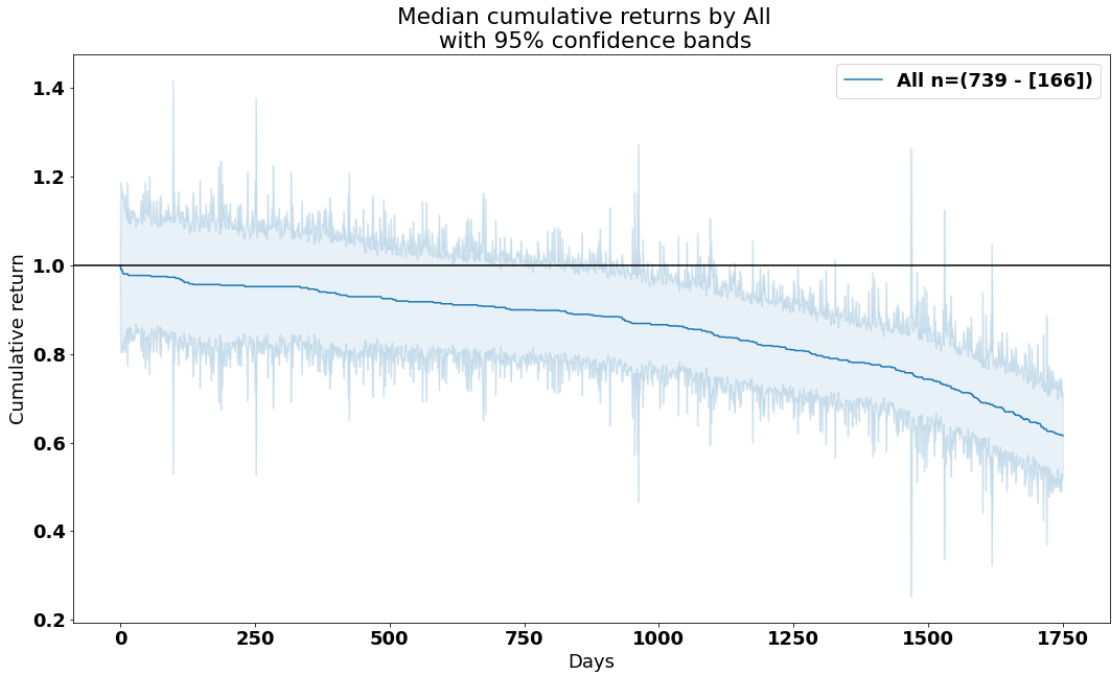

Figure 16 : Median cumulative returns of firms on Swedish Secondary Stock Exchange (MTF)s

3.4 Answers to core research questions

Based on these overviews, answers to the core research questions can be summarized.

1. What happens to Health Science and Cleantech startups in Europe in the long run, in terms of survival and end outcomes?

Survival rates vary across clusters, but not as much across subcategories. The best survival rates are in clusters in Western Europe, with Sweden's clusters having the best survival ratios. Survival ratios are lower in Eastern Europe, with Moscow having the worst ratios. Lifecycle outcomes vary across clusters, although M&As dominate across all geographies and industry subcategories. Sweden stands out with significantly more public offering (IPO) exits than other countries, likely related to the Swedish second-tier stock exchanges.

2. How does financing, ownership, exit route and industry affiliation relate to the survival and long term outcomes for these firms?

European Health Science and Cleantech startups are primarily funded by European venture capital (VC). In the early phases of the startups' life cycles, there is significant supplementary funding in the form of grants from European institutions (such as Horizon) and US foundations (such as the Gates Foundation). In the later phases, private equity investments (PE) begin to rival venture capital investments, yet the overlap between VC and PE funded startups is remarkably small. Although there are differences in life cycles and exit patterns for startups with either VC or PE funding, these differences are small. This indicates that in terms of exit preferences, VCs and PEs follow a similar exit logic in deciding when and how to exit their portfolio companies.

Companies with a longer development life cycle, such as Pharma and Deeptech companies, are more likely to exit through IPOs than other companies. A likely reason for this is that IPOs are primarily a fundraising solution and not intended as a long-term ownership solution. These companies have considerable capital requirements and a long time horizon to market, with which few private investors have the patience and terms of capital to align. Hence, these startups find an IPO to be one of the few avenues for long-term funding. Public markets accept that these companies go public, despite often lacking revenues, due to their future potential value once they reach their intended markets. Hence, public listing works remarkably well for these companies as a long-term funding source. Once listed, they can raise consecutive rounds through those markets.

Interestingly, a number of such publicly listed startups are eventually acquired by larger listed corporations, which equates to them being acquired. Hence, the stock exchange is not a long-term home for these companies, but rather a temporary funding source, until finally acquired.

3. How do survival, exit, financing type, and ownership patterns for Health Science and Cleantech startups in Europe converge and diverge from patterns found in previously studied regions?

The most notable difference in survival ratios is the considerably high number of European startups that continue to survive without signs of being profitable, funded or having an exit. European startups are remarkably adept at staying alive, even under conditions that, if located in the US market, they would be closed or sold off. At face value, this indicates a resilience that is admirable and likely conserves some jobs. However, the cost of this "struggling on" is that sometimes it is better to shut down a firm with poor prospects and allow the talent and capital to be redeployed to new, more-promising firms. How many of these firms continue with little income could not be answered with the present data and methodology. Answers to this question would require a different approach, such as qualitative case studies, or verification of current operating status by matching these thousands of startups with longitudinal business census data.

Focusing on those startups with verifiable exits—whether positive exits via IPO or M&A or negative exits via bankruptcy or liquidation—the exit patterns for European Health Science and Cleantech startups are similar to previously studied regions in the US, with a stronger emphasis on acquisitions.[20] However, assuming that the majority of these European startups that "struggle on" are the "walking dead" or "on life support", and unlikely to ever become successful, then European startups have lower survival ratios than similar startups in previously studied regions in the US. The notable exception in this context is Sweden, with higher survival and IPOs rates than in the rest of Europe. The higher survival rates are likely explained with the unique opportunity of the second-tier stock exchanges, which are more accessible in Sweden than elsewhere in Europe.

4. Can subcategories, such as pharma, biotech, and medical devices in Health Sciences, or agriculture, food, energy, and environment in Cleantech, explain differences in survival, exit route, end outcome, financing and ownership, and if so how?

Industry subcategories alone cannot explain such differences. There are distinct regional specializations of certain clusters. However, there is no evidence that regional specializations are related to differences in survival or exit outcomes. Survival and exit routes appear to be uniform across subcategories. Differences between clusters are more likely related to proximity to contextual

[20] Hulthén, P. and Graff, G., 2019. See footnote 9.

factors and localized synergies, such as financial centers, industry incumbents, and top universities.

5. Are some regions significantly more successful in growing and retaining their Health Science and Cleantech startups in the long run, and if so why?

Yes, clusters in Western Europe have higher survival rates, with Sweden's clusters being among the highest. Most surviving startups are acquired by European acquirers, so most startups remain European. However, if startups are sold abroad, they are most likely sold to US acquirers, especially the most valuable. A key finding in previous studies—*that the more valuable a startup was, the more likely it was to transition to ownership by an incumbent in Silicon Valley*—was also true for Health Science startups in Europe, but less so for Cleantech.

Startups sold to owners or listed on stock exchanges in the USA have considerably higher mean and median valuations than startups that remained owned by Europeans. This trend is much stronger in the Health Sciences than in Cleantech. Ownership and control remained in Europe for the majority of Health Science and Cleantech startups, but more successful startups tended to migrate to the US. Important differences for Health Sciences and Cleantech relative to other sectors previously studied, is that Silicon Valley as a region is less dominant, with the entire US market as a destination for European exits. Some of the Europe to US ownership transitions occur through listings and re-listings on US stock exchanges, rather than acquisitions.

6. What happens to Health Science and Cleantech firms listed on second tier stock exchanges, to what degree do they grow, remain listed, become acquired or go bankrupt in the long run?

Startups listed on second tier stock exchanges in Sweden have remarkably high survival rates. When the first and second tier stock markets declined in the early 2020s, there is a notable decline in new listings. However, startup continue to list and listing frequency over time goes up. There is a notable drop in valuations on the second-tier stock exchanges, however, these drops are on par with share prices falling on first tier stock exchanges in Sweden. Startups listed on secondary stock exchanges have in generally a higher survival rate than startups that become subsidiaries. Overall, secondary stock exchanges are resilient as a long-term funding source for Swedish (and other European) startups.

7. What commonalities, for instance in financing and background characteristics, are observed between the best and worst performing startups listed on second tier stock exchanges?

The best performers, measured in long-term share price increases after listing, are startups that are profitable even before listing, with no previous equity funding. Indications are that VC funded startups are often overpriced at listing and are unable to defend their share prices in the long run, which results in gradually declining share prices in the years following listing. PE funded startups listing have similar indications of overpricing at listing, and difficulties in defending their share prices as well. Most self-funded startups are, in contrast, underpriced relative to their long-term potential.

For the VC and PE investors seeking to exit startups through an IPO on a second-tier exchange, the long-term decline in share prices is seldom a problem. Share prices often do not decline until after the lock-up clauses have expired, and the VCs and PEs have sold off their shares. Furthermore, the best firms listed on the secondary stock exchanges often relist on primary stock exchanges within a few years. This superficially contributes to a lackluster reputation for secondary stock exchanges, as the best performers were never staying permanently. This reinforces the previous perception of secondary stock exchanges as crossroads, where the best firms stop for a few years before they move up, while the mediocre to worst firms remain and never quite achieve the hoped for growth.

3.5 Answers to supplemental research questions

To conclude, the two supplemental research questions are answered.

1. Are there variables that increase or decrease the likelihood of an ownership exit from Europe, referred to as out-migration (as opposed to stickiness)?

A list of possible variables, derived from theories and earlier findings, is tested to substantiate which variables are statistically significant to increase the likelihood of migration or stickiness. In the end, a few variables are substantiated as statistically significant showing a correlation with migration at exit. No variables are substantiated as statistically significant for stickiness in general.

There is a statistically significant relationship between VC investments from the US going into a startup, and that startups later being acquired by a company based in the US. The mere presence of a US venture capitalists in a financing round of a startup increases the likelihood of a acquisition by a US corporation. Furthermore, the more US venture capital is invested, and the more US venture capitalists that become involved, this increases the likelihood of a US acquisition.

There is no similar statistically significant relation between venture capital investments into startups and the acquisition of these startups, related to other geographical regions, such as Asia. However, the volume of VC investments from Asia and exits to Asia, or any other region, is too small to establish if there is a statistically significant relationship. Hence, this relationship between venture capital investments and acquisitions may be valid in general, regardless of their geographical origin of the venture capitalists and acquirer. However, only the US based venture capitalists and acquirers have the volume of investments and acquisitions to establish the statistically significant relation.

A second variable of statistical significance is the "Anglo-centric" acquisition effect. Startups based in countries that share English as a first language, specifically the UK and Ireland, have a higher likelihood of an exit to the USA and Canada, by acquisition or listing. Apparently sharing a native language, with associated history as well as shared business and legal culture, lowers the barriers for cross-Atlantic acquisitions. A comparable cultural affinity-based acquisition affect has not been observed for other cultures and languages (Germanic, Hispanic, for example). This may again likely be due to a lack of acquisitions in other cultures and languages to substantiate a statistically significant relationship. A larger dataset of acquisitions is required to investigate this further.

However, no variable is found to have a significant influence on stickiness in general, increasing the likelihood of European startups exiting within Europe. There is no statistical evidence of European venture capital investments providing a European stickiness in general, despite expectations of this effect. The only European stickiness found is a stickiness specific for the 15 most startup populous Functional Urban Areas (FUAs) in Europe, the "top 15 FUAs". This means that if a startup originates from one of these FUAs, and receives venture capital funding from within this FUA, the likelihood of an exit, acquisition, or listing, within this same FUA increases. This is a localized effect, where the founding, financing and exit of a startup remains within a small geographical area, that is cohabited with many other startups and venture capitalists. The resemblance to Silicon Valley is striking. However, to achieve this localized effect requires a geographical concentration of startups and capital that is hard to achieve in Europe and may only be achievable in a few European metropolitan areas.

2. Are there notable funding and valuation differences within Europe, and specifically within Sweden?

Larger metropolitan areas have higher mean and median startup valuations. Venture capitalists often have offices in these areas, which means that areas with many venture capitalists also have higher mean and median startup valuations. These metropolitan areas also have more applied universities and more mature industry clusters. Valuations and fundraising is generally higher in

hubs with accumulations of capital, such as financial services centers, stock exchanges and sizable investor communities. Startups in hubs with higher valuations also tend to raise more capital at these higher valuations. Hubs with a history of successful exits also have higher valuations, likely associated with a reputational effect that "success breeds success". There are many factors that correlate with higher startup valuations. Thus, a more interesting question may be how large the differences between clusters are in startup valuations, given the general trend of metropolitan areas having higher startup valuations, and whether these differences are surprising.

Indeed, some differences do catch the eye and surprise. Figure 17 below shows the differences in fundraising in the four largest Health Science startup clusters in Sweden: Stockholm, Uppsala, Gothenburg, and Malmö/Lund. As seen in Figure 17, Stockholm and Uppsala startups raise on average more than twice the funding of startups in Gothenburg, and at higher valuations. Sweden is not the only country with these inconsistencies. There are examples across European of similar inconsistencies in capital raised and valuations between neighboring clusters.

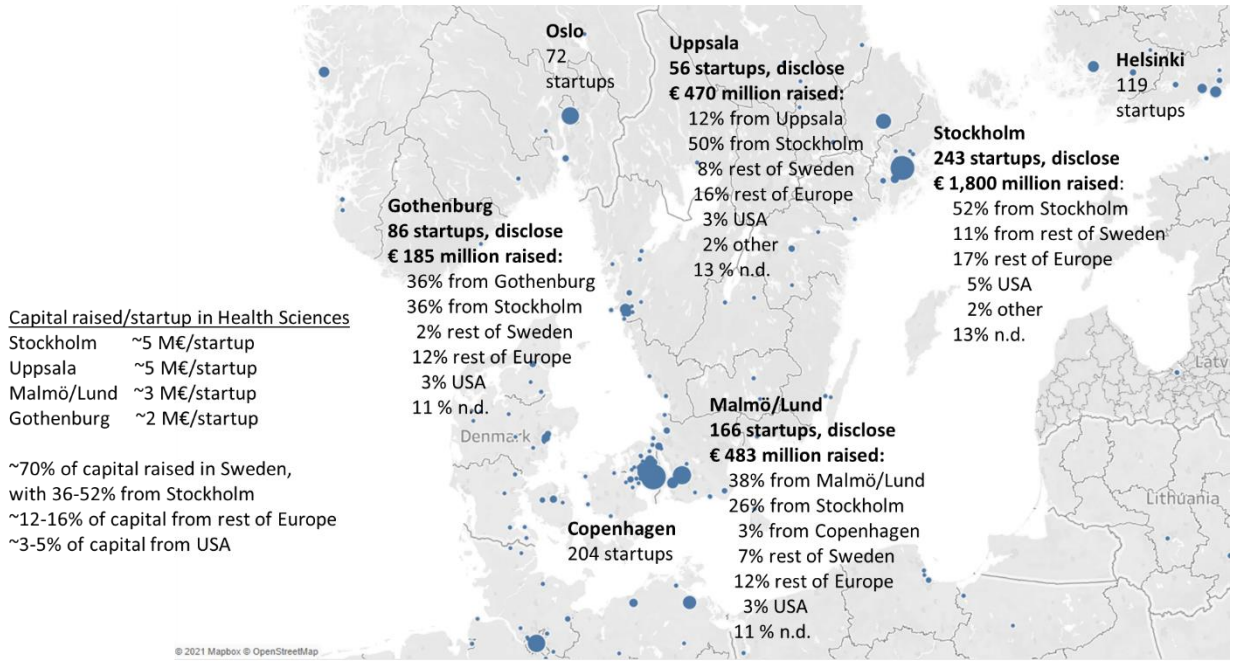

Figure 17. Fundraising in Swedish Health Science clusters

These is arguably an effect of local supply of and demand for capital invested in startups. In locations where there is more capital than startups, mean valuations are likely higher, while in locations with less capital, valuations are likely lower. This indicates a reluctance among investors to

travel for improved investment opportunities. Otherwise, these localized differences in valuation would begin to normalize over time. It also indicates that startup founders may be reluctant to travel for fundraising with better valuations and terms.

An interesting example of a disconnect in localized valuations is the Malmö/Lund hub in southern Sweden, less than 40 km outside of Copenhagen in Denmark, as can be seen in Figure 17. Taking the train from Malmö to Copenhagen takes half an hour, with more than 80 daily trains. Many people commute daily, working in Copenhagen with higher mean wages while living in Malmö with mean lower living costs. In practical terms, Malmö Is in many ways a suburb of Copenhagen. Yet mean valuations of Health Science startups in Copenhagen are considerably higher than those in Malmö or Lund. It would be natural to assume that Health Science startups in Malmö and Lund would routinely cross the bridge to Copenhagen to fundraise at higher valuations from the venture capital community in Copenhagen, with historical ties to the Danish Life Science cluster. However, this is seldom the case. Instead, 38 percent of funding comes from local investors and 26 percent from Stockholm (more than 600 km away), while only 3 percent comes from Copenhagen. Apparently commuting to Copenhagen for work is routine, but for fundraising is difficult.

These localized differences in valuations are not limited to Sweden and Denmark. Examples of where startups cross borders for fundraising at higher valuations are not common. Most startups raise funds within their national borders, even though crossing borders could often provide better financing terms. This is interesting, as startups sell products and services across Europe and internationally but limit their fundraising to their national borders. Although the European Union is a relatively integrated market, this has yet to apply to startup fundraising. This effectively creates national fundraising silos with limited competition and price adjustments, and at worse may create local monopolies for venture capitalists.

4 Implications for policy and practice

There are some general implications that should be of interest for policymakers, practitioners and scholars alike, before implications specific for policymakers, founders and investors are offered.

1. In most modern ecosystem, equity funding is unavoidable, and so are startup exits.

The most fundamental insight from the EVS projects is that how a startup is financed will influence what happens to it in the long run. If a startup is financed with equity funding from investors, those investors will expect a financial exit within the foreseeable future. The times when investors prefer to own a share of a profitable company and get their financial returns through dividends are long past. In modern entrepreneurial ecosystems, modeled after Silicon Valley, lean startups and venture capital funding, there is little patience for long term ownership of firms. Although the "industrialist" approach of building to own long-term still exists, and thrives in some places, it is not the model popular among today's founders nor policymakers. If a founder wants to be an industrialist, and own their startup for the foreseeable future, they need to avoid investors that expect an exit within the foreseeable future, and likely bootstrap to positive cash flow. If policy-makers wish to build an ecosystem without startup exits and startup migrating post-exit, they essentially need to design funding options that do not rely on venture capitalists, or investors that share their investment practices of startup exits within a certain time frame. These paths are not impossible, but very difficult. Hence, these implications will focus on how to influence startup exits to your benefit, rather than avoid them altogether.

2. Equity funding comes with strings attached, usually pulling towards an acquisition exit.

Given the observation that how a startup is financed will influence what happens to it in the long run, an obvious implication is that with more capital and resources, a startup has better possibil-ities to achieve its goals of successfully launching products and services, capturing market share, and becoming profitable. However, a less obvious interpretation is that money always comes with strings attached. These strings are important to understand, as they influence the direction and destination of startups. Equity investments come from investors that invest for returns within a certain time frame. Investors without interest in timely returns are rare. Investors generally have strong opinions on how to achieve and maximize profits, within the necessary time frame, and use their influence in subtle and sometimes crude ways to ensure a startup develops in a manner they are confident will deliver this profit.

Among investors, venture capitalists are in general the most professional and have established practices for how they identify suitable startups for investments, conduct their investments, manage their portfolio companies to maximize value increase within a certain time frame, and finally sell or list their portfolio companies to maximize profit. Best practices among venture capitalists to achieve their goals of profit maximization have been established for decades.

Foremost among these practices, venture capitalists will not invest in a startup without first having a good idea for how to exit by selling or listing that company, years later, with good chances of sizable returns. The established practice for venture capitalists when they do invest, to ensure an exit will happen as expected, is to require contractual control of the startup on key issues, so that a required exit can be forced if required. These shared practices of enforcing exit requirements within a certain time frame give venture capital funded startups a predictable life cycle. In the average case, venture capital funded startups can expect to be sold to the highest bidder about five years from their first venture capital investment. The more successful the startup is, and thus the more valuable, the longer the venture capitalists can wait for the exit, although an exit will invariably be required within a maximum of twelve years from the first investment.

The more successful a startup is, the more likely it is to be listed on a first-tier stock exchange or sold to a large corporation with headquarters likely outside of the home region of that startup (unless it was founded in Silicon Valley). The likelihood of outcomes depends to some extent on industry. Health Science startups are, for instance, more likely to be listed, while software companies are more likely to be acquired. However, even the Health Science startups that are listed are likely to be acquired eventually by larger listed companies, so the result is predominately for startups to be acquired and absorbed by larger companies. There are exceptions where startups are listed and remain publicly listed long-term. Some listed startups grow aggressively, often through frequent acquisitions of smaller startups. “Eat or be eaten” seems to be the rule of the land.

3. The majority of successful startups are absorbed by incumbents, to fuel incumbents’ continued innovation, growth and competitiveness.

Startups are often celebrated as sources of innovation and economic growth, with a focus on those startups that go public on first-tier stock exchanges, as this creates visible and measurable value. The top few percentage points of startups that go public deliver a disproportionate share of the measurable economic value of startups. The story often ends here, with the rest of the startup that do not go public disregarded or forgotten.

Based on the EVS studies, this is a misconception of the primary economic value delivered by startups. Most startups that are successful, even just moderately so, are acquired and absorbed by incumbents. Hence, the inherent potential embodied in these startups, in terms of products, services, technology, intellectual property, and talent, is realized by their acquirers. As acquired startups outnumber the startups that go public by a factor of a hundred, it would be prudent to state that the economic impact of startups is as much manifested through the continued growth and profitability of incumbents, as it is through the economic growth of the few startups that become public companies.

If a startup is not successful enough to be listed on a first tier stock exchange, it will most likely be sold to an acquirer. Even if a startup is successful enough that it could be listed on a first-tier stock exchange, it is still more likely to be acquired, as venture capitalists prefer acquisition exits due to the lower perceived financial risks associated with them. There is truth to the observation that venture capitalists list startups when the stock market is hot and sell startups when the market is down. However, when the IPO market is hot, there is a tendency that M&A valuations and thus exit frequencies are also high. Many startup acquisitions are by publicly listed incumbents, so when the stock market is hot the incumbents' share prices are also high, making acquisitions paid for with shares more attractive. Thus, it is more accurate that when the stock market is hot, exit frequency and exit valuations in general are high, and when the stock market is down, exit frequency and exit valuations in general are down.

In distinguishing between the likelihood between a listing and acquisition exit, listing exits are only likely to occur if the expected financial returns from a listing is significantly higher than the returns from an acquisition exit. The higher expected returns need to be perceived as sufficient to compensate for the perceived financial uncertainty associated with the lock-up clauses, that prevent venture capitalists from selling shares in publicly owned firms before the lock-up period has passed. The word "perceived" is crucial in this regard. Perceptions of uncertainties and risks require substantial rewards to overcome inherent aversion loss biases, as seen in previous studies.

Venture capitalists are seldom sentimental in terms of cutting their losses. The less successful the startup is, the earlier the exit will be expected, and forced if required. One of the few exceptions to these general patterns are startups in Sweden, where less successful startups are more likely to be listed on second tier stock exchanges than sold or closed down. This gives Swedish startups comparably higher survival chances. These listed starts often eventually become profitable, although they rarely experience high growth and tend to linger on with modest growth, and may be acquired later if they draw the attention of incumbents hungry for successful firms.

Once acquired, most startups turned subsidiaries are over time absorbed by parent corporations. Large corporations routinely cut costs, centralize functions and create synergies in select hubs. Startups turned subsidiaries will experience an initial growth of revenues and support when they gain access to the infrastructure and resources of the large corporation. However, unless they grow rapidly to become one of the select hubs where resources are focused, they tend to over time be reduced to a specialized satellite. Innovation resources are transferred to primary hubs, while the startup turned satellite is slimmed down and focused on support and local sales. If local sales and support can be centralized, the satellite is eventually closed down completely.

The time frame for these consolidations processes that often occur in large companies depend on economic cycles and the parent company's requirements of their subsidiaries. Indications are that the more important a subsidiary is to accessing a local market, or a subsidiary is uniquely entrenched in a local innovation hub, that provide competitive advantages that are hard to transfer to or replicate in the parent, the better the chances are for the subsidiary to become a prioritized hub that is given resources rather than slimmed down, or at least it may linger longer as a satellite to not lose the unique competitive advantage it provides.

By absorbing startups on an ongoing basis, that have new products, technology, IP and talent packaged together for easy integration, incumbent's product pipelines are continuously filled with new innovations, and that keep incumbents competitive and growing. Thus, the main economic impact of startups is manifested in the long term through the continued innovation, growth and competitiveness of incumbents. This insight would in part explain the continued success of Silicon Valley incumbents, who are among the most aggressive acquirers in the world hunting for the best startups on a global basis. With this insight, an important policy question emerges of how good are local incumbents at acquiring and absorbing startups?

4. Venture capitalists' hidden importance in the economy as sourcing agents for incumbents.

Venture capitalists are often portrayed as value-adding investors, with the primary function to invest and to a degree creating value through their advice, networking and imposing governance on startups. Contemporary narratives frame venture capitalists as facilitators of exceptional growth and midwifes of new public companies such as Google and Facebook. All this may be true, but it is also a superficial understanding of the role venture capitalists play in our economy.

The EVS studies provide reasons to reinterpret the role venture capitalists play in the economy. This narrative is not false, but considering the findings of EVS it is incomplete in capturing the entire role venture capitalists play in the modern economy. Saying that venture capitalists invest is like saying that an ant carries things. An ant has multiple functions in the system of the ant hill,

and so do venture capitalists in our economy. The significant dominance of acquisitions, relative rarity of IPOs and priming of venture capital funded startups towards acquisition together form an argument that venture capitalists play an equally important role in our economy as crucial sourcing agents for incumbents.

Venture capitalists find, finance and structure immature innovation and organizations into ready to acquire and integrate packages with the required technology, IP and talent wrapped up with a verification from early customers that the package works. Venture capitalists understand what the incumbents need and deliver these tested innovation packages for hefty finders' fees on a regular basis. Thus, they help to ensure the incumbent's product pipelines are continuously filled with new innovations that keep the incumbents growing and profitable, and able to afford more acquisitions in the future. Venture capitalists may be the midwives of the occasional new public company, but for every new public company they help list, they sell a hundred startups to the hungry incumbents. While venture capitalists have helped list tech giants such as Apple, Google and Facebook, they have also sold hundreds of startups to these former startups turned public companies. By listing startups they also create future customers for acquiring startups, thus the two roles of midwife and sourcing agent are intrinsically interdependent.

This reframing implies that venture capitalists may play an equally important role in revitalizing the competitiveness of existing industry clusters, as in birthing new industry clusters. For regions that wish to grow new industry clusters, using venture capital as the primary tool for financing and accelerating the growth of their startups may thus yield different results and unintended consequences than hoped for. Exit patterns for venture capital funded startups favor Silicon Valley, even in regions other than Silicon Valley.

5. Money has a geographical gravity that pulls in startups, and the more successful a startup is the stronger the gravitational pull.

There appear to be a geographical gravity to capital centers that pulls in successful and promising startups. Silicon Valley is the most obvious example, but metro areas such as London, Paris, Berlin, Madrid, Copenhagen and Stockholm also have this gravity. The gravitational pull is to a degree proportionate to the capital accumulated in the area, in public and private wealth, and further increased by proximity of stock exchanges, industry clusters and applied science universities.

It is easier to build a successful startup in these hubs, due to access to resources, customers, talent and finance. Incumbents with an appetite for acquisitions are also situated there and habitually acquire and absorb startups. This gravitational pull is not just apparent in the exit phase of startups, but in the financing and scaling phases. Startups tend to relocate according to this gravity

long before the exit, to facilitate easier fundraising at higher valuations, closeness to customers and better access to top talent and infrastructure, despite the fact that these gravity centers also tend to have higher costs of living. This gravitational phenomenon may be conceptualized as a web of interconnected gravity wells, where a newly formed startup first moves from the small town to the regional capital and over time moves to larger metros as it becomes more successful. The moves are categorized by ownership moving first geographically, and over time operations of the firm follow the ownership migration. The larger the firm, and the more extensive the operations of the firm, the longer this move where operations follow ownership takes. If operations are large and locally entrenched enough, operations may not even move, but linger in their original location for the foreseeable future.

This gravity pull, before and after startups exit, makes it challenging for smaller hubs to successfully grow their startups and entrepreneurial ecosystems. As their startups become successful and grow so increase the likelihood of them, as the gravitational pull increases. How to counter this gravitational pull remains one of the mysteries that was only in part answered in the EVS 3 project, and where brighter minds may prevail. Anchoring startups deeply in local ecosystems to prevent the pull for as long as possible, and making the best possible use of entrepreneurial recycling, is the best advice to give for smaller hubs that hope to grow their entrepreneurial ecosystems.

4.1 Implications for policy

Policymakers should be aware of these likely long-term outcomes for venture capital funded startups. Venture capitalists will act to profit maximize, and this will often lead to the most promising startups being sold to acquirers in other regions. Most startups turned subsidiaries will provide limited local growth long term, and are likely to be consolidated in the future. Hence, regions that aim to grow their local ecosystem should expect this loss over time and compensate with continual repopulation of new startups with entrepreneurial recycling. Growing startups until they are entrenched enough not to relocate their operations may also be an option, but this will likely require more patience than most venture capitalists have.

Policy makers should approach venture capital policies with open eyes as to the motivations and modus operandi of venture capitalists. In a market economy, venture capitalists should be allowed to operate freely. Venture capital scholars warn against governments tampering with venture capitalists' business models and decision making, as it can lead to disrupting market forces. However, in some regions such as in Europe, a considerable part of the financing of venture capital comes from public sources. If venture capitalists' money comes with strings attached, is it so far fetched that the money venture capitalists receive also have strings attached? If asking venture

capitalists, the answer will likely be that they require full freedom to act to fulfill their contractual obligations to profit maximization, and any restrictions could jeopardize this obligation.

Some European venture capitalists argue that since venture capital create so much value for the public, public investors in private venture capital firms should be satisfied with a smaller portion of profits compared to the private investors, sometimes referred to as asymmetrical profit and risk division. This puts the value venture capitalists actually deliver under scrutiny, and if equal or better effect could be achieved through alternative funding mechanisms such as angels, public venture capitalists and loans.

Policymakers may be tempted to nudge their regional exit patterns towards more local exits and less foreign acquisitions. This may be possible through advocating alternative funding to venture capital. Another alternative is attaching strings to the startups to keep them from relocating or making it costly to relocate or consolidate them. However, there are no indications that angel investors or private equity investors in general have significantly different exit preferences than venture capitalists. Private equity funded startups in EVS 3 have similar exit patterns to venture capital funded startups. There are examples of angel investors being more patient than venture capitalists, however there are also examples of angels being more impatient. There is so far no quantitative evidence that startups with solely angel funding result in significantly different exit patterns than venture capital funded startups.

Some countries, such as Israel, has experimented with conditional loan policies, where startups are financially incentivized to not sell to foreign acquirers and foreign acquirers not to consolidate subsidiaries. For Israel, these policies were somewhat successful in increasing revenues for the government and keeping subsidiary satellites longer. However, they did not substantially shift away from foreign acquisitions. Foreign acquirers paid so much more, than it easily compensated for any domestic additional loan repayment fees.

A more promising approach to keep startups longer is to entrench them in their local ecosystems. Anchoring theory proposed that startups entrenched are more likely to remain long-term. In EVS 3, there was no statistically significant evidence to support anchoring theory, but that does not it is not valid. It just shows that another methodological approach is needed to investigate. Startups that grew over time have an increased likelihood of being acquired, while startups that do not grow much over time have a lower chance of being acquired. Thus, acquisitions likelihoods are related to success, rather than age. However, keeping startups from growing just to keep them longer is counterproductive, and not how this finding should be interpreted.

The most promising policy option so far to nudging exit patterns may be leveraging secondary stock exchanges more actively. EVS 2 and EVS 3 studies have so far substantiated that startups listed on secondary stock exchanges have higher growth and survival ratios than many acquired startups. This is despite the fact that it is the smallest startups that are typically listed on secondary stock exchanges, as venture capitalists often see listing on secondary stock exchanges as a last resort. If secondary stock exchanges can achieve these results for the smallest startups, they should be able to achieve equal or better growth for the startups now being acquired. However, this would require for venture capitalists to change their perception of, and aversion towards, secondary stock exchanges. Policymakers may find it hard to change venture capitalists' strong preference of acquisitions. It may be easier to first address the second tier stock exchanges' vulnerabilities regarding high volatility, as more stable secondary stock exchange may change perceptions.

Nudging exit patterns are, however, unlikely change the fact that the most promising startups will likely still be sold to USA acquirers with headquarters in Silicon Valley. This fact is likely more a question of acquisition appetite of Silicon Valley, than startup funding and startup policy. The incumbents in Silicon Valley will pay a premium for the best and brightest – a premium that other acquirers have yet to match. In a market economy the highest bidder gets the startup, if the seller of the startup is profit maximizing, which venture capitalists are contractually obliged to do. Silicon Valley is not just the best at creating startups, but at acquiring them. The growth of Silicon Valley incumbents is fueled by a constant acquisition of startups, and willingness to pay a premium to get the best and brightest. As long as Silicon Valley incumbents continue with this practice, they will be hard to knock off their throne, or for other regions to replicate the success of Silicon Valley.

European startup policy has in recent year focused on the challenge of how to finance European Deeptech startups, with the implicit goal of keeping European startups in Europe. The focus has been on raising larger European venture capital funds, to meet the significant capital needs of Deeptech startups. However, the proposed solution is only to funnel more venture capital into Deeptech startups. It will still be through ten year venture capital funds with a focus to profit maximize within this time frame. Even with considerable funds, Deeptech startups are unlikely to become profitable after ten years.

Venture capitalists will be required after ten years to list the Deeptech startup or find an acquirer, whichever provides the highest returns at lowest risk, so their preference will likely be an acquisition. If the Deeptech startups offered for sale own technology assets that may shape our collective future and be very valuable, who is likely to be the highest bidders? Silicon Valley incumbents are likely. If Silicon Valley incumbents are to acquire the best European Deeptech startups, are they likely to remain in Europe? Not likely. Hence, policymakers in Europe may wish to consider if

their policies fulfil their goals. Policies that could keep European Deeptech startups in Europe long-term may either be to make listing on stock exchanges more attractive and consider funding on a time frame longer than ten years

Looking past the funding requirements of European Deeptech, to the requirements of the mass of European startups, the EVS 3 project uncovered highly localized fundraising markets across Europe, with considerable differences in valuations and capital accumulation between regions. For decades, there have been policies in place across Europe to provide seed capital at a local level and support the creation of venture capital firms across Europe to fund European startups. These policies have often been nationally organized to promote funding within national borders.

These practices may, inadvertently, have contributed to the formation of national fundraising silos, rather than a shared European market for fundraising, with the advantages inherently drawn from a shared market. If startups are always advised by their incubators and investors to fundraise in their local town or from their national center, over time it becomes a self-fulfilling prophesy that this is how it is done. However, it enforces national borders, reduces founders' ability to exploit valuation differences between hubs and shields investors from competition. If startups are able to sell across borders, as many European startups are, they should also be able to fundraise across borders. Tearing down barriers, regulatory, cultural and psychological barriers, for startups to fundraise across Europe would likely benefit everyone, except investors that may no longer rely on their national silos to limit competition.

Examples of alternatives are other equity investors such as business angels, family offices and crowdfunding, and non-equity solutions such as loans. All of these investors invest or lend their own money, which remove some of the limitations placed on venture capitalists and allow them to be more patient and flexible, if they choose to do so. However, there is no research on how these investors view and act in regards to startup exit, in situations where they collaborate with venture capitalists or in situations where they act alone. More research in this regard, with a focus on how different financing solutions influence the long-term development of firms, including post-exit development.

As venture capitalists usually have extensive control rights, which include the exit decision, they effectively hold the remaining shareholders and stakeholders of the startup hostage. The venture capitalists decide exit route, and thereby post-exit format and growth trajectory of the startup, but also the profit for 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.

Finally, there is a tendency in theory to overgeneralize venture capitalist behavior, while there evidently is heterogeneity. Certain subgroups within venture capitalists, for instance corporate venture capitalists and government venture capitalists, may have different exit preferences such as favoring local exits, as compared to 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.

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 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.

Policies should take a longer perspective on startup and ecosystem development. Venture capital has a short to mid-term accelerating effect on startups, while long-term priming them for acquisition. In a five to ten years perspective, promoting the use of venture capital may thus be a productive approach to stimulating growth. However, twenty years later, this approach may also result in most of these firms no longer being found operating in their region of origin. Thus, policy needs to be evaluated over a longer time frame.

4.2 Implications for practice - founders

Founders should understand that in deciding on the funding strategy for their startup, they are effectively also choosing which strings to apply to their startup. In negotiating their shareholder and investment agreements, they are actively designing how these strings influence their startup. There is a saying among some serial entrepreneurs that you should “choose investors with the same care as you chose your future spouse”. There are plenty of horror stories floating around of conflicts between founders and investors who disagree on the direction of their shared startups, and how founders were kicked out of their own startup. These conflicts are in no small part due to founders not understanding how venture capital works, and how venture capitalists operate to ensure profit maximization with a certain time frame.

Furthermore, founders may by reading this report better understand what to expect long term, if their startups are successful or less so. It allows them to make choices that influence the direction

of their startups in their desired direction, as their goals may not be for something more than the profit maximization over ten years that venture capitalists have. If founders truly expect to be the sole deciders of the fate of their startups, they will likely need to say no to most equity investors and bootstrap to profitability. If they accept equity investors, they should know whom they are giving influence to and have a transparent conversation about mutual expectations. According to interviews, this is seldom done. Founders are also given the possibility to be prepared for whichever outcome and in advance plan their post-exit lives accordingly.

Finally, founders should consider fundraising with the same degree of internationalization as they sell. Even if they still chose to fundraise locally, the fact that they approach fundraising as sourcing process with competing suppliers of capital, and communicate this fact to investors, is likely to strengthen their bargaining position with investors. Investors who believe founders have little choice may otherwise feel they are in a position to dictate terms. Founders who wish to profit maximize like their investors, should also consider reading implications for investors.

4.3 Implications for practice - investors

Investors, regardless if they are angel investors, venture capitalists or private equity investors, share an interest in profit maximization, and operate under time constraints to achieve this profit. This is especially true if they invest other people's money, such as venture capitalists and private equity, and have deadline to return their clients' money with interest. Knowing that exits to USA acquirers in Silicon Valley historically have been among the most valuable exits, is likely useful information. Furthermore, knowing that including a USA based venture capitalist in your startup's financing rounds will more than double the chances for an exit to a USA acquirer will likely also be useful. Knowing that the more the USA acquirer invests in the startup, the more it increases the chances for this acquisition will further be good to know, if this is your goal.

However, pursuing a dual strategy of planning for both an IPO and acquisition will maximize your options for profit maximization. Studies have shown that startups that planned for IPOs, but kept their options open for an M&A and later chose to do an M&A instead, were sold for more money than startups that went straight for an M&A. The more options you have often translates to better bargaining position and a higher final price. Furthermore, if you are having trouble fundraising for a portfolio company, consider advising them to look further afield and past the usual suspects. There are plenty of examples of startups that received more interest and better terms, by seeking funding in their neighboring countries. Although the EVS studies only looked at startup funding, and not funding for venture capitalists, the advice may be equally valid for venture capitalists seeking to raise their own funds to look further afield.

Investors could consider making better use of public markets, both first and second tier stock exchanges, as an exit opportunity and financing platform for their startups. If second tier stock exchanges are solely used as a dumping ground by venture capitalists, it becomes a self-fulfilling prophecy that this is all they are. However, if venture capitalists use second tier stock exchanges to actively seek alternatives to acquisitions, they may become more than just dumping grounds. Having more options for an exit also likely leads to a higher final price. Maybe a dual strategy of IPO and acquisition is not only feasible for first tier stock exchanges, but also with second tier stock exchanges?

As a final observation, investors may wish to consider how one of the most respected venture capitalists on Sand Hill Road, Sequioa, changed their investment practice away from the traditional ten-year funds to the Sequioa Fund, with no time restraints on how long they could be owners. This change provides Sequioa with unprecedented flexibility in when and how to sell shares in their portfolio companies. If attractive, Sequioa may continue to own shares in startups that have gone public and profit from their public share prices going up. Further consider why the newly established NATO fund chose a fifteen-year fund lifetime, rather than the traditional ten year fund setup. The answer is that viewing investments on a longer time frame is likely more profitable than being forced to sell after ten years. Some of the most profitable funds in history have been patient funds. In time, more investors will come to this realization and move beyond the ten-year fund structure.