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ENTREPRENEURSHIP AS A CAREER? AN INVESTIGATION OF THE RELATIONSHIP BETWEEN ENTREPRENEURIAL EXPERIENCE AND ENTREPRENEURIAL OUTCOME

PhD Series 06-2018

Rasmus Vendler Toft-Kehler

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ENTREPRENEURIAL EXPERIENCE AND ENTREPRENEURIAL OUTCOME**

PhD School in Economics and Management

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CBS  **COPENHAGEN BUSINESS SCHOOL**
HANDELSHØJSKOLEN

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Rasmus Vendler Toft-Kehler

Academic Supervisor

Finn Valentin, Professor, Department of Innovation and Organizational Economics

PhD school in Economics and Management

Copenhagen Business School

Industrial Supervisor

Peter Torstensen, CEO

Accelerace Management A/S

Rasmus Vendler Toft-Kehler
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Preface

Since childhood, I have been passionate about entrepreneurship. My parents founded a family business when I was three. The business was an integral part of my youth and eventually inspired my career. All steps I have taken during my career have been guided by one aim: To gain expertise in building new ventures.

This PhD dissertation is the result of work carried out at Copenhagen Business School in the Department of Innovation and Organizational Economics under the supervision of Professor Finn Valentin and at Accelerace A/S under the supervision of CEO Peter Torstensen.

The studies comprising this dissertation collectively aim to provide a better understanding of how to build new ventures. Specifically, the constituent papers investigate the relationship between entrepreneurial experience, entrepreneurial, talent and entrepreneurial outcomes to gain a better understanding about what can really be learned in terms of building new ventures. Experience-outcome dynamics are presented and discussed in three papers, of which the first and the last have been published in *The Journal of Business Venturing* and *The Journal of Business Venturing Insights*.

Due to my life-long passion for entrepreneurship, I have appreciated the opportunity to combine academic research with extracurricular activities. As such, during the PhD, I became a co-founder of three biotech companies, a co-inventor on six patent filings, and a co-author on a paper published in *Nature Reviews Microbiology* (2017).

During my PhD studies, I also enjoyed the privilege of visiting New York University (2009 and 2011), Harvard University (2011 and 2014), and University of Cambridge (2014). These stays were financially supported by Oticon Fonden, Fabrikant Vilhelm Pedersen & Hustrus Legat, Foreningen til Unge Handelsmænds Uddannelseslegater, Familien Hede Nielsens Fond, Konsul Axel Nielsens Mindelegat, Knud Højgaards Fond, and Otto Mønstedts Fond. Finally, because I am obtaining an industrial PhD, my studies were financially supported by Accelerace and Industriens Fond.

Acknowledgement

This dissertation is the result of support, trust, and valued contributions from many people. First and foremost, I would like to thank Peter Torstensen, CEO of Accelerace, my project sponsor, and my industrial supervisor, for his enthusiasm throughout the project and ever-burning desire to implement research into Accelerace's daily work with high-tech ventures. Peter's persistence to build a science-based venture accelerator is unparalleled and has led Accelerace into the global elite of accelerators. I have enjoyed every moment at Accelerace and in Peter's company. Our discussions have been a great source of inspiration, and the support of Peter has provided me a broad range of both academic and entrepreneurial opportunities.

Of similar importance, I would like to thank Professor Karl Wennberg. Karl has been my closest collaborator and scholarly friend since we met at Imperial College in London at the earliest stages of my PhD. Karl's knowledge, talent, and in-depth understanding of entrepreneurship at both academic and practical levels has been of tremendous inspiration. Through the years, a much-appreciated friendship has emerged and led to many memorable times both academically and personally.

Also, I would like to thank my academic supervisor Professor Finn Valentin, who made it possible for me to initiate my entrepreneurial research at the Department of Innovation and Organizational Economics at Copenhagen Business School. I am particularly grateful for his support of my practical interest in entrepreneurship alongside my PhD studies through both the BioBusiness and Innovation Program as well as direct involvement with new ventures.

My gratitude also goes to Associate Professor Phil Kim, who came on board in the review process for the first paper of this dissertation and brought along new ideas, valued energy, and outstanding skills. Since then, Phil has become a wonderful friend with whom I share the passion for entrepreneurship. Phil's thoughtfulness, talent, and ever-kind attitude is unmatched.

A special thanks goes to Dr. Jens Aaris Thisted and Professor Peter Lotz, who provided me the dispensation and unique privilege of initiating my PhD at Copenhagen Business School upon receiving my bachelor's degree.

A number of people have had a significant impact on my time as a PhD fellow. These include Professor Noam Wasserman, a prime example of a highly esteemed researcher with a profound practical understanding and who included some of the findings of this dissertation into the No.1 ranked entrepreneurship class at Harvard Business School; Professor Melissa Schilling who inspired some of my early thoughts on experience-performance relationships and hosted a rewarding and memorable research stay at New York University; Professor Saras Sarasvathy, who has on several occasions provided great input to the papers of this dissertation; Professor Ted Zoller, a true visionary and an unprecedented motivator for both scholars and entrepreneurs; Professor Shailendra Vyakarnam, who provided me a wonderful opportunity to visit University of Cambridge; and Associate Professor Aviad Pe'er, who has been of great inspiration and brought thoughtful comments to both my academic and practical ventures.

My greatest gratitude also goes to the universities I have been fortunate to visit as a PhD student and researcher during my PhD, including New York University in 2009 and 2011, Harvard in 2011 and 2014, and University of Cambridge in 2014. These experiences have provided me with a multi-faceted impression of what entrepreneurship research is about and have left me with

motivation and inspiration to continue the work. These visits have all had a significant impact on the content, process, and—not least—joy of writing this dissertation.

I would also like to thank the anonymous reviewers as well as the editors, Professor Dean Shepherd and Professor Dimo Dimov, from *Journal of Business Venturing* and *Journal of Business Venturing Insights*, who significantly contributed to the quality of my research and finally accepted my papers for publication.

My gratitude also goes to the many scholars and entrepreneurs who commented, inspired, and willingly discussed my ideas and work over the years, such as Associate Professor Robert Salomon, Professor Erko Autio, Thomas Wedell-Wedellsborg, and my colleagues at both Accelerace and Copenhagen Business School. In particular, I would like to thank Professor Toke Reichstein and Associate Professor Jörg Claussen for their comments in the submission process.

My time as a PhD fellow has also been wonderfully enriched by family and friends. In particular, I would like to thank Professor Morten Sommer, with whom I have ventured into multiple biotech companies and learned much about the practical aspects of entrepreneurship as well as research in disciplines beyond that of entrepreneurship.

Finally, above and beyond all, I want to extend my dearest gratitude to my two children—Ingrid and Holger—and my wife Dr. Anne Katrine, who has been with me every step of the process. Thank you for all the support, care, love, and understanding.

Extracurricular Activities

Publications

Prediction of antibiotic resistance: Time for a new preclinical paradigm?

Morten O.A. Sommer, Christian Munck, **Rasmus Vendler Toft-Kehler**, Dan I. Andersson

Nature Reviews Microbiology (2017)

The method of entrepreneurship: The entrepreneurial cycle

Rasmus Vendler Toft-Kehler, Søren Lottrup and Peter Torstensen

International Association of Science Parks (2011)

Inventorships

Co-inventor on six patent filings. Two of these have published at the time of PhD submission

(EP20150762551 and WO2016193136A1)

Field work

Co-founding and managing the earliest phases of three new ventures:

AntibioTx A/S and **AntibioTx North America Inc.** (Co-founder and CEO)

Clinical-Microbiomics A/S (Co-founder)

UTILITY therapeutics Ltd (Co-founder)

Summary

Entrepreneurs and investors alike rely on prior entrepreneurial experience and talent as vital clues for anticipating entrepreneurial performance. However, the extent to which entrepreneurial expertise accumulates and the extent to which entrepreneurial talent can be defined and measured remain open for debate. Therefore, the studies of this dissertation have been conducted with the aim of advancing our understanding of how entrepreneurial experience and entrepreneurial talent relate to entrepreneurial performance and behavior. Each study offers insights into how entrepreneurial expertise accumulates and is therefore of relevance to multiple stakeholders.

The papers in this dissertation build upon the learning and psychology literatures and integrate research on entrepreneurial experience to examine potential performance effects (Papers 1 and 2). Furthermore, behavioral implications of entrepreneurial experience are assessed (Paper 3). In so doing, the concept of barriers to learning is framed and defined as *the obstacles encountered by entrepreneurs that prevent them from extracting appropriate knowledge from their prior venturing or from applying their existing knowledge appropriately to new ventures* (Paper 1). The concept of barriers to learning reflects the finding that prior entrepreneurial experience does not always have a positive impact on later venture performance. An important finding, however, is that barriers to learning appear more prominently in the burgeoning stages of entrepreneurial careers (Paper 1) and are found to depend on the specific type of prior experience (Papers 1 and 2) as well as entrepreneurial talent at the individual level (Paper 2). Finally, entrepreneurial experience appears to impact not only entrepreneurial performance but also entrepreneurs' behavior (Paper 3).

To mitigate methodological challenges inherent in entrepreneurship research, the studies in this dissertation utilize multilevel, longitudinal datasets maintained by Statistics Sweden covering entire populations of entrepreneurs. As such, a total of up to 65,000 entrepreneurs were followed for up to 18 years. Key variables are computed from individual-, firm- and national-level information. The nature of the dataset allows for more nuanced measures of the complex dynamics between entrepreneurial experience, talent, and performance.

The dissertation concludes that there is a significant relationship between entrepreneurial experience, talent, performance, and behavior with implications for entrepreneurs, investors, educators, policymakers, and researchers.

Summary in Danish

Entreprenørielle erfaringer og entreprenørielt talent anvendes ofte som tidlige markører for entreprenøriel succes og tillægges stor betydning af iværksættere, investorer og øvrige interessenter. Det diskuteres imidlertid stadig i akademiske kredse, hvorvidt entreprenørielle erfaringer bidrager til bedre resultater og endvidere om iværksætteri overhovedet kan læres. Samtidig er det endnu uafklaret om entreprenørielt talent spiller en rolle i opnåelsen af entreprenøriel succes.

Studierne i nærværende afhandling har til formål at øge vores forståelse for forholdet mellem entreprenøriel erfaring, entreprenørielt talent, entreprenørielle resultater og entreprenøriel adfærd. Hver af de tre studier giver indsigt i, hvordan de entreprenørielle resultater fremmes og er af betydelig samfundsmæssig relevans.

Afhandlingens tre artikler tager teoretisk afsæt i litteratur indenfor læring og psykologi og har til formål at integrere forskning omkring entreprenøriel erfaring for derved at analysere potentielle effekter på resultatet af entreprenørielle aktiviteter (Artikel 1 og 2). Ligeledes analyseres adfærd-relateret effekt af entreprenøriel erfaring (Artikel 3). Artiklerne definerer og diskuterer relevansen af 'lærings-barrierer' (barriers to learning) indenfor iværksætteri. Lærings-barrierer defineres som *de forhindringer, der besværliggør akkumulering af relevant viden fra én kontekst eller applicering af sådan viden i en ny kontekst*. Resultaterne i Artikel 1 og 2 viser, at entreprenøriel erfaring ikke automatisk akkumuleres og veksles til forbedrede entreprenørielle resultater som traditionel teori indenfor læringskurver tilskriver, men at tidligere erfaringer også kan have endog negativ effekt på fremtidige entreprenørielle resultater. Dette særligt hos iværksættere med begrænset entreprenøriel erfaring, hvorimod iværksættere som har mange opstartsvirksomheder

bag sig generelt bliver dygtigere og dygtigere til at starte succesfulde virksomheder. Dog er det en essentiel observation i Artikel 2, at karakteren af tidligere erfaring samt iværksætterens talent spiller en betydelig rolle i samspillet mellem erfaring og resultat. Endvidere belyser Artikel 3, at entreprenøriel erfaring påvirker iværksætterens adfærd.

Med henblik på at adressere en række metodiske udfordringer indenfor entreprenøriel forskning beror studierne i afhandlingen på kvantitativ analyse af longitudinelle datasæt hvor op til 65.000 iværksættere følges i perioder på op til 18 år. Databaserne vedligeholdes af Statistics Sweden og dækker hele populationer af svenske iværksættere samt virksomheder. Analysens variabler er konstrueret med data på tværs af individer og virksomheder. Anvendelsen af disse data muliggør således mere nuanceret analyse af komplekse sammenhænge mellem entreprenøriel erfaring, talent og resultater.

Det konkluderes på baggrund af afhandlingen, at der er sammenhæng mellem entreprenøriel erfaring, entreprenørielt talent og entreprenørielle resultater, hvilket har betydelig interesse for både iværksættere, investorer, undervisere, politikere og forskere.

List of Manuscripts

Paper 1

Practice makes perfect: Entrepreneurial-experience curves and venture performance

Rasmus Vendler Toft-Kehler, Karl Wennberg, and Phillip H. Kim

Journal of Business Venturing (2014) 29, 453-470

Paper 2

Barriers to learning in early entrepreneurial careers: An empirical assessment of the entrepreneurial experience–performance relationship and the moderating role of entrepreneurial talent

Rasmus Vendler Toft-Kehler

Working paper

Paper 3

A little bit of knowledge is a dangerous thing: Entrepreneurial experience and new venture disengagement

Rasmus Vendler Toft-Kehler, Karl Wennberg, and Phillip H. Kim

Journal of Business Venturing Insights (2016) 6, 36-46

Introduction

According to research from Harvard Business School, 70-80 percent of all entrepreneurial ventures fail to deliver any return to investors, and a remarkable 90-95 percent of all new ventures fall short performance projections (Nobel, 2011). Similarly, only 10 percent of ventures funded by venture capital funds lead to significant financial returns despite careful pre-investment due diligence and substantial resource allocation. Despite the low likelihood of financial success entrepreneurs are consistently being called upon as driving forces of the modern economy. This paradox implies an interesting potential for economic growth and technological advancements through improved expertise in building and sustaining new ventures.

“Serial entrepreneur” and “entrepreneurial talent” are common expressions in the popular press with references to successful ventures. Yet, entrepreneurial experience and entrepreneurial talent—and their association with entrepreneurial performance—leaves many questions for empirical research to investigate. Surprisingly, these constructs may not be as intuitively related as we might expect. Take Janus Friis, Co-founder of Skype; one of the greatest venture successes in the modern economy. After building Skype, a truly disruptive peer-to-peer platform for international calls, Friis became one of the world’s most heralded technology entrepreneurs. Following Skype, Friis founded Joost, an online platform utilizing similar peer-to-peer technology as Skype, for online distribution of television content. Despite Friis’ leadership, experiences with peer-to-peer technology, free media exposure and large investments, Joost did not meet the expectations and divested the assets and shut down in 2009. Friis’ third venture, Rdio, had similar characteristics and ultimate destiny, also leading to a shutdown in 2015. Friis, however, continued his entrepreneurial pursuits. He is presently gaining significant traction with his latest venture, Starship Technologies, which has received numerous awards and recently announced a

partnership with a leading retail giant. Starship Technologies seems to be well on track to become a new venture success. But does the venture-trajectory of Janus Friis tell us anything generalizable about the experience-performance relationships entrepreneurship?

Despite entrepreneurship being one of the fastest growing fields of social scientific research, we have yet to establish a sound understanding of the mechanisms that determine entrepreneurial performance. Among practitioners, it is commonly highlighted, e.g. by venture investors claiming to invest in people over inventions, that experience is a key criterion for gauging the likelihood of venture success. Indeed, practitioners seem generally to believe in entrepreneurial experience as a predictor of entrepreneurial performance. But do entrepreneurs actually learn from their experiences? How do different types of experience impact the ability to learn? Does entrepreneurial experience uniformly translate into better performance in later ventures? And does entrepreneurial experience change the behavior of entrepreneurs?

Similarly, “entrepreneurial talent” is often considered a cornerstone of entrepreneurial performance and a constituent part of entrepreneurial ecosystems. “Talented entrepreneurs” have therefore become a much-courted group of individuals. Not only by investors, but also by regions seeking to build entrepreneurial ecosystems as exemplified by Start-up Chile. The rationale is that talent increases entrepreneurial productivity and breeds “dealmakers” (Feldman and Zoller 2012). Dealmakers re-invest in the ecosystem, thereby attracting new talent. Talent attracts talent, leading to a positive spiral as in the case of Silicon Valley. Yet, from a scientific standpoint, our knowledge about entrepreneurial talent remains limited. Arguably, it could be debated whether such thing as entrepreneurial talent even exists. If it actually exists, we remain to understand how it is defined, expressed, identified and measured. Certainly, if entrepreneurial talent is real, it should receive significant interest from researchers, educators, policymakers and practitioners

alike. Interestingly, empirically grounded literature in the field of entrepreneurship is almost void of references to entrepreneurial talent (Eesley and Roberts 2012).

The association between entrepreneurial experience, talent, performance and behavior, constitute the epicenter of this dissertation. The three papers are motivated and inspired by close collaboration with the No. 1 seed accelerator in Europe and Top-10 accelerator globally, Accelerace. The Accelerace team, led by CEO Peter Torstensen, has devoted considerable efforts to research and understand experience-performance relationships and further to incorporate science-based insights into the Accelerace program. Since 2008, more than 500 high-growth ventures have completed a four-month accelerator program in Accelerace with more than 85% of the ventures still in existence. Combined, the ventures have raised hundreds of millions of dollars in venture capital and generated thousands of jobs. The questions set forth in this dissertation were formed through discussions with the team at Accelerace as well as venture investors, entrepreneurs and academics, with a subordinate aim to provide an even stronger foundation for Accelerace to build a science-based accelerator.

Review of empirical literature on entrepreneurial experience and performance

Prior research reflects a lively and continued debate related to experience and performance in entrepreneurship. In a literature review of papers associating entrepreneurial experience with performance (summarized in Table 1), I searched Journal of Business Venturing, Entrepreneurship Theory and Practice and Strategic Entrepreneurship Journal for papers with the keywords "entrepreneurial experience", "start-up experience", "serial entrepreneur", "habitual entrepreneur", "expert entrepreneur", "repeat entrepreneur", and "experienced entrepreneur". I added all papers identified through Web of Science and Google Scholar, as well as papers cited

in prior literature reviews (Delmar and Shane, 2006; Ucbasaran et al., 2008). I selected only empirical papers correlating entrepreneurial experience with some type of direct performance outcome, noting sample, operationalization of experience, outcome variable(s) and key findings. In summary, the studies identified on the subject have not been conclusive. Out of 25 studies identified, 12 studies showed insignificant or mixed effects of entrepreneurial experience on performance. Two studies have curvilinear effects of entrepreneurial experience on performance (showing both positive and negative effects, such as effects that are context or time dependent). Nine studies showed significant positive effects of entrepreneurial experience on performance (many of which are cross sectional and small sample studies), and two studies revealed significant negative effects of entrepreneurial experience on performance (published in *Journal of business Venturing* in 2007 and *Journal of Rural Studies* in 2006). The first two papers in this dissertation ("Practice makes perfect: Entrepreneurial-experience curves and venture performance" and "Barriers to learning in early entrepreneurial careers: An empirical assessment of the entrepreneurial experience–performance relationship and the moderating role of entrepreneurial talent") build on prior research at the intersection of experience and performance with differentiated objectives as summarized in Table 1.

TABLE 1: Empirical papers on entrepreneurial experience and performance

Author and year	Sample	Measure of entrepreneurial experience	Entrepreneurial experience impact on performance
Birley and Westhead (1993)	Cross-sectional survey of 408 new firms in U.K. that had their first order between 1986 and 1990.	Entrepreneurial experience measured as a binary variable.	No significant difference between novice and habitual founders on a number of performance variables.
Dyke, Fischer and Reuber (1992)	Cross-sectional survey of 386 businesses in five U.S. industries with less than 500 employees, drawn from Dun and Bradstreet.	A. The number of previous businesses founded B. The number of years of business ownership prior to the current firm.	No significant impact for a variety of performance variables (sales, profits, growth in employees, growth in profits), but positive for previous experience running a business for firms in food industries.
Eesley and Roberts (2012)	Retrospective longitudinal data collected in 2001, 2003, and 2006. Sample of 2,067 MIT alumni, of which 960 founded multiple companies.	A. Number of prior firms founded B. Interaction with “industry familiarity” C. Interaction with “technical familiarity”	Experience generally shown to have a positive effect on revenue, but interactions reveal both positive and negative contingencies.
Chandler (1996)	Cross-sectional survey of 134 manufacturing and service firms incorporated in Utah from 1985 to 1989.	A. Job experience / entrepreneurial experience (no distinction) B. “Task environment similarity” C. “Skills/abilities similarity”	Positive main effect for task environment similarity on earnings and sales growth. Curvilinear moderation effect for skills/abilities similarity.
Westhead, Ucbasaran and Wright (2003)	Cross sectional survey of 354 Scottish firms sampled from Dun and Bradstreet. 200 firms run by novice entrepreneurs, 66 by	Previous start-up experience (novice, serial or portfolio).	Portfolio entrepreneurs reported significantly higher sales and greater sales growth than novice

	serial entrepreneurs, and 88 by portfolio entrepreneurs.		and serial entrepreneurs.
Parker (2012)	Longitudinal study of 707 entrepreneurs drawn from the U.S. panel study of income dynamics between 1968-1992.	Prior spells in entrepreneurship.	Temporary positive effects of prior experience on hourly profits, which eventually attenuate.
Delmar and Shane (2006)	Longitudinal survey of 222 entrepreneurs in the Swedish PSED 1998 -2000.	Founding team joint entrepreneurial experience + its squared version.	Non-linear effects of team entrepreneurial experience on firm sales.
Hsu (2007)	149 early stage technology-based start-up firms.	Number of start-ups founded.	Prior founding experience increases the likelihood of VC funding.
Oe and Mitsuhashi (2012)	PSED data on 382 firms, of which 108 firms reached break-even.	Number of startups previously launched by sample founders.	Prior founding experience has no significant effect on the likelihood of reaching break-even.
Ucbasaran, Westhead and Wright (2006)	190 “habitual” entrepreneurs (22.2% serial entrepreneurs and 29.6% portfolio entrepreneurs) and 177 novice entrepreneurs surveyed in Great Britain.	Previous start-up experience (novice, serial, or portfolio).	No significant differences in performance between habitual entrepreneurs and novice entrepreneurs, nor between portfolio and serial entrepreneurs.
Stuart and Abetti (1990)	52 firms across multiple industries.	Prior start-up experience compatibility with new venture (number of ventures and the role of the founder).	Entrepreneurial experience is the most important indicator of financial performance for new tech-based ventures.
Alsos and Carter (2006)	Cross sectional survey of 207 Norwegian farms.	Resource transfer from previous experience measured along 6 knowledge-related	The transfer of knowledge-based resources tends to

		variables (operational knowledge, pricing knowledge, etc.).	reduce new venture performance.
Westhead and Wright (1998 and 1999)	Sample of 621 businesses. 389 businesses (62.6%) owned by novice or one-shot founders. 75 businesses (12.1%) involved portfolio founders. 157 businesses (25.3%) owned by serial founders.	Previous start-up experience (novice, serial or portfolio).	No statistically significant differences between the three types of founders in the rural sample and the urban sample.
Dencker, Gruber and Shah (2009)	436 individuals in the Munich region who founded their own firms as an alternative to continued unemployment.	Prior founding experience measured as a binary variable (included as a control variable).	Prior founding experience does not have any significant effect on firm survival.
Gompers, Kovner, Lerner, and Scharfstein (2010)	8,808 VC-backed entrepreneurs in a longitudinal study spanning 1975 to 2000.	Prior success (an indicator variable that takes on the value of 1 if the entrepreneur had started a previous venture-backed company that went public or filed to go public by December 2003, and 0 otherwise).	Prior success leads to future success, measured as IPO or IPO-filing prior to December 2003.
Brüderl, Preisendorfer and Ziegler (1992)	Retrospective survey data from 1,849 business founders in Germany.	Self-employment experience measured as a binary variable.	Self-employment experience has an insignificant effect on new firm survival.
Gimeno, Folta, Cooper and Woo (1997)	1,547 entrepreneurs who founded new businesses in the US from 1983 to 1985, with yearly data collections from 1985 to 1987.	Entrepreneurial experience measured as a binary variable.	Performance measured as (money taken out) was positively associated with experience, while venture discontinuance (exit) was insignificant.

Chandler and Jansen (1992)	Self-assessed data from 84 manufacturing firms and 50 service firms. Cross-sectional survey data collected in 1990 for companies incorporated from 1985 to 1988.	A. Number of prior ventures established B. Similarity of prior ventures established.	The number of businesses previously initiated and the years spent as an owner-manager do not appear to be strongly related to venture performance.
Tornikoski and Newbert (2007)	Longitudinal data of the first three years of PSED data – a total of 2,490 respondent-years. Data analyzed with pooled time series analysis.	Prior start-up experience operationalized as the number of other businesses the lead entrepreneur helped start.	Prior start-up experience has a significant negative impact on success factors (e.g. first sale achieved, received external funding, achieved any emerging success-factors).
Davidsson and Honig (2003)	380 nascent entrepreneurs in Sweden interviewed every 6 months starting in 1998 until 2000. Data based on PSED.	Previous start-up experience measured as a binary variable.	Previous start-up experience has an insignificant impact on the occurrence of first sales or profitability.
Reuber and Fischer (1994)	43 Canadian biotechnology (n=27) and telecom (n=16) firms with mean annual revenues of 23.2M USD and 68 employees surveyed in 1992.	Previous start-up experience measured as the number of start-ups.	Start-up experience has a significant effect on the number of employees, but an insignificant effect on four other performance measures including sales and profits.
Chen (2013)	Panel data of 3,265 individuals identified through the <i>NLSY79</i> .	Previous start-up experience measured as the number of start-ups.	Effects of learning by doing are apparent only when the analysis focuses on founding new startups in sectors closely related to entrepreneurs' previous ventures.

Lafontaine and Shaw (2014)	All new business establishments started any time between 1990 and 2011 to sell taxable goods and services in the state of Texas, totaling 2.3 million retail businesses. 25 percent were started by owners who had started at least one other business.	Owner's prior experience at starting a business measured as a binary variable.	Prior experience at starting a business increases the longevity of the next business opened, also when controlling for person fixed effects. Experience at starting retail businesses in other sectors (e.g. a clothing store versus a repair shop) is beneficial as well, though not as much as same sector experience, and not in the restaurant sector.
Bosma et al. (2004)	896 new businesses started in the Netherlands in 1994 and registered in the Dutch chamber of commerce database. Surveyed annually until 1997.	Previous business ownership experience measured as a binary variable.	Positive effect of start-up experience on three-year profits, but insignificant effect on survival and the number of employees.
Paik (2013)	Panel data from 172 firms – including firms founded by teams – in the semiconductor industry based Dow Jones VentureSource database.	Previous business ownership experience in the founding team (at least one team member's experience) measured as a binary variable including a binary measure for prior success.	Ventures founded by serial entrepreneurs perform better than those founded by novice entrepreneurs regardless of whether entrepreneurs had prior success or failure. Serial entrepreneurs without prior VC financing experience perform better than serial entrepreneurs with prior VC financing experience.

Empirical literature on entrepreneurial talent and financial performance

In contrast to entrepreneurial experience, entrepreneurial talent remains an emerging theme in entrepreneurship research with only a handful of publications that have included empirical measures in an effort to disentangle entrepreneurial talent from other factors (Gompers, Kovner et al. 2010; Eesley and Roberts 2012; Chen 2013). At a general level, these studies find empirical evidence to suggest that entrepreneurial talent is a relevant construct to explain entrepreneurial performance. Yet, in a hypothetical scenario where, *ceteris paribus*, entrepreneurial experience plays no role and talent plays a role in entrepreneurial performance, one would imagine a linear and constant relationship (at the level of entrepreneurial talent) between experience and performance. In other words, there would be no impact of learning from previous experiences and thus no relevance of experience curve theory in the field of entrepreneurship (Toft-Kehler, Wennberg et al. 2014)¹. In this light, entrepreneurial talent could be defined as the ability of an entrepreneur to learn from experiences and convert these learnings into future performance. In an effort to challenge the status quo and advance our understanding of entrepreneurial talent, the second paper of the dissertation (“Barriers to learning in early entrepreneurial careers: An empirical assessment of the entrepreneurial experience–performance relationship and the moderating role of entrepreneurial talent”) defines an exploratory construct of entrepreneurial talent and tests the construct to assess associations between talent and entrepreneurial performance.

Review of empirical literature on entrepreneurial experience and disengagement

Finally, prior research has devoted significant attention to the association between entrepreneurial experience and disengagement from venture pursuits. In a comprehensive review of the literature

¹ Interchangeably referred to as “learning curves” and “progress curves” (Epple et al., 1991)

associating entrepreneurial experience and disengagement, the Journal of Business Venturing, Entrepreneurship Theory and Practice, Strategic Entrepreneurship Journal, Academy of Management Journal, Administrative Science Quarterly, Journal of Management Studies, Organization Science, Strategic Management Journal, Journal of Business Venturing Insights and Small Business Economics were initially searched using key words as "serial entrepreneur", "entrepreneurial experience", "business ownership experience", "start-up experience", "habitual entrepreneur", "repeat entrepreneur", "expert entrepreneur", "experienced entrepreneur" and "repeat business owner." Finally, all papers identified through Google Scholar and Web of Science, as well as papers cited in existing literature reviews (e.g. Delmar and Shane, 2006; Ucbasaran et al., 2008), were added to the review.

From the list, only empirical papers correlating entrepreneurial experience with an outcome denoted as "exit", "duration", "disengagement" or "survival" were selected. Taking note of author, year, sample, operationalization of experience, outcome variable(s) and key findings, the review is summarized in Table 2 and published along with the manuscript (Toft-Kehler, Wennberg et al. 2016). Qualitative papers and papers with a singular focus on firm failure (e.g. financial distress/bankruptcy) were excluded from the review since a strict view on failure may reflect a forced exit from a given venture and not an independent decision made by the entrepreneur to disengage. One paper by DeTienne, McKelvie and Chandler (2014) that used age as a proxy for experience was also excluded.

Out of 22 empirical studies that empirically tested the effect of entrepreneurial experience on disengagement, ten studies found insignificant effects of entrepreneurial experience on disengagement, three studies showed increased likelihood of disengagement and seven studies found that prior entrepreneurial experience decreases the likelihood of disengagement (many of which are cross sectional and small sample studies). Two studies found mixed results and none of

the studies found evidence for a curvilinear relationship. Only one of the 22 studies (Delmar and Shane 2006) investigated the curvilinear effect of entrepreneurial experience. Their study comments on the relationship based on unreported models, but highlights that no curvilinear effects on venture disengagement during the first 30 months of venture existence were found.

The third paper of this dissertation (A little bit of knowledge is a dangerous thing: Entrepreneurial experience and new venture disengagement) takes a deeper look at the relationship between entrepreneurial experience on venture disengagement and provides a new theoretical framework to reconcile previously mixed findings on their relationships.

TABLE 2: Empirical papers on entrepreneurial experience and survival

Author and year	Sample	Measure of entrepreneurial experience	Entrepreneurial experience impact on survival
Adams, Fontana and Malerba (2016)	936 start-ups in the US semiconductor industry between 1997 and 2007.	Entrepreneurial experience measured as a binary variable equal to 1 if the founder or a member of the founding team, had previously founded another firm.	Impact of prior entrepreneurial experience was insignificant. In terms of performance, firms founded by serial entrepreneurs have a lower hazard of exit by acquisition.
Baptista, Karaöz, and Mendonça (2014)	A longitudinal matched employer-employee dataset built from information submitted annually by all firms with at least one wage earner to the Portuguese Ministry of Employment and Social Security from 1986 to 2005.	Entrepreneurial experience measured as a binary variable.	Prior entrepreneurial experience increases likelihood of survival.

Bosma et al. (2004)	896 new businesses started in the Netherlands in 1994 and registered in the Dutch chamber of commerce database. Surveyed annually until 1997.	Previous business ownership experience measured as a binary variable.	Start-up experience is not significantly related to new venture survival.
Brüderl, Preisendorfer and Ziegler (1992)	Retrospective survey data from 1,849 business founders in Germany.	Self-employment experience measured as a binary variable.	Self-employment experience is associated with extended new firm survival.
Ciavarella, Buchholtz, Riordan, Gatewood and Stokes (2004)	Survey data of 111 US entrepreneurs based on their experiences from 1972 to 1995.	Binary measure of prior start-up experience.	Start-up experience is not significantly related to new venture survival.
Coad, Frankish, Roberts and Storey (2013)	Longitudinal study of 6,247 UK start-ups that began trading in the same quarter of 2004 and were customers of Barclays Bank.	Dummy variable equal to 0 if the owner-manager(s) had previous experience managing a business.	Prior business experience is not significantly related to the likelihood of an exit.
Delmar and Shane (2003)	Longitudinal survey of 223 entrepreneurs in the Swedish PSED 1998 - 2000.	Founding team joint entrepreneurial experience.	Team entrepreneurial experience lowers the likelihood of an exit.
Delmar and Shane (2006)	223 new Swedish ventures followed over a 30-month period.	Previous start-up experience measured at the founder team level as the log of the total number of firms previously started by founding team members. On average, the founding teams had started three previous firms, but 52 percent of the teams had no previous start-up experience.	Founding teams with prior start-up experience are more likely to survive. The marginal effect of prior founding experience is decreasing and is almost exclusively denoted by the difference between any and no prior start-up experience.
Dencker, Gruber and Shah (2009)	436 individuals in the Munich region who founded their own firms	Prior founding experience measured as	Prior founding experience does not have

	as an alternative to continued unemployment.	a binary variable (included as a control variable).	any significant effect on firm survival.
Gimeno, Folta, Cooper and Woo (1997)	1,547 entrepreneurs who founded new businesses in the US from 1983 to 1985, with yearly data collections from 1985 to 1987.	Entrepreneurial experience measured as a binary variable.	Entrepreneurial experience is not significantly related to exit outcomes.
Heaad (2003)	U.S. Census Bureau's Business Information Tracking Series (BITS) used to track the status of new employers during the early 1990's. The U.S. Census Bureau's Characteristics of Business Owners (CBO) used to analyze the status of closed businesses.	Entrepreneurial experience measured as a binary variable.	Prior entrepreneurial experience increases the likelihood of firm survival.
Kalleberg and Leicht (1991)	411 companies in the computer sales and software, food and drink, and health industries in South Central India from 1985-1987.	Longitudinal studies of organization's mortality used to measure entrepreneurial experience.	Prior entrepreneurial experience increases likelihood of an exit for male entrepreneurs, but not for women.
Lafontaine and Shaw (NBER Working Paper 2014)	All new business establishments started any time between 1990 and 2011 to sell taxable goods and services in the state of Texas, totaling 2.3 million retail businesses. 25 percent were started by owners who had started at least one other business.	Owner's prior experience at starting a business, measured as a binary variable.	Prior experience increases firm survival, although not in the restaurant sector.
Oberschachtsiek (2012)	645 self-employment observations (1998: n = 184; 1999: n = 292; 2000: n = 169) with a maximum observation period of 55 months.	Self employment was defined as the difference between the start-up date and the point in time at which the self-employment ended.	The results show that previous self-employment experience is associated with early exits.

Paik (2014)	Panel data from 172 U.S. VC-financed semiconductor firms that entered the market during 1995-1999, including firms founded by teams.	Previous business ownership experience in the founding team (at least one team member's experience) measured as a binary variable.	Prior entrepreneurial experience extends firm survival.
Raffiee and Feng (2014)	Longitudinal data on 1,093 entrepreneurs followed from 1994 to 2008.	Entrepreneurial experience measured the cumulative number of businesses started.	The main effect of entrepreneurial experience is associated with an increased likelihood of exit.
Reuber and Fischer (1994)	43 Canadian biotechnology and telecom firms with mean annual revenues of 23.2M USD and 68 employees in 1992.	Previous start-up experience measured as the number of start-ups.	Previous start-up experience has an insignificant effect on survival.
Schollhammer (1991)	Cross-sectional survey data of 138 start-ups.	Successful and unsuccessful prior entrepreneurial experience.	Successful prior experience led to prolonged survival. Failed prior experience led to reduced survival.
Shane and Stuart (2002)	134 firms founded to exploit MIT-assigned inventions during the 1980–1996 period.	Binary variable, coded 1 if at least one member of the founding team had previously launched a new company.	Start-up experience is not significantly related to new venture survival.
Taylor (1999)	A nationally representative random sample of some 5,500 households and 10,000 individuals.	Lifetime job history data and labor market activity.	Prior entrepreneurial experience lowers the likelihood of an exit.
Van Praag (2003)	Longitudinal survey of 12,000 respondents between 14 and 22 years from 1979–1989.	Self-employment experience measured as a binary variable.	Prior entrepreneurial experience not significantly related to the likelihood of an exit.

Wennberg, Wiklund, DeTienne & Cardon (2010)	1,735 new Swedish ventures and their founders followed over eight years.	Number of years of experience between 1989 and 1995.	Experienced entrepreneurs are more likely to exit via harvest sale over continuation, liquidation, distress liquidation, and distress sale. In unreported models, entrepreneurial experience is found to increase likelihood of exit.
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Methodological challenges reduce research progress

Although entrepreneurship is one of the fastest growing fields of social scientific research, our knowledge of contributing factors to entrepreneurial performance remains inadequate. One of the main reasons for this inadequacy is rooted in the methodological challenges that are inherent to research of complex phenomena such as entrepreneurial careers and entrepreneurial ventures.

One of the challenges pertains to definitions and in particular the lack of universal definitions that enable researchers in this field to systematically build upon prior studies. For example, definitions of “entrepreneurship” are abundant, spanning both non-profit venturing in rural areas of the world with one-man service providers and to companies with hundreds of highly educated researchers and collaborators across the globe. Naturally, such structures are not easily compared.

A related challenge pertains to the measures adopted by researchers. For example, entrepreneurial performance can be, and has been, defined in a myriad of ways: Revenue, profits, price/earnings, exit-value, venture capital investments, number of patents, number of employees, survival rates, growth rates etc. In addition, performance can be measured relative to the expectations of the founder and over shorter or longer periods of time. Finally, performance can be measured at both the level of the entrepreneur, the company or as the impact on society. Performance measures that

could indicate success in a biotech company may indicate failure in a service company and so forth. These examples are merely the top of the iceberg. The level of detail, dualism and complexity only increases as we dive deeper into the measures at the very core of entrepreneurship research. As a consequence, reliable quantitative research in the field of entrepreneurship requires in-depth data on a narrowly defined group of entrepreneurs or large datasets—preferably longitudinal—which are not easily obtained.

In an effort to overcome some of these challenges, the papers constituting this dissertation have been based on large, longitudinal datasets encompassing a full sample of entrepreneurial ventures followed over extended periods of up to 18 years. Also, the papers have to the extent possible adopted stringent definitions in an effort to increase comparability and complementarity with prior research. Despite such methodological considerations, there are limitations in each of the papers, which are also avenues for future research.

Introduction to the constituent elements of the dissertation

In Table 3 and the following sections, each of the three papers is briefly introduced, as well as the implications for researchers, practitioners, educators and policymakers are discussed.

TABLE 3: Overview of the papers in the dissertation

	Paper 1	Paper 2	Paper 3
	Practice makes perfect: Entrepreneurial-experience curves and venture performance	Barriers to learning in early entrepreneurial careers: An empirical assessment of the entrepreneurial experience–performance relationship and the moderating role of entrepreneurial talent	A little bit of knowledge is a dangerous thing: Entrepreneurial experience and new venture disengagement
Research objective	Investigating the entrepreneurial experience-performance curve of entrepreneurs by tracking their financial performance across a series of ventures founded over an 18-year period. The paper additionally investigates how the level of similarity between the ventures moderates the experience-performance relationship.	Assessing the entrepreneurial performance of recent college graduates from Venture 1 to Venture 2. In particular, studying how different types of experience in Venture 1 impact performance in Venture 2 and also how entrepreneurial talent impacts the ability to overcome barriers to learning found especially in early career experiences.	Testing and theorizing how entrepreneurs with varying levels of entrepreneurial experience disengage from early-stage companies.

Sample	65,390 genuinely new incorporations (excluding sole proprietorships, partnerships) started by individual entrepreneurs as full-time ventures in Sweden between 1990 and 2007.	766 serial entrepreneurs comprising two cohorts of Swedish college graduates from 1989 and 1990. All entrepreneurs in the sample founded their first venture within three years after college graduation and at least one other venture in the period up until 2002. The sample includes all types of ventures founded: sole proprietorships, partnerships, and full incorporations.	29,338 genuinely new incorporations and proprietorships started as full-time ventures in Sweden between 1994 and 1996, and followed through 2002 where the data is right-censored. The observation window covers prior experiences 1989 to 1993.
Dependent variable	Financial performance, defined as in Hamilton (2000), across ventures (individual and firm level).	Financial performance, defined as in Hamilton (2000), of Venture 2 (individual and firm level).	Probability of disengagement.
Independent variables	Entrepreneurial experience Geographical similarity Industrial similarity Temporal similarity.	Duration of the first venture Financial performance of the first venture Complexity of the first venture Dissimilarity between first and second venture Entrepreneurial talent.	Entrepreneurial experience. Observation window: 1989 to 1993.

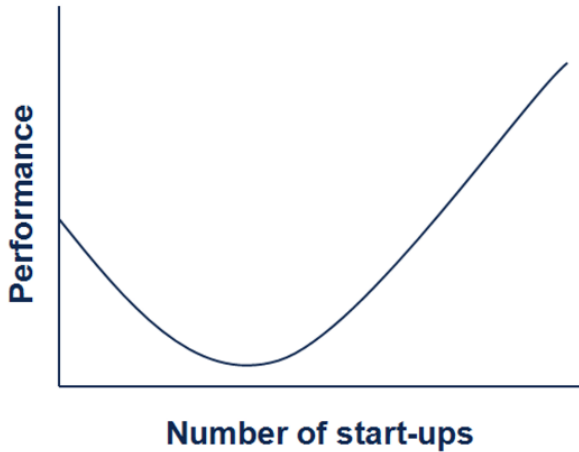
Analytic model	Generalized Least Squares regression (random effects).	Generalized Least Squares regression (random effects).	Survival analysis (Cox proportional hazard).
Key findings	Entrepreneurial experience was found to negatively affect subsequent entrepreneurial performance among novice entrepreneurs, while positive performance returns occurred among expert entrepreneurs. Context similarities between prior and current ventures strengthen this direct effect.	Duration of experience, and performance of Venture 1, as well as dissimilarity between Venture 1 and 2 constitute barriers to learning, with potentially negative effects on subsequent entrepreneurial performance. Entrepreneurial talent positively moderates the ability to overcome barriers, but does not necessarily lead to increased performance.	Curvilinear effects of entrepreneurial experience on venture disengagement was identified, such that novices and highly experienced entrepreneurs are more likely to quit their ventures (although for different reasons), while moderately experienced entrepreneurs are more likely to persist in their entrepreneurial pursuits.

Paper 1 - Practice makes perfect: Entrepreneurial-experience curves and venture performance

The first paper of the dissertation builds upon the experience curve literature to promote our understanding of the relationship between prior experience and subsequent entrepreneurial performance. Based on a longitudinal and matched employee-employer dataset covering an entire population of Swedish founder-managers from 1990 to 2007, the study finds a non-linear relationship between entrepreneurial experience and financial performance consistent with the framework presented in the paper. Specifically, the analysis shows that the positive experience-performance relationship only appears to entrepreneurs with extensive experience, while novice

entrepreneurs may actually perform increasingly worse until a certain threshold level of experience has been accumulated.

Figure 1: Conceptual illustration of entrepreneurial-experience curve (Paper 1)



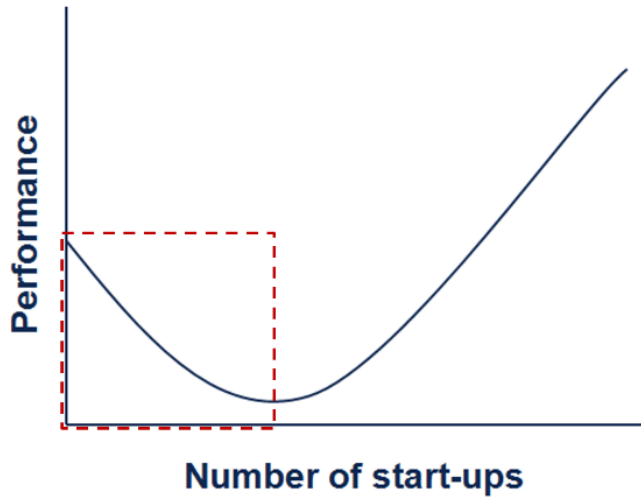
Our explanation for the non-linear relationship is that novice entrepreneurs lack the ability to effectively generalize prior experiential knowledge into new ventures due to barriers to learning, which we define as obstacles encountered by entrepreneurs that prevent them from extracting appropriate knowledge from their prior venturing or from applying their existing knowledge appropriately to new ventures. Further, the analysis shows that the level of similarity between prior and current ventures (industry, geographic and temporal) positively moderates this relationship and improves subsequent venture performance.

Paper 2 - Barriers to learning in early entrepreneurial careers: An empirical assessment of the entrepreneurial experience–performance relationship and the moderating role of entrepreneurial talent

The second paper builds upon the concept of barriers to learning introduced in Paper 1 by exploring how early entrepreneurial experience in the first venture upon college graduation impacts subsequent entrepreneurial performance. The paper utilizes longitudinal data on 776 serial entrepreneurs followed up to 14 years, who founded their first venture within a three-year period after college graduation. The study includes both individual and firm level measures to investigate the impact of entrepreneurial talent and types of experience on financial performance of the second venture. These different types of experience include variation in the duration of first venture commitment, complexity and performance of the first venture, as well as industrial similarity between the first venture and the second venture. The different types of experience are interacted with entrepreneurial talent.

The present paper's core contribution is to provide an understanding of the prevalence and impact of barriers to learning in the earliest phases of entrepreneurial careers (upon college) and how entrepreneurial talent moderates the ability to overcome such barriers.

Figure 2: Conceptual illustration of research focus (Paper 2)



The results show that duration of prior experience, prior performance and dissimilarity between ventures constitute barriers to learning leading to potentially negative effects on subsequent financial performance. Moreover, entrepreneurial talent is demonstrated to moderate the impact of barriers, however it does not necessarily lead to increased performance from the first to second ventures.

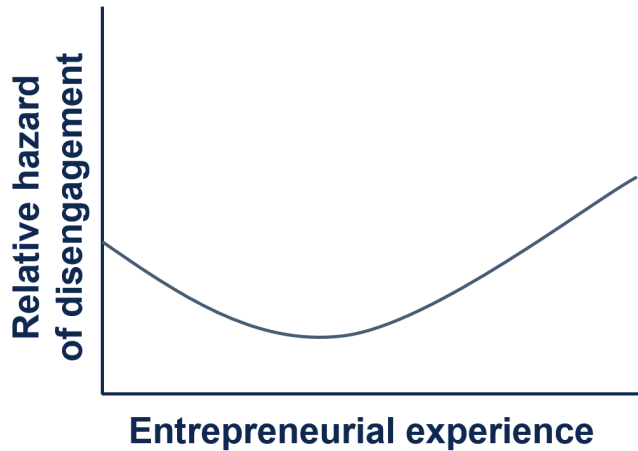
Paper 3 - A little bit of knowledge is a dangerous thing: Entrepreneurial experience and new venture disengagement

Paper 3 is motivated by a comprehensive literature review highlighting a gap in our understanding of how entrepreneurial experience influences whether entrepreneurs will maintain their entrepreneurial commitment to a given venture or disengage. This paper extends the findings from Papers 1 and 2, highlighting that entrepreneurial experience is central to our understanding of entrepreneurial performance, by bringing us one step further towards understanding the mechanisms by which entrepreneurial experience induces an actual change in behavior.

The findings advocate a U-shaped relationship suggesting that novices and entrepreneurs with high levels of experience are more likely to quit their ventures, while moderately experienced entrepreneurs are more likely to continue in their ventures. The paper offers both theoretical and empirical support to explain how the likelihood for entrepreneurs to disengage from entrepreneurial pursuits evolves with entrepreneurial experience.

The analysis is based on a longitudinal dataset comprising a full population of new ventures (incorporations and proprietorships) established in Sweden between 1994 and 1996 which are being followed until disengaged or until 2002, where the data is right censored.

Figure 3: Conceptual illustration of entrepreneurial experience-disengagement curve (Paper 3)



Implications and speculations derived from the dissertation

Serial entrepreneurship denotes an important subset of all entrepreneurial activities both economically and theoretically for several reasons. From a scientific perspective, serial entrepreneurship provides a unique opportunity to learn about entrepreneurial experience as a predictor of entrepreneurial performance (MacMillan 1986; Lafontaine, Shaw et al. 2014). The findings of this dissertation are based in this unique feature of serial entrepreneurship and impose implications for researchers, practitioners, educators and policymakers with entrepreneurial interests.

Implications for researchers

The dissertation draws the contours of entrepreneurial-experience curves and provides a basis for theoretical reasoning with regards to accumulation of expertise through entrepreneurial experience. It builds upon the fundamental notion that a career perspective on entrepreneurship is warranted to achieve a better understanding of how entrepreneurial experience and talent impact new venture activities both in terms of financial performance and entrepreneurial behavior (Burton et al. 2016).

Negative effects of experience challenge the experience curve literature

In demonstrating the existence of entrepreneurial-experience curves, this dissertation provides new evidence to the mixed findings reported in the literature on the experience–performance relationships in entrepreneurship. Yet, in contrast to the established experience curve theory, assuming that experience and performance are uniformly positively related, the present findings suggest a non-linear experience-performance relationship implying that not all levels of experience, or experience from any context, positively impacts returns in subsequent ventures. In fact, the results show the reality of negative performance implications from knowledge transfer among novice entrepreneurs who are unable to overcome barriers to learning from their initial entrepreneurial experiences. As such, the study points towards boundary conditions of the established experience curve literature, by challenging the assumption that repeated task experience generates automatic and consistently positive returns to performance (Yelle 1979). Experience curve theory was originally established on the basis of repetition of simple and similar tasks, but has gradually been applied to contexts with greater levels of task complexity and dissimilarity. By testing the classical learning curve theory in entrepreneurship—a field characterized by extreme complexity and dissimilarity between tasks—the study shows that

experience curve theory in its original form does not adequately capture the cumulative effects of experience. These findings highlight the need for adjustments to the established experience curve theory to maintain its relevance in contexts such as entrepreneurship. Such adjustments need to take into account the effects of complexity and dissimilarity which may under certain conditions lead to *negative* effects of prior experiences that are not currently accounted for in the established experience curve literature.

Defining barriers to learning as a possible construct for performance evaluation

Beyond highlighting the opportunities for individuals to build entrepreneurial-experience curves, the papers collectively frame barriers to learning as a new construct to help understanding when experience leads to both positive- and negative-performance outcomes.

In essence, the papers find evidence to suggest why entrepreneurs with limited entrepreneurial experience are likely to perform increasingly worse at low to medium levels of experience, while increases of entrepreneurial performance only occur at substantial levels of entrepreneurial experience. These moderating effects can be attributed to the prevalence of barriers to learning, which were defined and measured as either contextual dissimilarities among prior and current ventures—such as industry, geographic and temporal characteristics—or content-related characteristics of prior experiences—such as outcome, duration or complexity of venture engagements of the past. Also, speculations pertaining to the timing of experiences in an entrepreneur’s career are presented as a potential barrier for the ability to transform experience to expertise.

In general, barriers to learning were found to significantly moderate the outcome of later ventures. By incorporating the concept of barriers to learning into the learning literature in entrepreneurship,

the disconnect between experience and performance may be harnessed. Conclusively, the dissertation seeks to advance our understanding of how entrepreneurial expertise is developed through entrepreneurial experience, the conditions under which this expertise translates into improved venture performance, and furthermore how entrepreneurship can be learned through well-organized opportunities to gain practice (Ucbasaran et al. 2008; Kim et al. 2009; Parker 2012).

Entrepreneurial talent as an emerging avenue for entrepreneurship research

With a few notable exceptions, entrepreneurial talent has been largely neglected in empirical investigations of entrepreneurship (Baron and Henry 2010; Eesley and Roberts 2012; Chen 2013). Yet, in the second paper of this dissertation, the moderating effects of entrepreneurial talent on entrepreneurial learning were analyzed and found to have a significant impact on the dependent variable financial performance. Generally, entrepreneurial talent was found to positively impact performance both directly and indirectly in overcoming barriers to learning. In particular, it appears that returns to talent increase with the level of barriers such that the moderating effect of talent becomes stronger, for example when the dissimilarity between the first and the second venture increases. These results offer new knowledge to support recent research by Eesley and Roberts (2012) and Chen (2013) highlighting talent as an important and positive moderator of performance in entrepreneurship. Superior outcomes from talented individuals could be attributed to advanced abstraction skills that allow talented entrepreneurs to form heuristics and diverge their thinking to break established frames (Eesley and Roberts 2012). Thereby, in dealing with what is already known and what needs to be known, the interplay between entrepreneurial experience and talent seems to address dual and exclusive challenges of new venture establishment to the benefit of entrepreneurial performance.

Behavioral differences due to entrepreneurial talent and experience

The dissertation also suggests that certain behavioral approaches to entrepreneurship are linked to entrepreneurial experience. In particular, the third paper finds that novices and highly experienced entrepreneurs are quicker to disengage from their ventures but for different reasons. This is in line with the lean start-up movement, which has attracted the attention of researchers, educators, practitioners and policymakers in recent years (McGrath 1999; Ries 2011; Blank and Dorf 2012). Importantly, the dissertation does not make direct conclusions regarding the link between venture disengagement and performance. However, as the link between highly experienced entrepreneurs has been established in the literature, as well as in the first and the second paper of the dissertation, it supports the hypothesis that timely venture disengagement leads to increased likelihood of overall career performance at the individual level. Such proposition warrants further research to understand how entrepreneurial behavior leads to value creation in entrepreneurship (DeTienne 2010).

Implications for practitioners

The findings in this dissertation suggest that varying degrees of entrepreneurial talent exist and have both direct and indirect impact on the performance in new ventures. Yet, as previously highlighted, “entrepreneurial talent” is not well defined. Nonetheless, I find it important to highlight that the findings of the dissertation indicate that entrepreneurs at all levels of talent are capable of increasing the likelihood of building successful ventures through means of experience. In particular, the findings suggest that it may be rational to approach learning in entrepreneurship through ventures with lower levels of complexity, which in Paper 2 of this dissertation was defined as R&D intensity. The argument is that by reducing the level of complexity, the ability to extract valid and generalizable knowledge is improved and the risk of superstitious learning is reduced

(Levitt and March 1988). Despite not being commonly exercised in the field of entrepreneurship, such seemingly rational approaches to learning are used in a broad range of learning contexts; novices are challenged by simple exercises and as expertise accumulates the level of complexity is gradually increased (Unger et al. 2009).

Leaving the role of talent aside, there are important decisions to be made when deciding to become an entrepreneur. First, it may be easy to become an entrepreneur but it takes time—and probably several new ventures—to really *learn* entrepreneurship and most likely to become a *successful* entrepreneur. Thus, structuring an entrepreneurial career path and matching this to personal needs for income, family interests, complexity of ventures, timing of entrepreneurial entry, and inter-venture similarity seems rational based on the findings of this dissertation. Indeed, returns from an entrepreneurial career are likely to become increasingly attractive as the number of venture experiences increase, while at the same time keeping “venture disengagement” as an approach to accelerate accumulation of expertise in mind.

Finally, due to the inherent uniqueness of any given venture, it is suggested that entrepreneurial careers should be established with certain levels of similarity between initial ventures in order to fast-track expertise accumulation and advancement on the entrepreneurial-experience curve.

Although entrepreneurial advisors such as tech transfer agents, accelerators, consultants, and investor-representatives in start-ups are distinct in several ways, the ultimate role as an advisor to a new venture is to provide support and suggestions on strategic decisions and actions required by the entrepreneur to achieve success within a given venture. Although the prevalence of entrepreneurial talent and experience curves supports the benefit of advisors, one key implication of this dissertation applies on a general level: Since advisors typically are less directly involved

in the daily operations of a given venture, it is important to bear in mind that dissimilarities between ventures—even subtle ones that are not easily observed—may render the worth of previous experiences obsolete and potentially even detrimental to performance. Accordingly, advice should be consciously and carefully matched to the specific venture and to the extent possible, rely on similar empirical experiences. Far too often, advisors forget about barriers to learning and provide guidance to entrepreneurs based on intuition and inappropriate generalization.

Investors commonly express people-centric approaches to venture investments, and such approaches are supported by the research underlying this dissertation. Yet, through meetings and discussions with a broad range of investors it is clear that a universal and measurable definition of entrepreneurial talent is yet to be established.

Obviously, the negative effect of limited entrepreneurial experience and the potentially moderating effect of context similarity should cause investors to enforce a nuanced perspective on the value of prior experience. Also, in assembling an investment team, the need for high levels of experience and the similarity of prior experience to the investment focus should be of primary concern.

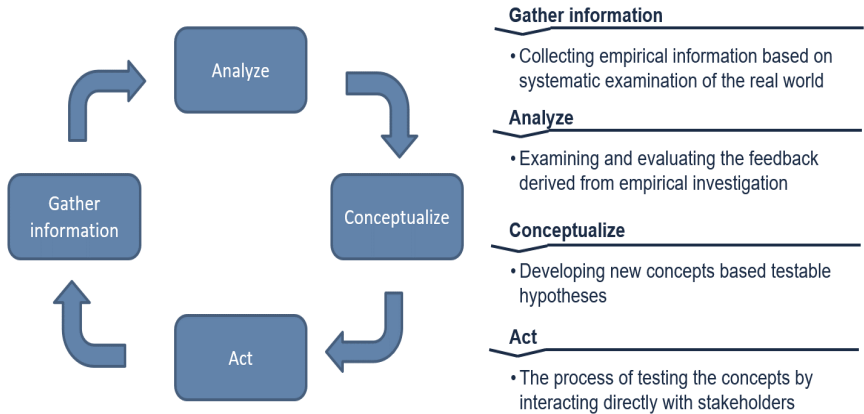
In the future, I envision that stakeholders such as investors could play a more central role in supporting entrepreneurial talents in the progression along entrepreneurial-experience curves by taking a “one entrepreneur, multiple-ventures” approach to investing. That is, instead of betting on the entrepreneur with a given venture it could prove advantageous to consider betting on the entrepreneur over a series of ventures. According to the findings of this dissertation, this should significantly increase the probability that the entrepreneur-investor partnership will eventually hit

the homerun. Such an approach could also reduce inherent and contradictory incentives, which are currently an essential element in every venture capital case as explained by game theories (Eisenhardt 1989). Finally, such longer term engagements could promote more rational approaches to entrepreneurial-experience curves for the benefit of entrepreneurs, investors, and society in general.

Implications for educators

Relating to the education of entrepreneurs, the idea of entrepreneurial methods is in contrast to the conventional teaching of entrepreneurship and calls for iterative and action-oriented approaches – in part because real world interactions are required to understand potential reactions (Saravathy 2001). For example, consumer preferences are often difficult for product designers to predict without introducing the actual product to consumers to gain their feedback or, even better, their purchase or use of the product. Thus, an emerging focus on "entrepreneurship as a method" (Moberg 2014; Williams et al. 2014; Berglund and Korsgaard 2016) is supported by the findings of this thesis which points to the relevance of incorporating entrepreneurial methods such as the lean start-up (Ries 2011) or "the entrepreneurial cycle" (Toft-Kehler et al. 2011) into the teaching of entrepreneurship. The cycle prompts entrepreneurs to A) Gather information, B) Analyze, C) Conceptualize, and D) Act – and continue iterating this cycle until there is a good fit between demand and supply.

Figure 4: The entrepreneurial cycle



The learning of a method thus becomes the microfoundation of the entrepreneurial-experience curve. The entrepreneurial cycle is argued to be a generalizable approach to entrepreneurship at its most fundamental level and therefore—in contrast to causal approaches to entrepreneurship—a method for navigating through a complex world of unpredictability. While success in entrepreneurship depends on more than a method, it is important to emphasize that the entrepreneurial cycle, like any other method, can be taught and practiced by any individual or organization to raise the capacity for entrepreneurial venturing. Focusing on iterative methods in entrepreneurship education seems rational in a world where content knowledge continues to perish at increasing speed.

In addition to teaching entrepreneurial methods, core curricula in the areas of business administration such as finance, accounting, marketing, negotiation, and management is likely to be of benefit for entrepreneurs. All these disciplines may well be learned through direct venture

experience—and potentially supplemented by classroom training—which is also supported in this research.

Implications for policy makers

Highlighted by the finding that entrepreneurial talent can be developed, policymakers could play an important role in creating an infrastructure to support the identification, selection, and development of entrepreneurially talented individuals. Inspiration to form such programs could come from sports, cultural, or educational traditions where talent development is inherently embedded as a mechanism for successful performance.

Also, provisions could be taken to support the training of entrepreneurs under circumstances where the decision and economic risk to engage in entrepreneurship—or disengage—is reduced. Supporting knowledge-intensive entrepreneurs to take the risk of starting a new venture in lieu of financially secure career paths is likely to increase the proportion of new ventures, but must be accompanied by a selection mechanism to avoid the erosion of entrepreneurial ambitions.

In certain countries, the change of regulations may also promote positive effects. For example, providing better opportunities for failed entrepreneurs to reasonably re-engage in entrepreneurship may have a positive effect on the utilization of learning acquired in the first failed attempt, which can be leveraged in subsequent venture efforts.

Finally, establishing incentives for successful entrepreneurs to remain in the ecosystem after a successful exit from their ventures may have significant impact. These individuals have experience, networks, credibility, and potentially even financial resources which could be reinvested into the ecosystem to increase opportunities, along with an increased likelihood of

success for the next generation of entrepreneurs within that system. Interesting studies pertaining to the role of these individuals as “dealmakers” have been published and are gaining increasing attention (Feldman and Zoller 2012). Regions across the globe have invested large amounts in building clusters inspired by Silicon Valley, but only a fraction of these have been successful—none to the extent of Silicon Valley—and many of them have been abandoned as failures. The findings of this dissertation support the view that building entrepreneurial ecosystems takes generations of experience, which importantly must remain within the system as lighthouses for aspiring entrepreneurs and to provide advice, funding, networking, and recognition for the next generations. Learning from entrepreneurial experience takes time and building an ecosystem to capture and accumulate that experience takes significantly longer.

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Paper 1

PRACTICE MAKES PERFECT: ENTREPRENEURIAL- EXPERIENCE CURVES AND VENTURE PERFORMANCE

Authors: Rasmus Vendler Toft-Kehler, Karl Wennberg and Phillip H. Kim

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Practice makes perfect: Entrepreneurial-experience curves and venture performance[☆]



Rasmus Toft-Kehler^{a,b,*}, Karl Wennberg^{c,d}, Phillip H. Kim^e

^a Copenhagen Business School, Kilevej 14a, 3rd floor, 2000 Frederiksberg, Denmark

^b Symbion Entrepreneurial Learning Lab, Fruebjergvej 3, 2100 Copenhagen, Denmark

^c Stockholm School of Economics, P.O. Box 6501, 11383 Stockholm, Sweden

^d The Ratio Institute, P.O. Box 3203, 10364 Stockholm, Sweden

^e Wisconsin School of Business, University of Wisconsin-Madison, 975 University Ave, Madison, WI 53706, United States

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ABSTRACT

This study tackles the puzzle of why increasing entrepreneurial experience does not always lead to improved financial performance of new ventures. We propose an alternate framework demonstrating how experience translates into expertise by arguing that the positive experience–performance relationship only appears to expert entrepreneurs, while novice entrepreneurs may actually perform increasingly worse because of their inability to generalize their experiential knowledge accurately into new ventures. These negative performance implications can be alleviated if the level of contextual similarity between prior and current ventures is high. Using matched employee–employer data of an entire population of Swedish founder-managers between 1990 and 2007, we find a non-linear relationship between entrepreneurial experience and financial performance consistent with our framework. Moreover, the level of industry, geographic, and temporal similarities between prior and current ventures positively moderates this relationship. Our work provides both theoretical and practical implications for entrepreneurial experience—people can learn entrepreneurship and pursue it with greater success as long as they have multiple opportunities to gain experience, overcome barriers to learning, and build an entrepreneurial-experience curve.

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1. Executive summary

Central to the entrepreneurship literature is the conventional wisdom that entrepreneurs and investors alike use experience as a vital clue for anticipating future performance—the level of financial success in new ventures. Extant literature suggests that entrepreneurs who have more experience found better-performing ventures, their experience enabling them to generalize knowledge from one setting and to apply it effectively to a new situation. However, according to learning studies, experience may not necessarily trigger increased performance if incorrect inferences are drawn from previous experiences. The objective of our study is to investigate these contrasting theoretical arguments in entrepreneurship.

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* Corresponding author at: Copenhagen Business School, Kilevej 14a, 3rd floor, 2000 Frederiksberg, Denmark. Tel.: +45 40 10 30 44.

E-mail addresses: rasmus@toft.us (R. Toft-Kehler), karl.wennberg@hhs.se (K. Wennberg), pkim@bus.wisc.edu (P.H. Kim).

In this paper, we argue that entrepreneurs, despite their experience, may actually perform worse in subsequent ventures because of conditions that prevent learning from automatically occurring from one venture to the next. We refer to these conditions as *barriers to learning*, which we define as “obstacles encountered by entrepreneurs that prevent them from extracting appropriate knowledge from their prior venturing or from applying their existing knowledge appropriately to new ventures.” Our study uses theories of experience curves and superstitious learning from the organizational learning literature to propose an alternate framework that demonstrates how the positive experience-performance relationship only appears to expert entrepreneurs, while less-experienced entrepreneurs may be unable to apply their experiential knowledge accurately and successfully to new ventures. While expert entrepreneurs have the necessary general awareness to make more effective connections and to place particular events into their proper contexts, entrepreneurs with lower levels of venture experience attempt to apply lessons learned from experiences they believe to be similar but in practice are inherently different.

To investigate the experience-performance relationship, we developed a set of predictions derived from the experience curve literature to show a number of barriers to learning based on content- and context-domain differences. We described our predictions specifically in terms of three context-domain differences between prior and current ventures: industry, geographic, and temporal. For each of these three context-domain characteristics, we predicted that, at low to moderate levels of experience, high context similarity weakens the negative direct relationship between experience and venture performance. At moderate to high levels of experience, we predicted that high context similarity strengthens the positive direct relationship between experience and venture performance.

We tested our theory by using matched employee-employer data of an entire population of Swedish founder-managers between 1990 and 2007. Consistent with our theoretical predictions, we found evidence to support our framework predicting why limited experience lowers performance while enhanced financial performance only occurs at substantial levels of experience. We observed that contextual similarities among prior and current ventures positively moderated the direct experience-performance relationship.

Our work provides both theoretical and practical implications for entrepreneurial experience—people can learn entrepreneurship and pursue it with greater success as long as they have multiple opportunities to gain experience, overcome barriers to learning, and build an entrepreneurial-experience curve. As such, this study provides new insights for the experience curve literature by challenging the assumption that repeated task experience generates automatic and consistent returns to performance. In demonstrating the contours of entrepreneurial-experience curves, we provide a corrective to mixed evidence reported in the literature regarding the experience-performance relationship. Just as critically for aspiring entrepreneurs, our work shows that extensive practice enables them to learn entrepreneurship and makes for the possibility of better performing ventures.

2. Introduction

Entrepreneurs and investors alike use experience as a vital clue for anticipating future performance—the level of financial success in new ventures. In its simplest form, entrepreneurial experience is past involvement in founding a business. Entrepreneurs tap into the knowledge gleaned from their prior ventures to formulate and execute their plans in new ventures. Investors, on the other hand, regularly tout a philosophy of “betting on the jockey rather than the horse” when evaluating potential entrepreneurs to back with their financial support. But for both parties, entrepreneurial experience serves as a proxy for expertise—an underlying ability to generalize knowledge from one setting and to apply it effectively to a new situation (Eisenhardt and Martin, 2000; Hayes, 1989). Thus, conventional wisdom dictates that entrepreneurs who have more experience would also found better-performing ventures, a relationship consistent with experience curve theory (Argote and Todorova, 2007).³ Acceptance of this null argument depends on the validity of the assumption that learning from prior ventures is cumulative and automatic with each successive effort (Hayes and Clark, 1985; Yelle, 1979). However, we also know from learning studies that experience may not necessarily trigger increased performance if incorrect inferences are drawn from previous experiences, a theoretical concept known as superstitious learning (e.g., Levitt and March, 1988). In particular, infrequent events are more difficult to learn from due to the lack of repetitiveness or the time decay of learning (e.g., March et al., 1991; Parker, 2012).

The purpose of our study is to investigate these contrasting theoretical arguments in entrepreneurship. Despite their experience, entrepreneurs may actually perform worse in subsequent ventures because of conditions that prevent learning automatically occurring from one venture to the next (Bingham et al., 2007; Rerup, 2005; Shepherd, 2003). We refer to these conditions as *barriers to learning*, which we define as obstacles encountered by entrepreneurs that prevent them from extracting appropriate knowledge from their prior venturing or from applying their existing knowledge appropriately to new ventures. We develop arguments for why some experienced entrepreneurs are unable to overcome these barriers fully—and why they experience poorer entrepreneurial performance—by comparing experience curve and superstitious learning theories.

We investigate our research questions using a unique longitudinal dataset of new ventures in Swedish knowledge-intensive sectors from 1990 to 2007. This comprehensive, historical, and time-varying information about the owner-managers of these ventures allows us to examine carefully the experience-venture performance relationship. Our analyses reveal a non-linear relationship between these two facets of entrepreneurship, such that entrepreneurs actually perform progressively worse between low to moderate levels of experience and improve only at moderate to high levels of experience. The strength of this non-linear relationship varies depending on industry, geographic, and temporal similarities between the entrepreneurs' current and prior ventures.

³ Initially introduced in psychology, the term has acquired a broader interpretation over time, and expressions such as “learning curve” and “progress curve” are often used interchangeably (Epple et al., 1991).

Our study offers several contributions to the entrepreneurship literature. By applying experience curve theory to this literature, we provide a more comprehensive framework for understanding how entrepreneurial experience can be applied to new venturing efforts, why experience does not always lead to increased performance outcomes, and how it produces both positive- and negative-performance outcomes (e.g., Chandler, 1996; Eesley and Roberts, 2013; Gartner and Starr, 1999; Parker, 2012; Rerup, 2005; Shepherd et al., 2009; Ucbasaran et al., 2009). These insights have especially broad appeal to those studying *serial entrepreneurs*—individuals who found one venture and subsequently found at least one other venture. This population represents 15 to 25% of the total population of entrepreneurs, and these entrepreneurs are considered essential contributors to economic growth (MacMillan, 1986; Ucbasaran et al., 2008). By developing a new framework for assessing the level of experience and its similarity to current entrepreneurial efforts, we clarify the moderating conditions in which experience produces both positive- and negative-performance outcomes. Our approach resolves some of the inconclusive findings reported in prior studies addressing the relationships between experience and venture performance (Delmar and Shane, 2006; Ucbasaran et al., 2008). By using a carefully constructed longitudinal study design mitigating survival and success biases, our work broadens knowledge about the time-varying and non-linear aspects of learning and performance also reported in recent studies (Campbell, 2012; Parker, 2012). Accordingly, our study reveals the conditions in which entrepreneurs can learn to overcome barriers to “learning” entrepreneurship, leading to improved performance in the ventures they create. Only with *extensive* practice, entrepreneurs can actually learn how to launch and manage new ventures effectively as they eventually proceed upward along their entrepreneurial-experience curves.

3. Conceptual background

In the following sections, we define the key theoretical concepts we employ in our study: entrepreneurial experience and experience curves (MacMillan, 1986). We use these concepts to build our theoretical arguments regarding their relationships with venture performance.

3.1. Entrepreneurial experience and venture performance

We define *entrepreneurial experience* as past involvement in founding a business. Research on entrepreneurial performance suggests that financial success is partly dependent upon the entrepreneurs' expertise in effectively applying knowledge from prior ventures to current efforts (Aldrich and Yang, 2013; Baron and Ensley, 2006; Eesley and Roberts, 2013; Gompers et al., 2006; Politis, 2005; Shepherd et al., 2009). Yet without the ability to measure expertise directly, entrepreneurial experience is more generally used as a predictor of a venture's financial performance and has generally been argued to enhance such performance in positive ways (e.g., Delmar and Shane, 2004; Haynes, 2003; Stuart and Abetti, 1990). Animating this null argument is the mechanism that experienced entrepreneurs increasingly develop expertise in starting and running businesses with each venture, which in turn is reflected in successive venture performance improvements (Eesley and Roberts, 2013; MacMillan, 1986). But the accumulated empirical evidence to support an association between experience and a venture's financial performance remains inconclusive. Some studies reported no effects (e.g., Dencker et al., 2009; Oe and Mitsuhashi, 2013; Ucbasaran et al., 2006; Westhead and Wright, 1998), while others showed non-linear effects (e.g., Delmar and Shane, 2006; Eesley and Roberts, 2013; Reuber and Fischer, 1994), while still others found even negative effects (Alsos and Carter, 2006; Tornikoski and Newbert, 2007).⁴ Given these inconsistent findings, we argue that the relationship between entrepreneurial experience and venture performance is not necessarily straightforward. To help clarify this connection, we look to experience curve theory to generate our arguments for how these two facets of entrepreneurship are related.

3.2. Experience curves and serial entrepreneurship

Following psychology research, we define individual *experience curves* as “improvement in performing a given task as a function of cumulative experience” (Ellis, 1965; Harlow, 1949). Principles of experience curves (or learning curves) have been developed in studies across a number of contexts and at the levels of individuals, groups, organizations, and industries (Argote, 1999; Yelle, 1979). Research on experience curves typically measures learning in terms of quality, cost, and speed-related performance outcomes (Dutton and Thomas, 1984; Lapré et al., 2000). Experience curves represent the link between experience and performance over time from repeating a series of events, each of which represents an opportunity for learning (Yelle, 1979). They are explicitly longitudinal because learning from experience is an inherently iterative and dynamic process (March, 2010). This description of experience curves is also consistent with the definition of learning found in the organizational literature, in which it is described as a change in behavior or performance that occurs as a function of experience (Argote and Epplé, 1990; Dutton and Thomas, 1984). From these principles, then, one could predict positive but diminishing returns to experience (Dutton and Thomas, 1984; Wright, 1936; Yelle, 1979).

⁴ In our review of papers associating entrepreneurial experience with performance, we searched the Journal of Business Venturing, Entrepreneurship Theory and Practice, and Strategic Entrepreneurship Journal for papers with the following key words: entrepreneurial experience, start-up experience, serial entrepreneur, habitual entrepreneur, expert entrepreneur, repeat entrepreneur, and experienced entrepreneur. We then added all papers identified through Web of Science and Google Scholar, as well as papers cited in prior literature reviews (Delmar and Shane, 2006; Ucbasaran et al., 2008). Among the 22 empirical studies we identified measuring the effect of entrepreneurial experience on performance, 10 studies show insignificant or mixed effect, three studies report curvilinear effects (positive and negative effects; e.g., context or time dependent), seven report positive effects (many of which are cross-sectional and small-sample studies), and two studies report negative effects.

The empirical evidence, however, shows variations in the shape of experience curves across levels of analysis, as well as across task-content and contextual domains (Argote and Epple, 1990; Hayes and Clark, 1985). These variations point to a more complex connection between experience and performance. Although experience curve theory is based on multiple repetitions of the same task, improved performance depends on similarities between the repeated tasks. Thus, we argue that these similarities can be viewed in terms of the content domain of the task and the context domain in which it occurs. Following Barnett and Ceci (2002:621), we define the *content domain* as what can be learned from experience with a given task and the *context domain* as where and when learning is transferred from and to. Content-domain similarities occur when entrepreneurs repeat similar actions when launching their businesses, such as developing products, conducting market research, mobilizing resources, and carrying out other activities typically associated with business formation. Conversely, context-domain similarities arise when entrepreneurs launch new ventures in similar contexts, such as in the same industry or general location as their prior efforts.

But when the tasks in content and context domains are not similar in one or both dimensions, barriers to learning complicate the ability for individuals to apply knowledge effectively from prior efforts to their current endeavors. Entrepreneurs' encounters with learning barriers depend on their level of general experience in starting ventures (content-domain similarity) and also depend on the extent to which those experiences are similar to their current efforts (context-domain similarity). Our argument highlights why content-domain similarities from previous businesses do not necessarily produce better performance in new ventures. We attribute this learning barrier to incorrect inferences made by serial entrepreneurs from previous experiences (Levitt and March, 1988; March, 2010; Novick, 1988). Moreover, we contend that this experience-performance relationship varies depending on context-domain similarities between past experiences and current conditions (Argote, 1999; Lampel et al., 2009; March et al., 1991; Parker, 2012).

4. Theory and hypotheses

In the following sections, we first address the role of increased content-domain similarity of starting businesses to overcome learning barriers. This represents the direct-effect relationship in our theoretical model explaining how the level of prior entrepreneurial experience influences current venture performance (Section 3.1). We then address the role of increased context-domain similarity as a second means of overcoming learning barriers. At large, we treat these contextual similarities as moderators to the direct experience-performance relationship in our theoretical model (Sections 4.2–4.5).

4.1. Limited entrepreneurial experience as a barrier to learning

Experience curve theory predicts that, when current situations seem similar to previous experiences, behavior from previous situations will be generalized to the current situation (Pinder, 1984; Tripsas and Gavetti, 2000). Taken at face value, we would then expect serial entrepreneurs to benefit increasingly from what they learned from their prior ventures (content-domain similarity) given their awareness of what is required to build new ventures and their assumed desire to pursue this effort successfully. However, learning theory also predicts the following—if current conditions are unlike previous situations, generalizing from past experience can lead to unfavorable outcomes (Mazur, 1994). Specifically, studies of learning both at the individual (Kahneman et al., 1982) and firm levels (Barnett and Ceci, 2002; Kahneman et al., 1982; March, 2010) have revealed that transferring knowledge derived from prior experiences becomes more difficult when new content domains are complex, such as the challenges faced by entrepreneurs starting businesses.

To apply experience curve theory to serial entrepreneurship, we first assume experienced entrepreneurs who start new ventures will not approach them as completely new endeavors (MacMillan, 1986; Parker, 2006). However, each new venture will have its own set of unique challenges to overcome, weakening the assumption that content-domain similarity is integral to experience curve theory for predicting increasing performance. Thus, serial entrepreneurs still wrestle with a variety of fundamental issues that are different for each new venture: how to deliver value to customers, secure financial resources, and thwart competitors. Despite the apparent similarities of these business-formation requirements, serial entrepreneurs are likely to encounter enough differences in each new venture so that application of prior knowledge is not straightforward.

To reconcile these two conflicting views, we argue that entrepreneurial experience has a curvilinear influence on venture performance. This argument contains two parts. In the first part, we argue that novice entrepreneurs—those with low to moderate venture experience—will generalize their knowledge incorrectly to new ventures, resulting in a negative influence on venture performance. This occurs because of superstitious learning, a false sense of understanding of the current situation from prior experience (Levitt and March, 1988). Novice entrepreneurs attempt to apply lessons learned in content domains they believe are similar but in practice are inherently different.

This false sense of understanding arises from an impulse to generalize from a limited set of experiences without full awareness of a wider body of challenges and accompanying solutions (Simon, 1978). When multiple solutions exist for addressing a particular venture-related problem, novice entrepreneurs find it difficult to compare the feasibility of alternative solutions *ex ante*, because novel, intuitive insights cannot be judged *a priori* right or wrong (Crossan et al., 1999). Thus, they increasingly generalize mediocre solutions from the past and import them to superficially similar conditions in the present (Mazur, 1994; Novick, 1988).

This increasingly negative influence is most acute at moderate levels of experience because moderate experience leads entrepreneurs into competence traps where they perceive such similarities, but lack sufficient perspective to recognize the similarities are only superficial (Levitt and March, 1988; Zollo, 2009). With low or moderate experience, entrepreneurs may continue employing developed routines even when confronted with pressure against their use (Frese, 2009; Kim et al., 2009).

Consequently, this application of prior knowledge can negatively affect venture performance (Dencker et al., 2009). In fact, studies have shown that performance loss can occur when entrepreneurs draw inaccurate inferences from even just one prior event that is incorrectly perceived to be similar to the current effort (Haleblian and Finkelstein, 1999).

The negative influence of superstitious learning reverses when serial entrepreneurs exceed moderate levels of experience. These individuals we refer to as expert entrepreneurs. For the second part of our direct-effect argument, we posit that venture performance starts to improve only at higher levels because these serial entrepreneurs are better equipped to deduce differences between prior and current conditions; that is to say, they are more likely to draw more accurate inferences based on their knowledge from other ventures. As the content domain of entrepreneurship is complex, each new venture will require entrepreneurs to transfer knowledge across conceptually distant content domains (Barnett and Ceci, 2002; Gick and Holyoak, 1987). Each venture contains its own set of unique circumstances and start-up challenges (Beckman and Burton, 2008; Eisenhardt and Schoonhoven, 1990). Addressing these varied challenges requires them to have at least a moderate level of experience for the necessary perspective to make more accurate generalizations and to apply them successfully to their new ventures (Eesley and Roberts, 2013; Kim et al., 2009; Levitt and March, 1988).

Expert entrepreneurs are better able to transfer knowledge into new content domains (i.e., the new challenges associated with each new venture), even if they lack direct experience for dealing with these specific challenges. These highly experienced entrepreneurs have the necessary general awareness to make more effective connections (Brown et al., 1989) and to place particular events into their proper contexts (Mitchell et al., 2007). The development of new entrepreneurial routines also increases entrepreneurs' ability to go beyond existing routines (Frese, 2009). Expert entrepreneurs are additionally able to better resist the impulse to react solely on initial impressions—reactions referred to by scholars as anchoring biases (Kahneman et al., 1982; Wilson et al., 1996). As the real benefits from learning commonly attributed to entrepreneurial experience manifest with extensive experience (Kim et al., 2009; Ucbasaran et al., 2008), we expect experience to exhibit a non-linear relationship with venture performance.

Specifically, it declines at low to moderate levels of entrepreneurial experience, but turns positive for entrepreneurs with moderate to high levels of experience. Therefore, we predict:

Hypothesis 1. The level of entrepreneurial experience will exhibit a U-shaped relationship with venture performance. Specifically, *low to moderate levels of experience* have a direct *negative* relationship with venture performance while *moderate to high levels of experience* will have a direct *positive* relationship with venture performance.

4.2. Contextual similarities and barriers to learning

In addition to the venture-performance implications resulting from content-domain differences, we also argue that contextual-domain similarities play an important role in why some entrepreneurs perform better than others in subsequent ventures. Recall that we define context domain as where and when learning is transferred from and to (Barnett and Ceci, 2002:621). From the experience curve literature, we know context-domain similarities directly affect performance outcomes when transferring knowledge across contexts (Argote and Miron-Spektor, 2011; Lapré et al., 2000). Beyond this direct relationship, however, we posit that context-domain differences also moderate the strength of the experience–performance relationship we described in the previous section.

In the following sections, we begin with a general overview about our moderating predictions. Because our direct experience-performance relationship in H1 is curvilinear (depending on the level of experience), we introduce our moderation argument in two parts: (1) why context-domain differences attenuate the negative experience–performance relationship for low to moderately experienced entrepreneurs (enabling them to alleviate barriers to learning) and (2) why context-domain differences accentuate the positive experience–performance relationship for moderate to highly experienced entrepreneurs (enabling them to enhance the effects of learning). After providing the general moderation argument, we describe our predictions specifically in terms of three context-domain differences between prior and current ventures: industry, geographic, and temporal.

4.2.1. Contextual similarity as means to alleviate barriers to learning

In the first part of our moderation argument, we focus on novice entrepreneurs, those with low to moderate venture experience. Among these entrepreneurs, those with high similarities between their prior ventures and current efforts, however limited, most improve their accuracy of transferring knowledge from one context to another. We offer several reasons for this improvement. Superstitious learning theory predicts that applying knowledge from a similar situation reduces the need for adapting the knowledge into the current context (Levitt and March, 1988; Zollo, 2009). Entrepreneurs can immediately use the insights derived from their prior ventures and benefit from this expertise. Generalization in similar contexts reduces the negative effects of behavioral persistence (Mazur, 1994; Tripsas and Gavetti, 2000). Additionally, the benefits of contextual similarity enable entrepreneurs to alleviate the barriers to learning that exist with limited experience. When current and past experiences are similar, process knowledge improves through specialization (Zollo et al., 2002). Small deviations in context across ventures thus allow entrepreneurs to distinguish easily between higher-order and lower-order heuristics by elaborating on existing knowledge and, ultimately, by developing deeper understandings of causal relationships (Bingham et al., 2007). Although we still expect the negative direct relationship between the experience and venture performance to exist, similarities between prior and current ventures help to address those drawbacks associated with limited experience.

4.2.2. Contextual similarity as means to enhance learning

In the second part of our moderation argument, we switch the focus to expert entrepreneurs—those with moderate to high venture experience. Among these entrepreneurs, high similarity between prior ventures and current efforts further improves their ability to generalize knowledge from one context to another. In addition to the benefits we described in the previous section, we outline two additional advantages. First, high similarity reduces challenges posed by superstitious learning theory, such as transferring knowledge from conceptually distant domains (Barnett and Ceci, 2002; Gick and Holyoak, 1987). Expert entrepreneurs benefit more from this association because of their ability to apply, easily and accurately, their insights from past ventures to their current efforts (Bingham et al., 2007). Second, high similarity also enables individuals to respond more quickly to current efforts based on their previous experiences because they do not need to learn new concepts (Nye, 1979). With the broad perspective they gain from extensive experience, expert entrepreneurs stand to further benefit from their experience when starting similar ventures. In the following sections, we outline our moderation arguments more specifically in terms of three forms of contextual similarities: industry, geographic, and temporal.

4.3. Industry similarity and barriers to learning

Perhaps the most salient indicator of context-specific entrepreneurial experience identified in the literature is industry similarity (Delmar and Shane, 2006; Eesley and Roberts, 2013; Klepper, 2001). Industry similarity is the extent to which an entrepreneur's prior ventures are similar to their current venture in terms of the industry in which they operate. Serial entrepreneurs may be able to respond quicker to a given challenge than novice entrepreneurs (Ucbasaran et al., 2008), yet there is a risk that their responses draw on incorrect inferences because the given context has changed (Levitt and March, 1988). Applying this general rationale of our moderating argument specifically to industry similarity, we posit that, at low to moderate levels of entrepreneurial experience, the negative direct relationship with venture performance will weaken as industry similarity increases. Under these conditions, industry-experienced entrepreneurs benefit from employing relevant knowledge to similar industry conditions they face with their current ventures. With such similarities, the positive benefits of industry experience—such as identifying more entrepreneurial opportunities (Gruber et al., 2008), increasing venture survival and growth prospects (Cooper et al., 1994), and forecasting performance more accurately (Cassar, 2014)—help to mitigate the negative outcomes associated with limited entrepreneurial experience.

The positive benefits associated with industry experience become even more evident at a high range of experience because of the ease with which entrepreneurs can accurately generalize from past venturing experiences in similar industries (Haunschild and Sullivan, 2002; Schilling et al., 2003). These benefits from industry-context similarities help entrepreneurs to overcome barriers to learning and to minimize the drawbacks associated with transferring knowledge into new contexts with limited experiences (Chandler, 1996; Gartner and Starr, 1999; Mazur, 1994). We also expect that at moderate to high levels of entrepreneurial experience, the positive direct relationship with venture performance will strengthen as industry similarity increases. For these reasons, we predict:

Hypothesis 2. Industry similarity moderates the curvilinear relationship between entrepreneurial experience and venture performance such that it *reduces* the direct negative effect of *low to moderate levels* of experience, while *strengthening* the direct relationship at *moderate to high levels* of experience.

4.4. Geographic similarity and barriers to learning

A second type of context similarity concerns the geographic proximity of an entrepreneur's current venture with their prior efforts. Geographic similarity is the extent to which an entrepreneur's prior ventures are located in close distance with their current venture. Again, we argue that at low to moderate levels of entrepreneurial experience, the negative direct relationship with venture performance will weaken as geographic similarity increases. Establishing new ventures within close proximity to previous ventures allows entrepreneurs to leverage a broader resource base and to profit from reputations established through previous entrepreneurial efforts (Mason and Harrison, 2006). These benefits help them to overcome the drawbacks that come with limited entrepreneurial experience and its consequences of superstitious learning (Levitt and March, 1988).

We also argue that at moderate to high levels of entrepreneurial experience, the positive direct relationship with venture performance will strengthen as geographic similarity increases. Entrepreneurs tend to engage in social networks with stakeholders primarily close to their base (Dahl and Sorenson, 2009). The locally bounded value of knowing who knows what and who knows whom becomes even more beneficial if new ventures are established in proximity to their previous ventures (Klepper, 2002; Stuart and Sorenson, 2003). Local experience yields knowledge about proximate patterns in demands, access to suppliers, regulations, and insights about social and economic trends. This knowledge is more applicable and easily transferred to new ventures started in the same region (Ingram and Baum, 1997; Pe'er et al., 2006). For these reasons, we expect:

Hypothesis 3. Geographic similarity moderates the curvilinear relationship between entrepreneurial experience and venture performance such that it *reduces* the direct negative effect of *low to moderate levels* of experience, while *strengthening* the direct relationship at *moderate to high levels* of experience.

4.5. Temporal similarity and barriers to learning

In addition to industry and geographic similarity, the time elapsed between entrepreneurial spells can impede learning from venture to venture as well. We define temporal similarity as the time elapsed between an entrepreneur's last venture and current venture. Similar to our previous two predictions, we argue that at low to moderate levels of entrepreneurial experience, the negative direct relationship with venture performance will weaken as temporal similarity increases. The value of experience from the prior venture is most valuable when the knowledge soon translates into a new effort because experiential knowledge depreciates over time unless that knowledge is put into action (Argote et al., 1990; Baum and Ingram, 1998; Benkard, 2000; Darr and Argote, 1995; Parker, 2012). By starting a new venture shortly after running a previous one, entrepreneurs are able to alleviate the disadvantages of limited experience by quickly putting their experiential knowledge into action. For example, knowledge of a market context is more relevant for subsequent ventures if it is applied quickly because markets are highly dynamic. Knowledge of yesterday's rules may not necessarily lead to future success (Gartner and Starr, 1999).

Temporal similarity will also have an enhancing effect on performance by expert entrepreneurs. Again, we expect that at moderate to high levels of entrepreneurial experience, the positive direct relationship with venture performance will strengthen as temporal similarity increases. By starting new ventures within short periods of time, entrepreneurs avoid the decline in their abilities and can go on to attribute sources of success correctly (Golden, 1997). This association strengthens the positive benefits of entrepreneurial experience on performance because of the more accurate inferences they can make from recent ventures (Levitt and March, 1988; Zollo, 2009). For these reasons, we predict:

Hypothesis 4. Temporal similarity moderates the curvilinear relationship between entrepreneurial experience and venture performance such that it *reduces* the direct negative effect of *low to moderate levels* of experience, while *strengthening* the direct relationship at *moderate to high levels* of experience.

5. Methods

5.1. Data

Investigating entrepreneurial learning at the individual level over time requires a study context with several features. We needed longitudinal data tracking ventures from their formation (Delmar and Shane, 2006). The data also had to follow serial entrepreneurs in ways that properly accounted for sample selection biases (Delmar and Shane, 2003; Hamilton and Nickerson, 2003). We additionally required a context in which entrepreneurial experience could be measured more comprehensively than a simple binary indicator of having any experience or not. Our study also needed an outcome measure that accurately reflected venture performance consistently across companies and industries (Delmar and Shane, 2006).

To fulfill these criteria and to accomplish our study objectives, we created a dataset with these features in mind. Our data came from two longitudinal sources maintained by Statistics Sweden—RAMS, which contains yearly data on all firms registered in Sweden, and LISA, which provides yearly data on all Swedish inhabitants from 1990 onwards.⁵ We used RAMS to identify all Swedish privately owned firms started between 1990 and 2007. Because these data contain complete information on the entire population of Swedish firms, we were able to examine new ventures from their very inception, which we define as when a single owner-manager worked full time in the new business. We excluded sole proprietorships and partnerships to avoid part-time ventures for which entry and exit may be “a trivial decision” (Gimeno et al., 1997). To decrease industry heterogeneity, we also limited the sample to entrepreneurs in knowledge-intensive sectors (i.e., high-tech manufacturing and knowledge-intensive services). Knowledge-intensive industries constitute about 35% of all firms started in Sweden (Folta et al., 2010), and they include most rapidly growing industries (e.g., chemicals, medicine, telecom, finance, business services, information technology, education and research). To identify these sectors, we used the Eurostat and Organisation for Economic Co-operation and Development's (OECD) classification system, which is based on whether or not the industry's R&D intensity is higher than the mean of the overall economy (Götzfried, 2004). A full list of sectors included in our study sample is shown in Appendix 1.

To investigate how experiences of individual entrepreneurs affect their ventures, we required the entrepreneurs to hold discretion over the firm's future (Beckman and Burton, 2008). Thus, we analyzed only newly started ventures from their inception onward, those enterprises founded by founder-managers working full time in a new firm in which they held a majority ownership stake. After excluding 4058 firms (5.8% of the sample) where no individual entrepreneur held a majority stake, we formed an analytical sample of 65,390 genuinely new (de-novo) firms started by individual entrepreneurs as full-time ventures.⁶

We used LISA to form our individual-level experience variables based on venturing activities occurring from 1990 to 2007. Because the RAMS and LISA datasets can be linked together, we were able to construct detailed individual- and firm-level

⁵ Additional details about these data can be found here: http://www.scb.se/Pages/List___257743.aspx.

⁶ Exclusion of these team start-ups was theoretically motivated by our experience-curve framework's focus on learning at the individual level. They were methodologically necessary since we cannot compare the benefits of an individual entrepreneur's learning with that of two- or three-member entrepreneurial teams in any systematic way. A small number of cases (0.08% of the sample) were reported as owners with entrepreneurial earnings but not reported as “entrepreneurs” in the occupational data. After discussion with experts at Statistics Sweden, rather than omit these cases they were corrected by assigning people with “missing” employment information as entrepreneurs or non-entrepreneurs, based on them reporting entrepreneurial earnings or not.

Table 1
Variable descriptive statistics.

Variable	Mean	St. dev.	Min	Max	VIF
Ln (entrepreneurial earnings)	12.89	5.60	0	16.13	1.19
Age	45.41	11.13	21	87	1.35
Female	0.56	0.50	0	1.00	1.05
Education	12.35	6.20	6	19	1.35
Management experience	0.46	0.55	0	2	1.10
Parents as entrepreneurs	0.34	2.09	0	8.00	1.00
Ln (capital)	10.35	40.20	0	190.44	1.01
Firm survival (lambda)	450.42	110.14	0	95.00	1.02
Ln (past performance as serial ent.)	6.33	3.73	0	21.4	2.34
Industry similarity	10.42	3.99	0	15.34	1.07
Geographic similarity	-240.81	160.87	-1010	0.00	1.28
Temporal similarity	-10.34	20.63	-15	0.00	3.83
# Ventures founded	0.39	0.77	0	5	5.32
# Ventures founded ²	0.64	2.07	0	25	8.23

Note: N = 65,390 individuals.

measures that met the necessary longitudinal requirements for testing our study predictions. One advantage of this study design is that our sample includes every individual who has ever worked in these knowledge-intensive industries. As such, we have complete labor-market histories for each entrepreneur who has started a venture in these industries (i.e., a balanced panel design). These histories include data on entrepreneurial experience if the entrepreneur previously funded or co-funded one or several businesses outside these sectors. We provide information on our variables' descriptive statistics in Tables 1 and 2.

5.2. Dependent variables

5.2.1. Venture performance

We measured venture performance based on Hamilton's (2000) definition of entrepreneurial earnings—[revenues – expenses = money taken out + retained earnings]. To construct this variable, we combined firm-level performance data from the venture's annual reports (in RAMS) with individual-level tax records (from LISA). Because of the high skewness in the earnings variable, we log-transformed it, following a commonly used technique in the labor economics literature.

We used entrepreneurial earnings as our performance measure because of its comparability and meaningfulness across industries. Some performance measures are not equivalent from industry to industry (e.g., annual sales growth), whereas other measures may not be as meaningful in some industries (e.g., number of patents). Given our objectives of testing theory that is generalizable across industries, we argue that entrepreneurial earnings are an appropriate performance measure. Using such an indicator to measure performance also helps to disentangle the role of learning's effect on firm performance as opposed to firm survival because collecting performance data is difficult for discontinued ventures. In such studies, performance has either been ignored or measured indirectly as "financial leverage" (Bates, 1990) or as "money taken out of the business" (Gimeno et al., 1997). These are highly imperfect measures because entrepreneurs often choose to forego current benefits in preference of reinvesting money. Given our longitudinal dataset with complete coverage of an entire population of firms, we also avoid recall bias and sample-selection problems in our dependent variable.

Table 2
Correlation matrix.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Ln (Entrepreneurial earnings)													
2 Age	0.064												
3 Female	0.292	0.001											
4 Education	0.041	0.012	-0.016										
5 Management experience	0.084	0.160	0.123	0.138									
6 Parents as entrepreneurs	-0.006	-0.025	0.006	-0.002	-0.041								
7 Ln (capital)	0.083	0.017	0.102	0.013	0.122	-0.028							
8 Firm survival (lambda)	0.005	0.041	0.039	0.006	0.201	-0.160	0.265						
9 Ln (past performance as serial ent.)	0.055	0.043	0.123	0.032	-0.039	0.001	0.059	0.177					
10 Industry similarity	-0.083	-0.019	0.212	0.016	0.090	-0.003	0.042	0.128	0.052				
11 Geographic similarity	0.108	-0.045	0.362	0.011	0.089	-0.015	0.133	0.200	0.087	0.145			
12 Temporal similarity	-0.096	0.052	0.184	0.050	0.021	0.001	0.067	0.165	0.834	0.087	0.099		
13 # of ventures founded	0.140	0.033	0.141	0.022	0.006	0.004	0.047	0.127	0.757	0.110	-0.105	-0.477	
14 # of ventures founded ²	-0.073	0.122	-0.029	-0.010	-0.062	0.005	0.010	-0.207	-0.073	-0.002	-0.002	0.296	0.916

Note: N = 65,390 individuals.

5.3. Independent variables

5.3.1. Number of ventures founded

We used data from LISA on individuals' career histories to determine the number of prior entries into entrepreneurship during the 17 years of our study period. To consider them as prior entries, we used several criteria. We first determined all occasions when there was at least a one-year gap between an individual's spells of entrepreneurship. For entries in the same industry and geographic location, we implemented a more stringent criterion of a two-year gap between spells to eliminate situations when individuals closed and restarted the same firm. Among all entrepreneurs in the sample, 14,288 (21.9%) had one or more spells of prior venturing activity.

5.4. Interaction variables

We included three variables—industry, geographic, and temporal similarity—to test our moderating predictions. To form our three interaction variables, we multiplied our main predictor variable, the number of prior ventures, with each of these variables.

5.4.1. Industry similarity

To test our arguments in H2, we used data from RAMS on a prior venture's industry affiliation to measure industry similarity between all prior and current ventures. We adopted Lien and Klein's (2008) industry-similarity measure, which is based on distances of firm sales across SIC industry codes. We created this measure using information about the prior ventures' industry sectors (*i*), current industry sectors (*j*), and sales (*s*) with this formula:

$$\text{Similarity} = \frac{\sum d_{ij}s_j}{\sum s_j} \quad (1)$$

where

d_{ij}	2 if <i>i</i> and <i>j</i> are in the same 3-digit SIC codes
d_{ij}	1 if <i>i</i> and <i>j</i> are in different 3-digit, but the same 2 digit SIC codes
d_{ij}	0 if <i>i</i> and <i>j</i> are in different 2-digit SIC codes

5.4.2. Geographic similarity

We also used data from RAMS to determine the venture's most recent location so that we could measure geographical relatedness between prior and focal ventures among serial entrepreneurs for testing our arguments in H3. We used geographical coordinates (latitude and longitude) to measure the simple geographical distance (in kilometers) between the most recent and current venture of serial entrepreneurs. This variable ranged from 0 to 1010 km. Since we expect a lower distance to exhibit a positively moderating effect of serial entrepreneurship on entrepreneurial performance, we reverse coded this variable to test for a positive moderating effect.

5.4.3. Temporal similarity

To test our arguments of experiential knowledge depreciation in H4, we measured the gap in time between the start of the current venture spell and the end of the most recent prior spell (this value is zero for first-time entrepreneurs). This variable ranges from two years (the minimum cut-off threshold, as previously explained in the number of ventures founded variable) to a maximum of 15 years. We expect a shorter time gap between the most recent venturing activity and a focal venture will positively enhance the effect of serial entrepreneurship on performance. Hence, we also reverse coded this variable.

5.5. Control variables

We included several additional variables to account for alternate influences on our performance dependent variable. All time-varying variables were lagged one year to mitigate problems of endogeneity.

5.5.1. Age

All individuals living in Sweden receive a personal identification number based on their date of birth. This information was used to calculate the age (number of years) of the individual.

5.5.2. Gender

Prior research has shown male and female entrepreneurs have different performance goals (Shane, 2003). We therefore included a dummy variable coded 0 for men and 1 for women.

5.5.3. Education

We included the number of years of formal education, the most common operationalization of general human capital in the entrepreneurship literature (Brüderl et al., 1992). We formed this variable from education codes in LISA describing the length and type of an individual's highest education level (e.g., three-year high school, two years of college, four-year college degree).

5.5.4. Management experience

To control for managerial capabilities, we included a three-category variable (0 = no experience, 1 = some experience, and 2 = extensive experience) taken from the 1990 and 2000 censuses associated with the LISA data.

5.5.5. Parents were entrepreneurs

It is possible that growing up with entrepreneurial parents precipitates vicarious learning influencing performance. Although prior research has shown growing up in a family–firm environment affects the propensity to engage in entrepreneurship (Gimeno et al., 1997), less is known about its relationship with performance (Sørensen, 2007). To account for this possibility, we included a dummy variable for individuals who, growing up, had parents who were entrepreneurs. This information also came from the LISA database.

5.5.6. Investment of financial capital

Better performance could be a result of new financial investments. Thus, we controlled for this with a variable based on the natural log percentage change in equity from one year to another. The sources of additional capital could be retained earnings or additional investments by the entrepreneur. This is an annually time-varying variable.

5.5.7. Past performance in serial entrepreneurship

To offset the potential endogeneity in performance across individual entrepreneurs, we use a lagged performance measure (Delmar and Shane, 2006; Hamilton and Nickerson, 2003). We constructed this measure based on individuals' average yearly performance and applied it over the entire period they were active entrepreneurs, using the same entrepreneurial earnings definition as our dependent variable.

5.5.8. Firm survival

Using a longitudinal sample to study performance can elevate survival bias resulting from terminated firms leaving the sample (e.g., Denrell, 2003; Wooldridge, 2002). In our dataset, 15,628 firms (23.9%) were terminated during the period of observation. If only surviving firms are included, there is a risk that those variable coefficients having a statistically significant effect on both survival and performance will be biased downward in regressions predicting performance. To correct for this problem, we used Lee's (1983) generalization of the Heckman selection model to create a selection-correction variable (Lambda). This involved the use of a Cox regression model with the same variables as in main models to predict termination. By introducing the selection variable Lambda in all models, we lowered the risk of observing spurious results based on sample selection bias.

5.5.9. Industry affiliation

Since we are interested in switches across industries among serial entrepreneurs, our analysis depends on a cross-industry sample. To account for industry-specific characteristics affecting performance, we included industry-fixed effects in our models. (Please refer to Appendix 1 for a list of industries).

5.5.10. Time and industry controls

We controlled for other time-varying and cross-industry economic effects that may affect the average level of performance across ventures by including year and industry dummies (SIC-2 equivalent).

5.6. Empirical strategy

We used hierarchical Generalized Least Squares (GLS) regression models to test our predictions for the following reasons. GLS models accommodate the panel structure of our data, especially the time-varying entrepreneurial performance dependent variable. These models address the heterogeneity across time and between individuals more effectively than Ordinary Least Squares (OLS) models. This feature is especially important because of the possibility that entrepreneurial earnings might accrue in an entrepreneur's own savings and be retained in their own firms (Hamilton, 2000). We also specified our models with random effects because including individual fixed effects eliminated variance in several of our individual-level predictor variables (such as the number of prior ventures). We also ran pooled-GLS models (without panel effects) and found similar results.

To gauge the level of multicollinearity between all constitutive variables, we computed variance inflation factors (VIF), and we report them in Table 1. Among the main-effect linear variables, VIF values are less than 5.32, below the generally accepted threshold of 10 (Kutner et al., 2004). Multicollinearity between non-linear and interaction variables are common but not necessarily a problem for inferential purposes (Allison, 1998; Brambor et al., 2006). We took additional steps to verify this; we tested all interaction effects separately and estimated a series of robustness models with mean-centered interactions. Both approaches yielded similar findings in terms of directions and levels of significance, reassuring us that multicollinearity among the non-linear and interaction variables are not a source of error in our hypotheses testing.

6. Results

In Table 3, we report results from our multivariate analyses. In Hypothesis 1, we predicted entrepreneurial experience has a non-monotonically increasing relationship with venture performance such that learning benefits decrease in the range of low to moderate experience and increase in the range of moderate to high experience. In Model 1, we began by testing only the linear term for entrepreneurial experience (# of ventures founded). This term is positive and statistically significant, which confirms the null argument derived from experience curve theory: that performance (i.e., ln entrepreneurial earnings) improves linearly as entrepreneurial experience increases.

To test the non-linear prediction in Hypothesis 1, we included the squared term (# of ventures founded²) in Model 2, which shows a negative relationship in the linear term (representing the consequences of superstitious learning occurring with limited experience; $b = -1.074$, $p < 0.01$) and a positive relationship in the squared term (representing the benefits of learning only realized after gaining moderate experience; $b = 1.377$, $p < 0.001$). This supports Hypothesis 1 in full. Further, our findings suggest that while the gains from prior experience of venturing clearly have a non-monotonic effect on financial performance of entrepreneurs, the effect is not quite U-shaped as indicated by the stronger coefficient in the squared term. The delayed learning benefits from experience begin after the second venture.

Table 3
Panel GLS models on (log) performance effects of serial entrepreneurship.

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	1.535 *** (0.117)	2.582 *** (0.118)	2.584 *** (0.119)	2.582 *** (0.119)	2.822 *** (0.119)
Age	0.019 *** (0.001)	0.008 *** (0.001)	0.008 *** (0.001)	0.007 *** (0.002)	0.007 *** (0.001)
Female	-0.017 (0.037)	-0.080 * (0.037)	-0.087 * (0.039)	-0.094 * (0.039)	-0.102 * (0.039)
Education	0.031 *** (0.001)	0.023 *** (0.001)	0.018 *** (0.001)	0.018 *** (0.002)	0.018 *** (0.001)
Management experience	0.538 *** (0.033)	0.444 *** (0.033)	0.444 *** (0.033)	0.475 *** (0.033)	0.430 *** (0.033)
Parents as entrepreneurs	0.009 (0.016)	-0.003 (0.016)	-0.002 (0.016)	-0.002 (0.016)	-0.002 (0.016)
ln (capital)	0.042 *** (0.002)	0.033 *** (0.002)	0.033 *** (0.002)	0.034 *** (0.002)	0.034 *** (0.002)
Firm survival (lambda)	0.449 *** (0.011)	0.416 *** (0.011)	0.413 *** (0.012)	0.410 *** (0.012)	0.402 *** (0.012)
ln (past performance as serial ent.)	0.098 *** (0.003)	0.248 *** (0.005)	0.236 *** (0.005)	0.271 *** (0.005)	0.242 *** (0.005)
Industry similarity	0.342 *** (0.012)	0.377 *** (0.010)	0.212 ** (0.042)	0.378 *** (0.011)	0.363 *** (0.010)
Geographic similarity	0.002 *** (0.000)	0.001 *** (0.000)	0.001 *** (0.000)	0.001 (0.001)	0.003 ** (0.001)
Temporal similarity	0.018 *** (0.004)	0.016 *** (0.005)	0.016 *** (0.005)	0.015 ** (0.005)	0.012 (0.007)
# of ventures founded	1.532 ** (0.120)	-1.074 ** (0.290)	-1.062 * (0.431)	-1.052 * (0.495)	-1.075 * (0.453)
# of ventures founded ²		1.377 *** (0.023)	0.943 * (0.043)	1.764 *** (0.070)	1.112 *** (0.030)
H1: affirmed					
# Ventures × industry similarity			-0.120 ** (0.011)		
# Ventures ² × industry similarity			0.183 *** (0.013)		
H2: affirmed					
# Ventures × geographic similarity				-0.002 * (0.001)	
# Ventures ² × geographic similarity				0.007 *** (0.001)	
H3: affirmed					
# Ventures × temporal similarity					-0.001 (0.001)
# Ventures ² × temporal similarity					0.002 ** (0.001)
H4: affirmed					
Fixed industry effects	Yes	Yes	Yes	Yes	Yes
R-sq: within	0.134	0.144	0.145	0.148	0.144
Between	0.125	0.141	0.152	0.135	0.147
Overall	0.127	0.147	0.155	0.151	0.149
Wald chi ²	40555.38***	44900.43***	45502.43***	44914.43***	34147.43***
LR test (null model in parentheses)		vs (1) 68.15***	vs (2) 41.23***	vs (2) 13.41***	vs (2) 34.52***

Notes: Estimates based on 356,835 individual-year observations and 65,390 individuals: All models include time dummies. Standard errors clustered on individuals in parentheses.

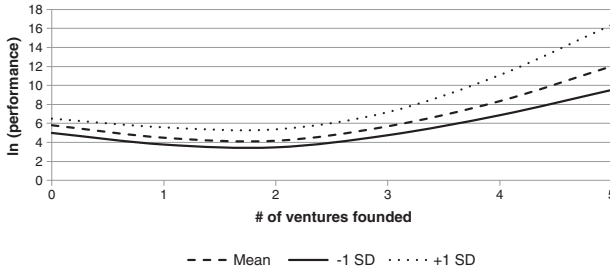


Fig. 1. Marginal effects of industry similarity on performance in serial entrepreneurship.

In *Hypotheses 2–4*, we predicted the moderating effects of context-domain similarity on the direct, non-monotonic relationship between entrepreneurial experience and venture performance. We focused on industry (H2), geographic (H3), and temporal (H4) domain similarities. For each of these three context-domain characteristics, we predicted that, at low to moderate levels of experience, high context similarity weakens the negative direct relationship between experience and venture performance. At moderate to high levels of experience, high context similarity strengthens the positive direct relationship between experience and venture performance. In Models 3–5, we report results for each interaction variable separately following standard practices for testing interactions (Aiken et al., 1991).

In Model 3, we report results for the industry-similarity moderation. We observe a statistically significant positive moderating relationship ($b = 0.183, p < 0.001$), confirming our prediction in H2. To properly interpret the nature of this relationship, we found it useful to display the relationships graphically. We plotted the predicted marginal effects of venture performance [y -axis = $\ln(\text{entrepreneurial earnings})$] for the range of # of ventures founded (x -axis) at high (+1SD), average, and low (–1SD) values of industry similarity. We produced three different curves—see Figs. 1–3. All other variables were held constant at their mean values.

We describe the graphs from left (low to moderate experience) to right (moderate to high experience). In the low to moderate experience range of Fig. 1 (from zero to two prior ventures), we observe a weaker negative relationship between experience and performance at high industry similarity (+1SD). Comparing the point estimates of the effects of zero versus two prior ventures on $\ln(\text{entrepreneurial earnings})$ at a high level (+1SD) of industry similarity, we calculate a decrease in expected entrepreneurial earnings by 19.2% (compared to a 42.8% decrease at the low level (–1SD) of industry similarity). For the same level of industry similarity in the moderate to high experience range (the point estimates of three versus five prior ventures), we notice a stronger positive relationship with performance by 127% (compared to a 97.9% increase at the low level of industry similarity). This fully supports H2. The knowledge depreciation in the low to moderate experience range of prior venturing is markedly lower for those starting ventures in a similar industry. Also, the gains from prior venturing in the moderate to high experience range are noticeably higher for those starting ventures in a similar industry.

We observed similar results for the other two context-domain similarity moderators. In Figs. 2 and 3, we plotted the interaction results from Model 4 for geographic similarity ($b = 0.007, p < 0.001$) and Model 5 for temporal similarity ($b = 0.002, p < 0.01$), respectively. Both figures show similar patterns to Fig. 1 regarding the moderating effects of geographic and temporal similarity. Comparing the point estimates of the effects of zero versus two prior ventures on $\ln(\text{entrepreneurial earnings})$ at a

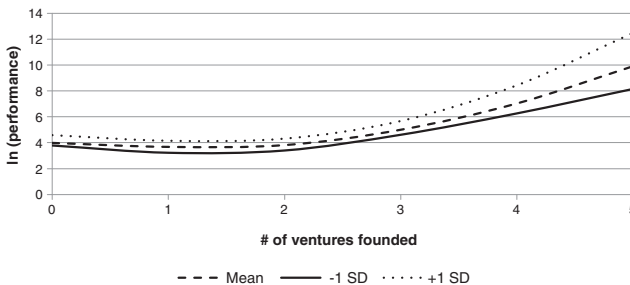


Fig. 2. Marginal effects of geographic similarity on performance in serial entrepreneurship.

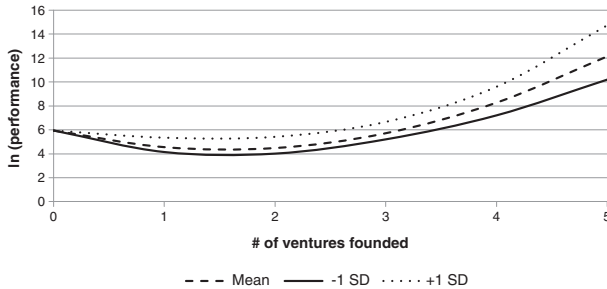


Fig. 3. Marginal effects of temporal similarity on performance in serial entrepreneurship.

high level (+1SD) of geographic similarity, we observe a decrease in expected entrepreneurial earnings by 4.6% (compared to a 8.6% decrease at the low level (−1SD) of geographic similarity). For the same level of geographic similarity in the moderate to high experience range (the point estimates of three versus five prior ventures), we notice a stronger positive relationship with performance by 117.5% (compared to a 64% increase at the low level of geographic similarity). This also confirms *Hypothesis 3*.

In Fig. 3, comparing the point estimates of the effects of zero versus two prior ventures on ln(entrepreneurial earnings) at a high level (+1SD) of temporal similarity, we observe a decrease in expected entrepreneurial earnings by 11.1% (compared to a 50% decrease at the low level (−1SD) of temporal similarity). For the same level of temporal similarity in the moderate to high experience range (the point estimates of three versus five prior ventures), we see a stronger positive relationship with performance by 120.9% (compared to a 96% increase at the low level of temporal similarity). This confirms *Hypothesis 4*.

When comparing the moderating influences among the three contextual similarities, we observe slight differences in the strength of their influences between novice and expert entrepreneurs. For novices, geographic similarities have the strongest alleviating influence on the negative direct experience–performance relationship. The top plot (high geographic similarity) in the left half of Fig. 2 shows that the slope is nearly flat, almost overcoming the learning barrier encountered by novices. For experts, industry similarities have the strongest enhancing influence on the positive direct experience–performance relationship. The top plot (high industry similarity) in the right half of Fig. 1 shows the slope is more positive, further strengthening the positive returns from learning by experts.

6.1. Supplementary analyses

As a further test of our theory, we conducted additional analyses investigating whether or not the time decay of learning from prior venturing is higher in rapidly changing industries (or industry volatility). We report these results in Appendix 2. Since we estimated all models in Table 3 with fixed-industry effects—to prevent them from being tainted by between-industry effects in barriers to entry and exit or other sources of industry heterogeneity—we could not investigate the time-decay question simply as a three-way interaction (# of ventures founded² × temporal similarity × industry volatility). We therefore re-estimated the models in Table 3 without fixed-industry effects and with abbreviated control variables. The table in Appendix 2 includes two models, the first identical to Model 2 of Table 3 but without industry effects. The second and third models include three-way interactions with industry volatility above and below the mean. This allowed us to conduct χ^2 tests of the difference of the effects of temporal similarity on new venture performance depending on whether industry volatility is above or below the sample mean. Model 2 in Appendix 2 reveals the coefficient for # of ventures founded² × temporal similarity to be positive if industry volatility is above the sample mean (0.003, $p < 0.05$), but this effect does not appear in Model 3 when industry volatility is below the sample mean. A test of the coefficient across the two models reveals that they are significantly different from each other ($\chi^2 = 11.03$, $p < 0.01$, d.f. = 2). This means that the performance effects of re-engaging in entrepreneurship more rapidly (higher temporal similarity) is increasingly beneficial in highly volatile industries, providing further support for our overall argument about the non-linear effects of learning from prior experiences.

6.2. Robustness tests

Learning theory suggests that experience curves exist if we can observe increased levels of performance between spells (Argote and Epple, 1990; Yelle, 1979). Yet, a potential confounder exists if some entrepreneurs possess unobservable traits that lead to higher performance. Then, those entrepreneurs could be more likely to continue starting new ventures than others. If this is the case, inferring learning from increasing levels of performance could be attributed to a sub-sample of highly skilled entrepreneurs having consistently higher performance than others, meaning they are also more likely to become serial entrepreneurs (Chen, 2013; Easley and Roberts, 2013). Without access to a suitable instrument or the potential to specify models

with fixed individual effects, we implemented an alternate method. We investigated the potential for self-selection by looking at performance among novice entrepreneurs by each decile (i.e., groups of 10%) in the year prior to exit. We then looked at the rates of serial entrepreneurship for all ten groups to see whether the better-performing entrepreneurs would be more likely to re-engage in entrepreneurship. From this analysis, we found no clear patterns in the data. Entrepreneurs in the third-performance decile were most likely to re-engage (12.4%), followed by the seventh (11.1%), fourth, (10.3%), first (10.1%) and sixth (9.4%) deciles. These results imply that there are no obvious patterns of self-selection into serial entrepreneurship due to individual-specific high performance levels.

To investigate if our results were affected by a small number of influential observations, we fitted alternative models after omitting the largest/smallest outliers from the data using a Winsoring algorithm (STATA command WINSOR). The results were identical in directions and levels of significance of all coefficients; effect sizes differed only marginally depending upon the threshold of outliers being removed (available upon request). This test further reassured us of the robustness of our main findings.

7. Discussion

Our study investigated the relationship between entrepreneurial experience and venture performance. Specifically, we found evidence to support our framework predicting why limited experience lowers performance while enhanced financial performance only occurs at substantial levels of experience. We also observed that contextual similarities among prior and current ventures, such as industry, geographic, and temporal characteristics, positively moderated the direct experience–performance relationship. Our work advances our understanding of how entrepreneurial expertise is developed through entrepreneurial experience, the conditions under which this expertise translates into improved venture performance, and also why entrepreneurship can be learned through sufficient opportunities to practice it (Kim et al., 2009; Parker, 2012; Ucbasaran et al., 2008). In the following sections, we describe our study's specific contributions to the serial entrepreneurship and experience curves literature.

7.1. Contributions to the Serial Entrepreneurship Literature

Our primary finding—that performance returns to entrepreneurial experience initially decline and then increase—and its underlying rationale clarify how expertise formed through experience affects serial entrepreneurial venture performance. We build on Delmar and Shane's (2006) study by highlighting the importance of studying serial entrepreneurs over time to unearth the nature and extent of learning from past experience. Specifically, our work shows that both positive and negative performance implications exist, depending on the level of experience and similarity in content domains of starting ventures (Hypothesis 1). These results reveal the limitations of having only limited experience (Kim et al., 2009); because of superstitious learning and competence traps, novice entrepreneurs are unable to generalize accurately from their prior ventures into their current efforts (Bingham et al., 2007; Dencker et al., 2009; Levitt and March, 1988). Drawing on experience with only one cognitive anchor as a reference (e.g., the first venture) makes it difficult to extrapolate applicable knowledge to the current venture because of inherent differences in the content and context of starting ventures (Wilson et al., 1996). Only when entrepreneurs have completed several ventures do they have multiple reference points from which they can determine appropriate ways to handle different business start-up situations effectively (Tversky and Kahneman, 1992). This finding is important because of the mixed evidence reported in the literature regarding the experience–performance relationship (e.g., Delmar and Shane, 2006; Dencker et al., 2009; Eesley and Roberts, 2013; Oe and Mitsuhashi, 2013; Reuber and Fischer, 1994; Stuart and Abetti, 1990; Ucbasaran et al., 2006).

In addition to our direct experience–performance relationship, our moderating relationship results also convey new insights for the serial entrepreneurship literature. For novice entrepreneurs, the barriers to learning erected from content-domain differences between prior and focal ventures can be alleviated if the contexts between them are similar. Contextual similarities help novice entrepreneurs to generalize better from previous experience (Gick and Holyoak, 1987) and to minimize negative knowledge transfers (Cohen and Bacdayan, 1994; Haleblan and Finkelstein, 1999; Novick, 1988). Thus, we find complementary support for Parker's (2012) "mean reversion" hypothesis in regards to the performance returns to serial entrepreneurship. Distinctively from the all-positive relationship suggested in classic learning curve theory and several prior studies in entrepreneurship, our findings of superstitious learning at low levels of experience provide further support of non-linear relationships between entrepreneurial experience and subsequent performance (Parker, 2012).

For expert entrepreneurs, contextual similarities can further strengthen the positive experience–performance relationship. Bringing both sets of findings together, our results indicate that an "entrepreneurial-experience curve" exists, one that follows a U-shaped trajectory. Entrepreneurs can benefit even more from knowledge drawn from similar industry contexts, local resources, and shorter time gaps between their prior and current ventures (Parker, 2012).

Our findings are based on a longitudinal study designed to analyze the experience–performance relationship and its boundary conditions. This design provides greater precision in assessing how and why prior venturing experience influences current venturing efforts. Many prior studies have relied on cross-sectional samples, or they measured entrepreneurial experience using a simple binary indicator of having any prior entrepreneurial experience. (Ucbasaran et al., 2013). We employed an experience curve approach—a spell-based assessment of the relationship between experience and performance across a series of events (Argote and Todorova, 2007). This analytical method matches the sequential nature of serial entrepreneurship (Parker, 2012).

Our non-linear findings of the experience–performance link reveal the benefits of employing a longitudinal design with a continuous measure of entrepreneurial experience (Delmar and Shane, 2006; Ucbasaran et al., 2008). Entrepreneurial experience

is distinct from many other types of experiences (including management experiences in established firms) in that it is both self-initiated and self-terminated (Saravathy, 2004), provides exposure to uncertain and ambiguous operating situations (Morris et al., 2011), involves development of diverse sets of skills (Lazear, 2004), and is frequently associated with high volatility in outcomes (Shane and Khurana, 2003; Shepherd, 2003). The longitudinal study design is also more consistent with the learning theories upon which serial entrepreneurship investigations are based. Learning is an iterative and dynamic process, and a longitudinal study design is better suited to measure how expertise (as a function of experience) evolves over time (March, 2010).

Our study implies that successful entrepreneurship requires the ability for entrepreneurs to leverage prior experiences appropriately (Eesley and Roberts, 2013). Because of content and contextual barriers to learning, this expertise takes time to develop through multiple venturing experiences. As reflected in our analyses, our study design addresses these characteristics of serial entrepreneurship and provides greater clarity into the conditions for which greater experience promotes higher venture performance.

7.2. Contributions to the experience curve literature

Our work provides new insights for the experience curve literature by challenging the assumption that repeated task experience generates automatic and consistent returns to performance (Yelle, 1979). Rather than confirming a positive linear effect of experience on performance, our non-linear results mean that not all levels of experience or contexts in which these experiences occur produce positive returns for performance. In fact, our results show the reality of negative performance implications from poor knowledge transfer among novice entrepreneurs who are unable to overcome fully their barriers to learning. These results are also useful for advancing the micro-foundations of experience curve theory in management. While prior work has shown the limitations of averaging individual-level tasks to an aggregate output (Brown and Heathcote, 2003; Newell and Rosenbloom, 1981), we avoid this complication by focusing on individual founder-managers and employing a study design that adequately measures these experiences.

7.3. Limitations and future research

We completed our study with rigor and care, but future research may address some issues more extensively. Although we examined several content- and context-domain differences among prior and current ventures centrally emphasized by prior studies, future studies on serial entrepreneurial performance may consider other differences beyond ours. Our results show that learning in entrepreneurship is possible but conditional upon a number of important barriers. This work also opens up avenues for exploring additional conditions for when and how barriers to learning interfere with entrepreneurial learning (Delmar and Shane, 2006; Parker, 2012). For example, more fine-grained measures of similarity beyond industry-based measures (such as similarity in business model or organizational design) could be employed to assess similarities across ventures. Alternatively, deeper investigation could be pursued about learning from failed experiences (Shepherd, 2003; Shepherd et al., 2009). Given the founder-manager focus of our study, future work can also apply experience curve theory to predict how team-level experiences are associated with performance. Finally, future research endeavors may also examine how our study findings generalize to other industrial sectors and national contexts.

8. Conclusion

Our study investigated the puzzle of why some experienced entrepreneurs do not perform better than others. As a corrective to present research on the topic, we developed theory based on the experience curve literature to show a number of barriers to learning based on content- and context-domain differences. From our analysis of a unique longitudinal sample of individual founder-managers, we showed how experience can negatively affect performance among novice entrepreneurs and how positive performance returns occur among expert entrepreneurs. Context similarities between prior and current ventures strengthen this direct effect. Furthermore, our study has implications for researchers in fields of entrepreneurship and learning theory, as well as practitioners considering how entrepreneurial experience contributes to new venture success. For scholars, we demonstrate the contours of entrepreneurial-experience curves. For aspiring entrepreneurs, our work indicates that extensive practice enables them to learn entrepreneurship and makes for the possibility of better performing ventures.

Appendix 1. Industries in sample.

Type of industry	Frequency	Percent	Volatility above mean = 1
Chemicals and fiber manufacturing	358	0.55%	1
Machinery	490	0.75%	0
Electrical and optical equipment	2,864	4.38%	0

(continued on next page)

Appendix 1 (continued)

Type of industry	Frequency	Percent	Volatility above mean = 1
Transport equipment	1,300	1.99%	0
Networks, radio and TV	234	0.36%	1
Finance	2,689	4.11%	1
Real estate business	4,312	6.59%	0
Computers/software	3,477	5.32%	0
Research and development	1,447	2.21%	0
Accounting/auditing	2,358	3.61%	0
Construction/engineering	4,848	7.41%	1
Advertising	2,402	3.67%	1
Management consulting	5,140	7.86%	1
Law firms	655	1.00%	0
Other consulting services	3,710	5.67%	1
Education	2,293	3.51%	0
Entertainment services	10,846	16.59%	0
Health and medicine	12,120	18.53%	0
News and entertainment	2,212	3.38%	1
Military & security	1,635	2.50%	0

Appendix 2. Panel GLS models on performance effects of serial entrepreneurship.

	Model 1 (= Model 2 in Table 3 without industry FE)	Model 2 (high industry volatility)	Model 3 (low industry volatility)
Intercept	2.531** (0.251)	2.377* (0.248)	2.356* (0.260)
Industry similarity	0.321*** (0.009)	0.320*** (0.010)	0.321*** (0.009)
Geographic similarity	0.003** (0.001)	0.002** (0.001)	0.003** (0.001)
Temporal similarity	0.016** (0.007)	0.015* (0.007)	0.016** (0.007)
# Ventures × Temporal similarity		−0.001 (0.001)	−0.001 (0.001)
# Ventures ² × Temporal similarity		0.003** (0.001)	0.003** (0.001)
# Ventures ² × Temporal similarity × Industry volatility dummy		0.004** (0.001)	−0.003 (0.003)
R-sq: within	0.123	0.123	0.123
Between	0.120	0.129	0.127
Overall	0.121	0.125	0.124
Wald chi ²	32320.12**	32381.42***	32321.10***
LR test (null = model 1)		16.10**	1.16

Notes: Estimates based on 356,835 individual-year observations and 65,390 individuals. All independent variables in Table 3 maintained as controls (unreported). Standard errors clustered on individuals in parentheses.

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Paper 2

BARRIERS TO LEARNING IN EARLY ENTREPRENEURIAL CAREERS: AN EMPIRICAL ASSESSMENT OF THE ENTREPRENEURIAL EXPERIENCE–PERFORMANCE RELATIONSHIP AND THE MODERATING ROLE OF ENTREPRENEURIAL TALENT

Author: Rasmus Vendler Toft-Kehler

**Barriers to learning in early entrepreneurial careers: An empirical
assessment of the entrepreneurial experience–performance relationship and
the moderating role of entrepreneurial talent**

Rasmus Vendler Toft-Kehler*

Copenhagen Business School
Department of Innovation and Organizational Economics
Kilevej 14a, 3rd floor
2000 Frederiksberg
Denmark
Tel: +45 40 10 30 44
E-mail: rasmus@toft.us
&
Accelerace A/S
Fruebjergvej 3
2100 Copenhagen
Denmark

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This paper extends the notion of barriers to learning by exploring how early entrepreneurial experience impacts subsequent venture performance. By analyzing the financial performance of 776 post-graduate serial entrepreneurs, this study offers deeper insights into the barriers to learning encountered by recent college graduate entrepreneur in their early venture experiences and the ways entrepreneurial talent moderates their ability to overcome such barriers. The results suggest that the duration of entrepreneurs' first venture experience, their first venture's performance, and dissimilarity between their first and second ventures constitute barriers to learning with potentially negative effects on second venture performance. Entrepreneurial talent generally moderates the impact of barriers to learning but does not necessarily lead to increased performance. This paper concludes with a discussion of the findings and their implications for entrepreneurship and experience curves in practice and in theory.

INTRODUCTION

A much-heralded conception in entrepreneurship research and the press is that entrepreneurs with greater experience are capable of launching more successful new ventures. A common argument for the link between entrepreneurial experience and subsequent performance is *learning* (Politis 2005; Holcomb, Ireland et al. 2009; Eesley and Roberts 2012). Such argumentation introduces an association between entrepreneurial experience and expertise with links to experience curve theory (Argote and Epple 1990; Ritter, Schooler et al. 2001). However, while experience curve theory has gained widespread recognition in psychology and management research, recent evidence in entrepreneurship research suggests that the experience-performance relationship in entrepreneurship does not necessarily align with conventional experience curve theory (Tornikoski and Newbert 2007; Toft-Kehler, Wennberg et al. 2014). The concept of barriers to learning has been brought forward to frame the non-linear and potentially negative association between experience and performance in entrepreneurship—an association that may be further confounded by the individual level of entrepreneurial talent (Eesley and Roberts 2012).

This paper extends research on performance in serial entrepreneurship by adopting the perspective of barriers to learning as a confounder in the experience-expertise relationship to understand how prior entrepreneurial experience impacts new venture performance. Specifically, the paper integrates research on entrepreneurial experience and experience curve theory to analyze how recent college graduates with two venturing experiences after college graduation perform in their second venture, taking into account the type of experience they gained during their first venture as well as their individual level of entrepreneurial talent. Entrepreneurs are defined as *founder-managers working full time in a new venture in which they hold a majority ownership stake*. This paper extends findings from a preceding paper which shows that experience from a first venture can lead to a negative effect on the second venture performance. A the entrepreneurial

career unfolds, the entrepreneurial performance gradually increases through the third, fourth, and fifth ventures (Toft-Kehler, Wennberg et al. 2014). Therefore, the aim of this paper is to understand the potential negative effects of first venture experience on second venture performance through an assessment of barriers to learning, which have been identified as confounding factors in the accumulation of entrepreneurial expertise at the onset of entrepreneurial careers. The definition of barriers to learning follows that of the preceding paper—namely, “*obstacles encountered by entrepreneurs that prevent them from extracting appropriate knowledge from their prior venturing or from applying their existing knowledge appropriately to new ventures*”—and basically challenges the notion underpinning conventional experience curve theory that individuals automatically accumulate expertise through experience (Toft-Kehler, Wennberg et al. 2014).

While substantial research in entrepreneurship has provided evidence to suggest that there is a positive correlation between experience and performance in entrepreneurship, research on the limitations of this correlation remains limited. This paper takes the position that performance and experience are not uniformly correlated and that barriers to learning impact this relationship. The paper further argues that entrepreneurial talent moderates the experience-performance relationship by enabling entrepreneurs to overcome barriers to learning. The importance of entrepreneurship for modern economies and the significance of serial entrepreneurs as a subpopulation of entrepreneurs make these interactions interesting to understand both empirically and theoretically. Therefore, this study poses the following research question: *how do recent college entrepreneurs financially benefit from first venture experiences and individual-level entrepreneurial talent in their second venture after college?* Answering this question is theoretically important because without understanding how different types of experience provide different grounds for learning and how entrepreneurial talent *moderates* entrepreneurs’ ability to

learn from experience, we can infer little about the true relationship between entrepreneurial experience and venture performance (MacMillan 1986). Insight into these interactions can provide a better framework for educating future entrepreneurs and lead to an advanced ability to build new ventures.

To shed more light on this theoretical and empirical gap, this paper proposes a quantitative measure for entrepreneurial talent and four novel sets of hypotheses derived from the literature on serial entrepreneurship, experience curves, and psychology. Through these four sets of hypotheses, the phenomenon of serial entrepreneurship in individuals' early careers is investigated with the aim of better understanding of why, when, and how early venture experiences affect later entrepreneurial performance with particular interest in the impact of barriers to learning (Toft-Kehler, Wennberg et al. 2014). To capture the effect of barriers to learning, this paper focuses on recent college graduates who have founded two ventures within a shorter timeframe after college graduation under the assumption that these individuals have limited entrepreneurial and/or other professional experience before founding their first post-graduate venture. As such, these entrepreneurs provide an interesting opportunity to understand how first venture experience contributes to second venture performance. Focusing on this relatively homogeneous group of entrepreneurs reduces the generalizability of the findings but also reduces the noise from unobservable effects and alleviates problems with incomplete career histories, both of which have been commonly neglected in the extant literature on entrepreneurial learning (Delmar and Shane 2006; Yang and Aldrich 2012). Finally, despite their importance at both the micro and macro levels of the economy, this type of entrepreneurs has been largely neglected in the extant literature (Åstebro, Bazzazian et al. 2012).

The dataset used for this study contains annual data from 1989 to 2002 and combines individual and venture level measures. The study design allows the ventures to be tracked from

their inception and up to 14 years after the entrepreneurs' graduation from college, thus mitigating problems of both left and right censoring (Sørensen 2007; Folta, Delmar et al. 2010; Yang and Aldrich 2012; Failla, Melillo et al. 2014). Random effects regression is utilized to analyze how different types of experience obtained during entrepreneurs' first venture after college graduation impacts the financial performance of their second venture. The analysis integrates controls at both the company and individual level, including a variety of background- and experience-based measures.

Overall, this paper contributes to the literatures on experience curves and entrepreneurship in three primary ways. First, the findings herein support recent research challenging the extant literature on the experience curve by highlighting the need to account for negative experience transfer (Barkema and Schijven 2008). In contrast to established experience curve theory's assertion that experience and performance are uniformly and positively related, this paper reveals that barriers to learning may lead to negative effects on subsequent performance. Second, the findings suggest that entrepreneurial talent can be an important moderator in experience-performance relationships in entrepreneurship, which is consistent with recent research (Gompers, Kovner et al. 2010; Easley and Roberts 2012; Chen 2013). Surprisingly, the paper finds that entrepreneurial talent is not always associated with higher entrepreneurial performance. Finally, by focusing on a sample of recent college graduates (Sarasvathy 2004; Sarasvathy and Venkataraman 2011; Åstebro, Bazzazian et al. 2012), the findings offer new insights into the experience-performance relationship for early-career entrepreneurs, for whom the experience curve is expected to be of particular significance (Yelle 1979). As such, this paper contributes suggestive answers to important yet unaddressed questions about when, how and why entrepreneurial experience and entrepreneurial talent impacts later entrepreneurial performance.

THEORY AND HYPOTHESES

The following section introduces the literature on entrepreneurial talent, entrepreneurial experience, and experience curves and uses this literature as a basis to establish four sets of hypotheses to inform the overall research question.

Entrepreneurial experience and performance

Substantial literature in the field of entrepreneurship argues that entrepreneurs with prior entrepreneurial experience are likely to launch better performing ventures (Stuart and Abetti 1990; Starr and Bygrave 1992; Gimeno, Folta et al. 1997; Bosma, Van Praag et al. 2004). For example, serial entrepreneurs have been found to be more likely to achieve higher revenues (Delmar and Shane 2006; Eesley and Roberts 2012), take more money out of their business (Gimeno, Folta et al. 1997), and extend venture survival (Brüderl, Preisendörfer et al. 1992). Beyond typical performance measures like revenue, earnings, and survival, other measures have shown similar positive relationships, such as a positive relationship between experience and the ability to identify new opportunities (Baron and Ensley 2006; Ucbasaran, Westhead et al. 2009) as well as between experience and the ability to raise external capital (Shane and Stuart 2002; Hsu 2007; Hallen and Eisenhardt 2012).

The positive effect of experience on performance is typically attributed to learning in the sense that entrepreneurs accumulate generally applicable expertise through venture experiences, leading to successively increasing entrepreneurial performance (Eesley and Roberts 2012). More specifically, the rationale is that entrepreneurial experience provides the entrepreneur with a more accurate understanding of challenges (Ellis 1965; Novick 1988; Unger, Rauch et al. 2011) and an ability to respond more rapidly to challenges through the transfer of knowledge and routines from prior experiences (Foss, Halbinger et al. 2017). In contrast, individuals engaging in

entrepreneurship with no or other types of professional experience are less likely to have learned the “nuts and bolts” of venture building (MacMillan 1986). For example, individuals with experience from large corporations may find it difficult to function under the resource constraints typical of new ventures (Wasserman 2003; Delmar and Shane 2006; Eesley and Roberts 2012).

Experience curve theory and early experience

The positive associations between experience and performance correspond well with experience curve theory, which has been widely applied in studies of individuals or teams in operational contexts (e.g. Yelle 1979; Schilling, Vidal et al. 2003; Barkema and Schijven 2008). Studies in this stream of research have captured an important aspect of learning by assuming that outcomes, such as unit cost (e.g. Argote, Beckman et al. 1990; Darr and Argote 1995), failure rate (e.g. Novick and Stitt 1999; Cox, Salud et al. 2001), quality (e.g. Fine 1986), productivity (e.g. Epple, Argote et al. 1991), and financial performance (e.g. Lubatkin 1983; Lieberman 1987; Haleblian and Finkelstein 1999), improve at decreasing rates as a focal task is repeated over time (Yelle 1979). Experience curve theory anticipates decreasing returns to experience, suggesting that the value of experience accumulates faster in the earliest repetitions of a given task and gradually marginalizes over time. This phenomenon is well documented in surgical procedures, for example (Cox, Salud et al. 2001). The mechanism underlying the marginalized effect of experience, is commonly linked to the reduction of new knowledge that can be retrieved through repeated experience (Argote and Epple 1990). Such a pattern is interesting since it implies that entrepreneurs are more likely to build expertise—and increase their entrepreneurial performance—in their first venture. With this, one would expect the greatest advancement in entrepreneurial performance to occur from the first to the second venture, which contrasts previous findings on the experience-performance relationship (Toft-Kehler, Wennberg et al. 2014) and is therefore subject to further analysis in this paper.

Drawing on classic work demonstrating continuous improvement in input-output ratios resulting from a growing stock of experience (Arrow 1962), the experience curve perspective makes explicit and implicit assumptions about the learning construct. Specifically, the theory is underpinned by two assumptions relevant to this paper. First, the mathematical expression of the experience curve does not allow for fluctuations in the learning index due to variance inherent in each spell of experience.² In other words, the experience curve assumes constant rates of learning and does not integrate the impact of barriers to learning, which may alter the experience-performance relationship across spells of experience. Second, the experience curve literature assumes that experience is positively related to performance and thus fails to acknowledge that experience may not only be insignificant but may even have a negative impact on later performance (Barkema and Schijven 2008; Toft-Kehler, Wennberg et al. 2014).

Although the general trend in research points toward a positive relationship between entrepreneurial experience and performance, a number of recent publications suggest non-linear or negative relationships. For example, Tornikoski and Newbert (2007) find that prior venture experience has a significant negative impact on success factors, such as first sale achieved. Also, Toft-Kehler et al. (2014) find that low levels of experience can have a negative effect on performance but that extensive levels of experience generally have a positive effect. Finally, Parker (2012) shows that learning occurs as a consequence of entrepreneurial experience but that the effect of such experience rapidly diminishes.

With entrepreneurial experience, entrepreneurs gain familiarity with and insights into a broader range of the challenges inherent in the venture-creation process. They build stocks of knowledge that can be readily applied in new contexts (Arrow 1962; Ronstadt 1988). The greater

² Wright's Unit Model of the experience curve is defined as $Y = aX^b$, where Y = performance in X^{th} unit, X = the cumulative number of units, a = performance in the first unit, and b = the learning index.

the number of prior startup experiences, the less likely it is that the decisions that need to be made in subsequent ventures will be unexpected or unfamiliar (Eesley and Roberts 2012). As such, experienced entrepreneurs are more likely to generalize from the past whereas inexperienced entrepreneurs are more likely to approach new venturing through exploratory efforts. For entrepreneurs starting their first venture, it is more likely to be obvious that there is much to be explored (Parker 2009)³. Although such exploratory efforts may reduce the speed of progress, they do help ensure early alignment with key stakeholders, such as customers, suppliers, employees, and investors. On the other hand, since time is of significant importance in all new ventures, experienced entrepreneurs may be in a position to move ahead faster by generalizing from previous experiences and assumptions about stakeholder positioning. While generalizations from prior experience may be rewarded under certain circumstances (e.g., in circumstances where barriers to learning are less prevalent due to similarity, for instance, the entrepreneur may benefit from the ability to make rapid decisions and reduce time to achieve important milestones), they may also lead to inferior outcomes (Reuer, Park et al. 2002; Toft-Kehler, Wennberg et al. 2014). Theoretical explanations for such negative experience transfer often stem from superstition (Skinner 1948), competence traps (Levitt and March 1988), and inappropriate anchoring (Tversky and Kahneman 1975). Such misapplications of “learning” can have detrimental effects on venture performance (Toft-Kehler, Wennberg et al. 2014), particularly at low levels of experience (Wilson, Houston et al. 1996).

While differences in the shape of experience curves are empirically supported in the literature, little is known about how, when, and why experience leads to different outcomes. For example, how different types of related experience moderate the experience-performance relationship remains an interesting debate (Argote and Todorova 2007). To gain a better

³ As a practical approach to building stocks of knowledge in new venture environments, lean start-up approaches have gained widespread appreciation (e.g., Blank, S. (2013). "Why the lean start-up changes everything." *Harvard Business Review* 91(5): 63-72.)

understanding of the experience-performance relationship in entrepreneurship, this paper seeks to further clarify confounding factors in this relationship with a particular focus on barriers to learning. This goal is important because without an understanding of why, when, and how the experience-performance relationship is moderated, our ability to theorize on the accumulation of entrepreneurial expertise is limited.

The role of entrepreneurial talent

In addition to clarifying the experience-performance relationship, research also calls for a better understanding of the role of entrepreneurial talent. Rather than framing entrepreneurs as bearers of risk, Schumpeter (1934) was among the first to suggest that entrepreneurial performance relates to individual talent. However, little empirical research has shed light on the actual role of talent in entrepreneurial performance (Eesley and Roberts 2012). However, recent research supports the notion that entrepreneurial talent could play a significant moderating role in the experience-performance relationship. For example, Gompers et al. (2010) suggest that talented entrepreneurs exhibit a stronger ability to select the right industry and time to start new ventures, which eventually leads to increased performance. Similarly, Eesley and Roberts (2012) find evidence suggesting that talented individuals are better able to extract lessons from experience and to combine talent with experience to achieve superior performance. Finally, Chen's paper (2013) shows that talent has a positive significant impact on new venture performance.

This paper takes inspiration from Eesley and Roberts (2012) and from the ability perspective of labor market wage equation models, implying an underlying assumption about inefficient labor markets, to predict a measure for entrepreneurial talent at the individual level (Van Praag and Cramer 2001; Parker 2004; Lazear 2005.). This measure's construct represents an effort to challenge the status quo and gain a better understanding of how entrepreneurial talent

moderates learning from different types of experience. More specifically, this paper adopts an abbreviated Mincer wage equation model (Mincer 1974) using entrepreneurial performance on the left side of the equation and education and entrepreneurial experience on the right side along with a number of control variables.

In line with recent research, it is proposed that talented entrepreneurs achieve better entrepreneurial performance on average. This paper takes the position that increased performance is due to a stronger ability to build expertise from experiences. In previous research, talented individuals have been found to do better in dynamic environments because they are better at abstract reasoning and better at identifying new paths in unfamiliar terrain, where cognitive agility may be of greater importance than experience (Furr 2011; Eesley and Roberts 2012). Also, talented entrepreneurs may simply be more capable of overcoming liabilities of newness (Stinchcombe 1965) and may have more effective approaches for assembling known resources in new means-ends frameworks (Shane and Khurana 2003; Baker and Nelson 2005; Baron and Henry 2010).

Entrepreneurship is a context characterized by complexity, novelty, and resource constraints, making it difficult for practitioners to predetermine appropriate solutions to challenges (Morris, Kuratko et al. 2011). These characteristics suggest that previous experience may have less relevance in the complex setting of entrepreneurship than in other more predictable professions. One explanation is the prevalence of barriers to learning (Toft-Kehler, Wennberg et al. 2014). However, in environments characterized by barriers to learning, entrepreneurial *talent* may play a significant role in entrepreneurs' ability to address challenges. In accordance with Eesley and Roberts (2012), this paper suggests that talent increases entrepreneurs' ability to draw on previous experience to overcome barriers to learning. To further our understanding of entrepreneurial talent, this paper investigates the moderating effect of this construct on the

experience-performance relationship. Specifically, in this study, talent is interacted with each of potential barriers to learning presented in the following sections. Talent is expected to reduce the risk of negative experience transfer through experienced entrepreneurs' stronger ability to extract and apply appropriate knowledge and thereby overcome barriers to learning (Toft-Kehler, Wennberg et al. 2014). The mechanisms by which talent reduces exposure to these barriers relate to entrepreneurs' ability to comprehend more complex streams of information (Baron and Henry 2010) and mindfully generalize prior experience to new contexts (Rerup 2005; Levinthal and Rerup 2006). Both mechanisms serve to avoid competence traps (Levitt and March 1988) and pitfalls related to anchoring and insufficient adjustments from early experiences (Tversky and Kahneman 1975). For example, talented entrepreneurs may be more conscious about contextual deviations between their first and second ventures and mindfully generalize experiences from their first venture (e.g., how to define a relevant target customer segment and tailor a product offering to the specific target segment) to their second venture (e.g., taking into account a consumer shift from in-store to online purchases).

In the following sections, four sets of hypotheses are framed around potential barriers to learning that may impact subsequent venture performance: 1) duration of first venture experience, 2) first venture performance, 3) complexity of first venture, and 4) level of dissimilarity between first and second ventures.

Negative effect of experience duration?

The duration of entrepreneurs' experience with their first venture after graduation may impact their ability to build entrepreneurial expertise. Here, *duration of experience* is defined as the number of years an entrepreneur committed to his or her first venture after college graduation. The established literature generally asserts that learning automatically accumulates from

experience and yields superior performance through the procurement of stocks of knowledge that can be generalized and further built upon (Arrow 1962; Argote 1999). However, this paper argues against this notion, instead proposing that entrepreneurs who are involved with one venture for an extended period of time are likely to enter a “knowledge corridor” - and follow a track guided by the past while failing to perceive signals that do not correspond with their established stock of knowledge (Ronstadt 1988). Thus, all else equal, the longer an entrepreneur sticks with his or her first venture, the more difficult it will be to succeed in a second venture. The concept of “staleness” theoretically explains the potential negative effects that can arise when entrepreneurs remain committed to the same venture over a longer period of time (Starr and Bygrave 1991). From a behavioral learning perspective, the inertia of these effects is expected to increase with the duration of commitment (Mazur 1994; Tripsas and Gavetti 2000). Based on this reasoning, the following hypothesis is put forth:

Hypothesis 1a: *The duration of entrepreneurs’ commitment to their first venture is negatively related to the financial performance of their second venture.*

Further, this paper argues that entrepreneurial talent represents an individual’s ability to overcome barriers to learning. The literature highlights a number of potential barriers associated with extended commitment to a first venture, including the aforementioned knowledge corridors (Ronstadt 1988), staleness (Starr and Bygrave 1991), and inertia (Mazur 1994). Entrepreneurial talent, however, could enable entrepreneurs to effectively deal with such barriers, thus turning extended venture experience into a valuable asset (Eesley and Roberts 2012). For example, prior experience—such as how to motivate a start-up team—may vary from one venture to the next depending on trends, types of employees, organizational culture, and employees’ perceptions of the founder. If a talented founder understands the need to adapt, thus avoiding competency traps,

experience may be leveraged and adapted to benefit the new venture (Rerup 2005; Levinthal and Rerup 2006). This leads to the next hypothesis:

Hypothesis 1b: *The relationship between the duration of entrepreneurs' commitment to their first venture and the financial performance of their second venture is positively moderated by entrepreneurs' level of entrepreneurial talent.*

Negative effect of complexity?

The second barrier to learning concerns the first venture's level of complexity. Here, *complexity* is operationalized as the intensity of a company's research and development (R&D), with technology-driven ventures generally being more complex than, for example, retail businesses. In many contexts other than entrepreneurship, individuals acquire expertise by beginning with simple exercises and gradually increasing the level of complexity (i.e., training). For example, when learning to play an instrument, a novice typically begins with basic chords, which can be developed and assembled into extended compositions as the individual climbs the experience curve. This approach is however not commonly adopted by entrepreneurs. The majority of aspiring entrepreneurs do not make deliberate decisions about how to acquire expertise but are often guided by a perceived opportunity, such as a technological innovation or market gap. However, complexity varies widely across opportunities, and certain industries have greater levels of technological uncertainty (Wang and von Tunzelmann 2000). As such, not all entrepreneurial undertakings offer equal opportunities for the acquisition of expertise (Haunschild and Sullivan 2002). Indeed, starting an entrepreneurial career by founding a complex venture can arguably become a barrier to learning that alters the value of venture experience, such as through increasing the risk of superstitious learning (Levitt and March 1988). In line with prior research, this study proposes that entrepreneurs are at a greater risk of negative experience transfer if their experience

is acquired in a complex context (Ellis 1965; Jovanovic and Nyarko 1995). Thus, the following is proposed:

Hypothesis 2a: *The level of complexity of entrepreneurs' first venture is negatively related to the financial performance of their second venture.*

Additionally, this study argues that entrepreneurial talent is positively linked to entrepreneurs' ability to overcome higher levels of complexity. Specifically, this increased ability is a result of more talented individuals better able to comprehend, analyze, and recognize meaningful patterns in the midst of excessive information (Baron and Henry 2010). For example, talented entrepreneurs may be more adept at structuring knowledge and assigning causal relationships between actions and outcomes and may thus be more likely to meaningfully generalize these actions in subsequent ventures (Cianciolo, Matthew et al. 2006). This leads to the next hypothesis:

Hypothesis 2b: *The relationship between the complexity of entrepreneurs' first venture and the financial performance of their second venture is positively moderated by entrepreneurs' level of entrepreneurial talent.*

Learning from failure or success?

The outcomes of prior ventures also impact how much entrepreneurs learn from their early ventures. Here, *outcome* refers to the financial performance of the first venture. This paper argues against the stream of literature suggesting that entrepreneurs learn more from successes than from failures (Shepherd 2003; Shepherd, Wiklund et al. 2009; Shepherd, Patzelt et al. 2011). For instance, Shepherd et al. (2009) suggest that the emotional cost of failure consumes founders' information-processing capacity, making it difficult for them to learn from failure experiences. Similarly, Ucbasaran et al. (2010) finds that entrepreneurs—particularly serial entrepreneurs—

are prone to attribution bias, which may make them less capable of learning from failure. On the other hand, there is significant evidence suggesting that overconfidence among entrepreneurs—particularly following successful ventures—can lead to hubris and negative effects on performance (Camerer and Lovallo 1999; Baron 2000; Koellinger, Minniti et al. 2007; Moore and Cain 2007; Hogarth and Karelaia 2011). This pattern is especially important because young entrepreneurs are more likely to be overconfident and thus more exposed to competence traps (Forbes 2005). Indeed, a study by Koellinger et al. (2007) documents a negative relationship between self-reported levels of entrepreneurial confidence and new venture survival, providing evidence that failure may actually benefit future performance due to a lower risk of competency traps (Levitt and March 1988). Additionally, a stream of research in psychology argues that failure is the most effective source of learning (Sitkin 1992; Madsen and Desai 2010; Cope 2011; Sarasvathy, Menon et al. 2013). One reason for this theory is that knowledge from failure depreciates more slowly than knowledge from success if individuals' mental models of failed events are richer in constructs and links than those of successful events (Ellis and Davidi 2005). Further, failure or near failure may promote preventive searches in the future, leading to more proactive behavior (Madsen and Desai 2010). This reasoning leads to the next hypothesis:

Hypothesis 3a: *The financial performance of entrepreneurs' first venture is negatively associated with the financial performance of their second venture.*

Overcoming the barriers to learning that stem from successful experiences is arguably a challenge that demands particularly high levels of consideration (Rerup 2005). While failure is more likely to trigger reflective reasoning, success is less likely to prompt entrepreneurs to think critically about prior experience or the applicability of such experience in new settings. This leads to increased exposure to competence traps (Argyris 1991). However, entrepreneurial talent is argued to foster reflective processes, whereby talented entrepreneurs may leverage prior

successful experiences more efficiently to achieve superior future outcomes (Gompers, Kovner et al. 2010). For these reasons, the next hypothesis is proposed:

Hypothesis 3b: *The relationship between the financial performance of entrepreneurs' first venture and the financial performance of their second venture is positively moderated by entrepreneurs' level of entrepreneurial talent.*

Dissimilarity as a barrier to learning?

The literature on experiential learning suggests that past experience is likely to influence future decisions through means of generalization (Dutton and Thomas 1984; Denrell and March 2001). Experience curve theory essentially suggests that such knowledge replication will lead to improvement (Yelle 1979; Argote and Epple 1990), yet studies of experiential learning have demonstrated that generalizing past experiences does not necessarily converge to a global optimum, particularly when past and current situations are dissimilar (Mazur 1994; Halebian and Finkelstein 1999; Toft-Kehler, Wennberg et al. 2014). Finally, there is significant literature suggesting that a certain level of dissimilarity increases learning (Haunschild and Sullivan 2002; Schilling, Vidal et al. 2003).

Industry similarity has frequently been used as a measure to gauge the level of applicability of prior experience in entrepreneurship (Klepper 2001; Delmar and Shane 2006; Eesley and Roberts 2012). For example, higher levels of industry similarity between prior and current ventures has been found to increase venture growth and survival (Cooper, Gimeno-Gascon et al. 1994), the number of new venture opportunities identified (Gruber, MacMillan et al. 2008), entrepreneurs' ability to forecast and manage expectations relative to performance (Cassar 2012), and the performance of ventures established by experienced serial entrepreneurs (Toft-Kehler, Wennberg et al. 2014). Hence, dissimilarity poses a potentially important barrier to learning and

may be strongest during the earliest stages of an entrepreneurial career, when contextual dissimilarity may be particularly disadvantageous for the generalization of past experiences (Forbes 2005). As such, the following hypothesis is put forth:

Hypothesis 4a: *The level of dissimilarity between entrepreneurs' first and second ventures is negatively associated with the financial performance of their second venture.*

Again, this paper argues that entrepreneurial talent plays an important role in enabling entrepreneurs to overcome the challenges associated with dissimilarities between their first and the second ventures (Unger, Rauch et al. 2011; Eesley and Roberts 2012). Entrepreneurial talent helps entrepreneurs' leverage and transform their prior experiences into applicable knowledge. It enables them to overcome the barriers that arise from dissimilarity, such as superstitious learning, through higher-ordering processing, including the perception, memory, metacognition, and intuition functions described by Baron and Henry (2010). Based on this reasoning, the final hypothesis is proposed:

Hypothesis 4b: *The relationship between the level of dissimilarity between entrepreneurs' first and second ventures and the financial performance of their second venture is positively moderated by entrepreneurs' level of entrepreneurial talent.*

DATA AND METHODS

The dataset used for this study contains annual data from 1989 to 2002 and is the result of a combination of two longitudinal databases maintained by Statistics Sweden: RAMS and LOUISE. RAMS comprises yearly data on all firms registered in Sweden and provides firm-level data, including balance sheets, income statements, organizational figures, and industry data. LOUISE comprises yearly data on all Swedish inhabitants and provides individual-level data, including founders' career histories, education, family, and socio-demographic variables. Linking

firm-level data and individual-level data allows for the creation of a multi-level longitudinal dataset with annual data during the period from 1989 to 2002. For this period, the dataset contains no missing data, except due to mortality or individuals leaving country.

The nature of the data mitigates several important issues that commonly impact the study of entrepreneurial performance. First, the study design utilizes the data's panel structure to follow the ventures from inception. This approach helps alleviate a common issue in entrepreneurship research by acknowledging the different challenges—both qualitatively and quantitatively—confronting new and more mature ventures (Shane 2003; Vohora, Wright et al. 2004). Second, the majority of variables are calculated from register data to reduce subjective measures or constructs that do not adequately reflect, for example, performance across ventures and industries. Third, the richness of the dataset allows for the collection of robust information on recently graduated entrepreneurs, including a range of individual, venture, and industry control variables, which serves to establish finer-grained measures of key constructs, such as entrepreneurial experiences, entrepreneurial talent, and entrepreneurial performance. These measures are particularly important because studies using simplified measures of founding experience (e.g., binary) and performance (e.g., scale-based self-assessments) may make misguided interpretations (Delmar and Shane 2006). Thus, the use of longitudinal data combined with the study's design helps form a more complete picture of individuals' early entrepreneurial experience. Further, the richness of the data provides numerous important control variables. For example, the inclusion of entrepreneurial talent as a variable helps control for innate skills, which have been presented as an important factor in entrepreneurial performance research (Delmar and Shane 2003; Hamilton and Nickerson 2003; Chen 2013). Naturally, the study design and data also give rise to certain limitations, which are discussed in later sections of the paper.

Because the databases are left censored in 1989, LOUISE was used to sample individuals from two cohorts of college graduates in 1989 and 1990, who were followed through 2002. The focus on recent college graduates not only serves to explore a poorly understood phenomenon, it also avoids the inclusion of individuals who may have obtained substantial experience in the 1970s or 1980s that cannot be measured or accurately compared against a younger sample. Recent graduates are also particularly relevant for this study because they represent an opportunity to understand the experience-performance dynamics in the burgeoning stages of entrepreneurial careers. Therefore, without significant prior entrepreneurial experience, these individuals are—according to the experience curve theory—expected to have substantially increased performance from their first to second ventures (Yelle 1979) but are—according to the concept of barriers to learning—also at a greater risk of negative experience transfer (Toft-Kehler, Wennberg et al. 2014). Furthermore, since college graduates have been less exposed to experiences, both professionally and personally, which can otherwise be difficult to effectively control for in quantitative analyses, the unobserved sample heterogeneity is reduced by the study design.

The sample includes all types of ventures founded: sole proprietorships, partnerships, and full incorporations. To minimize problems related to college graduates gaining extensive experience from other activities (e.g., employment), which can affect the performance of their subsequent entrepreneurial ventures, and avoid right censoring (because starting a new venture takes time and the dataset is right censored in 2002), this study only includes entrepreneurs who started their first new venture within three years of college graduation (Sørensen 2007; Folta, Delmar et al. 2010; Åstebro, Bazzazian et al. 2012).

Data contained by RAMS include variables from company profit and loss statements and balance sheets, which allows for the calculation of annual venture performance and resource deployment in the ventures. Since venture performance may correlate with time spent by the

entrepreneur in the venture, it is required that the entrepreneurs, as founder-managers, are working full time in the venture (Shane 2003). Additionally, it is important that the entrepreneur maintains control of the venture in order to utilize prior entrepreneurial experience. For that reason, a requirement of the entrepreneur holding a majority ownership stake is included to ensure that experience-performance relationships are not confounded by other parties ultimately controlling important decisions (Beckman and Burton 2008). To avoid the inclusion of firms for which entry and exit is a more trivial decision, a minimum requirement of a one-year time gap between entrepreneurs' first and second ventures was introduced (Gimeno, Folta et al. 1997; Wennberg, Wiklund et al. 2010). Further, to decrease unobserved heterogeneity at the venture level, spinoffs from existing businesses were excluded. The sample, therefore only covers genuinely new ventures. Finally, founder teams were also excluded as contributions to firm performance may not be equally distributed across team members, making it difficult to draw any conclusions about individual-level accumulation of expertise.

The resulting dataset is a sample of 766 serial entrepreneurs followed for up to 14 years after their college graduation. All entrepreneurs founded their first venture within three years of college graduation and their second venture within the sample period, resulting in 766 second ventures from various industries followed from inception. The total number of second venture time observations is 1,966, indicating an average duration of 2.53 years.

Dependent variable

Financial performance of the second venture. Utilizing the multi-level nature of the data, this study adopts Hamilton's (2000) definition of entrepreneurial earnings during the second venture founded by the entrepreneur after college graduation. The measure variable takes into account both money taken out of the venture plus retained earnings that have accumulated in the

venture. The computation of the performance construct combines yearly firm-level performance data from annual reports in RAMS with yearly individual-level tax records from LOUISE. The numbers were adjusted for inflation. The measure was highly skewed and was thus transformed into log format following the tradition of earnings equations in labor economics. Measuring performance in terms of annual entrepreneurial earnings reduces the bias introduced by subjective measures (e.g., self-reporting) or indirect measures (e.g., number of employees, survival, or revenue growth) (Delmar and Shane 2006). Finally, the dependent financial performance variable was lagged one year to reduce endogeneity.

Independent variables

Duration of the first venture. The duration of the first venture (representing “prior entrepreneurial experience” due to the nature of the sample) was measured as the number of years in which the founder was actively engaged as the founder-manager of the first venture founded within three years of college graduation.

Financial performance of the first venture. In accordance with the dependent variable, financial performance of the first venture was constructed according to Hamilton’s (2000) definition of entrepreneurial earnings and was calculated as the logged average annual performance of the first venture.

Complexity of the first venture. R&D intensity has been established as a valid measure of firm-level complexity (Markarian and Parbonetti 2007) and is generally used as a proxy for measuring the amount of intangible knowhow within a given firm. All else equal, high R&D intensity in a venture suggests technological innovation that needs to be assessed, managed and aligned with both commercial and financial requirements (Dolde and Mishra 2007). RAMS data

was used to establish a proxy for complexity, defined as R&D expenses proportional to total sales at the two-digit industry level in the first venture' industry.

Dissimilarity between the first and the second venture. Following research in strategy and entrepreneurship (Chatterjee and Blocher 1992), dissimilarity was measured using Standard Industrial Classification (SIC) codes to determine the industry distance between the serial entrepreneurs' first and second ventures. Data from RAMS on both current and prior ventures' industry affiliation was used. The measure of distance was adopted from Finkelstein and Haleblan (2002), who developed a continuous measure using four-digit SIC codes. However, this study relied on five-digit codes for more exact measurement. The industry codes between the entrepreneurs' first and the second ventures were compared, first on all levels of aggregation (five through one) thus coding an exact match (five-digit level) as "5", a four-digit match as "4" etc. Hence, smaller weights were assigned for lower levels of dissimilarity between the first and the second venture, but the measure still reflects the fact that there is higher level of dissimilarity between, for example, "construction" (SIC 4) and "trade" (SIC 5) than between "wholesale trade" (SIC 51) and "retail trade" (SIC 52). Finally, the measure was reverse coded to reflect dissimilarity.

Entrepreneurial talent. Entrepreneurial talent is an emerging theme in scholarly work with limited empirical foundation and no universal definition (Eesley and Roberts 2012).⁴ In this study, the measure for entrepreneurial talent is based on an abbreviated model of Mincer's widely employed labor-market wage equation model to predict individual-level talent. The Mincer equation has been used to determine the "match" between employees and their employment as

⁴ For example, Evans and Jovanovic (1989) define talent as the ability to get greater entrepreneurial earnings out of a given amount of capital invested. Others define talent as "the ability to combine tangible and intangible assets and to deploy them to meet customer needs in a manner that cannot easily be imitated" (Amit et al, 1990). Gompers et al. (2010) point to the importance of market timing and managerial experience, and finally, Eesley and Roberts (2012) define talent according to an individual's ability to generate greater venture performance consistently across multiple ventures.

determined by earnings relative to education and experience. The conventional Mincer equation predicts wage returns to education and industry experience at the individual level, where the unexplained variance captures unobservable individual effects—the most important being unobserved ability (Mincer 1974). In alignment with the ability concept in labor economics and a substantial portion of entrepreneurship research (Van Praag and Cramer 2001; Parker 2004; Lazear 2005.), this study uses an individual-level measure of entrepreneurial talent based on the error term of entrepreneurial earnings relative to the full sample mean.

Since several of the variables with known effects on entrepreneurial performance (e.g., gender and education) are time invariant, the data is not well suited for the fixed-effect method (Heckman and Li 2004). Therefore, and because it is extremely difficult to find satisfactory instruments to capture the effects of innate talent (Carneiro and Heckman 2002), Heckman’s suggestion to use a proxy for innate ability and include it as a regressor in the Mincer equation was followed. Since entrepreneurial parents are frequently associated with superior entrepreneurial ability and performance (Shane 2003; Nicolaou, Shane et al. 2008; Zhang, Zypnur et al. 2009), parental entrepreneurship was included as a proxy for ability in the talent measure (Heckman and Li 2004).

Following Eesley and Roberts (2012), *entrepreneurial talent* was defined as the log of entrepreneurial performance across the entire dataset (1989 to 2002) on the left side of the equation with years of education and entrepreneurial experience, including also the squared term of entrepreneurial experience, on the right side. Finally, controls for gender, household wealth, marital status, number of children, and parental entrepreneurship were included.⁵ Due to the curvilinear effect of prior entrepreneurial experience identified in a preceding paper (Toft-Kehler,

⁵ The Mincer equation is specified as the log of employment earnings on the left-hand side of the equation and years of education as well as the labor market experience and squared term of labor market experience on the right-hand side, controlling for gender and age, and is then predicted by simple OLS regression.

Wennberg et al. 2014), the talent variable takes each spell of entrepreneurial experience into account across the entire dataset (i.e., up to four spells of entrepreneurial experience, which is the maximum number of ventures started by any entrepreneur in the dataset after college graduation and until data censoring in 2002) as an independent term in the equation. Random-effects regression was used since many of the independent variables are time-invariant, rendering fixed-effects regression inappropriate (Please see regression output in Appendix A). Finally, the Stata command *predict* was used to estimate an individual measure for entrepreneurial talent.

Based on this construction of the entrepreneurial talent variable, a potential concern arises that the variable could be correlated with entrepreneurial performance in entrepreneurs' first and second ventures. However, since the measures underlying the entrepreneurial talent variable are based on data from the entire dataset, the correlation between talent and other variables was within the acceptable range. Specifically, both variance inflation factor and correlation assessments returned acceptable ranges with correlations of 0.257 to first venture performance and 0.178 to second venture performance. This suggests that the entrepreneurial talent variable is not related too closely to other variables and can therefore reasonably be included in regressions.

Control variables

Level of education. This variable was measured as number of years of education, the most common operationalization of general human capital in the literature (Brüderl, Preisendörfer et al. 1992). The variable was operationalized from education codes in LOUISE describing the length and type of an individual's highest education.

Age. All individuals living in Sweden receive a personal identification number based on their date of birth. This information was used to calculate individual age in years.

Gender. Prior research indicates that male and female entrepreneurs may have different performance goals (Shane 2003). A dummy variable coded 1 for men and 2 for women was included.

Entrepreneurial parents. Entrepreneurship research has suggested that genetics may play a role in entrepreneurial engagement and performance (Gimeno, Folta et al. 1997; Shane 2003; Nicolaou, Shane et al. 2008; Zhang, Zyphur et al. 2009). Therefore, to control for genetic disposition and likelihood of entrepreneurial entry, a dummy variable was created with data from the LOUISE database that accounts for entrepreneurs with a family history of entrepreneurial engagement.

Children. This control accounts for the number of children in an entrepreneur's household since this may impact the entrepreneur's ability and motivation to dedicate time and resources to his or her venture. The count of number of children is updated each year.

Duration of the second venture. A problem with studying the relationship between prior experiences and performance is the risk of bias related to ventures becoming established before generating significant profits (Gimeno, Folta et al. 1997). Consequently, the relative performance of a venture is likely to differ during its first, second, or ninth year of operation. Thus, the second venture's duration was also controlled for as this is likely to impact performance.

Time trends. Time-varying effects that may affect the average level of performance across ventures were also controlled for using time dummies for each year of observation.

Industry affiliation. To study industry changes among serial entrepreneurs, a multitude of industries were included in the analysis. Variation across industries introduces potential error in the analysis of performance levels that might affect inferences about entrepreneurial learning. All analyses were therefore estimated with fixed industry effects (SIC-2 equivalent).

Empirical strategy

A Sargan-Hansen test of overidentifying restriction—that is, whether regressors are uncorrelated with the individual-specific error term over time—revealed random individual effects as preferable to fixed effects (Chi2: 10.712, $p > 0.218$).⁶ To take advantage of the panel structure of the data from 1989 to 2002, all models were therefore estimated with conditional fixed industry and year effects and estimated with random individual effects. Standard errors were clustered on the individual level to avoid exaggerated significance levels. Each of the models predict the performance of the second venture at varying levels of talent and based on prior venture experience in terms of duration, financial performance, level of complexity, industrial dissimilarity, and a range of controls. Additionally, the moderating effect of entrepreneurial talent was analyzed through interactions with measures of prior experience. All models include constitutive terms in a base model with each linear term added in a hierarchical manner. Because interpretation of a model comprising all constitutive and interaction terms does not yield meaningful results, the interactions terms were introduced separately. This helps to reduce problems of multicollinearity but, more importantly, eases interpretation of individual coefficient results where the constitutive terms are interpreted in the base model and each moderator is interpreted in its individual specification (Aiken, West et al. 1991; Brambor, Clark et al. 2006).

One consideration regarding sample selection relates to the argument that serial entrepreneurs may constitute a more talented sample of entrepreneurs on average than those starting their first venture (Eesley and Roberts 2012; Chen 2013). This potential self-selection issue is counterbalanced by the inclusion of the entrepreneurial talent variable in all models to

⁶ The regular Hausman specification test was also performed, which showed a negative Chi-2 statistic. Following Wooldridge (2002, pp. 290-91), the Stata command *xtoverid* was used to compute the Hansen's J statistic, which is equivalent to the Hausman statistic but also robust to heteroskedasticity and the clustering of individual observations over time (Arellano, 1993).

reduce the potential bias by controlling for innate skills. Table 1 includes the means, standard deviations, and correlation matrix for the variables.

INSERT TABLE 1 HERE

Robustness tests

As seen in Table 1, there are no unexpected correlations among the independent variables and controls, which reduces concerns about multicollinearity. However, since some correlations exceed 0.5, variance inflation factors were computed. The mean variance inflation factor is 2.54, and none of the independent variables exceed 10, which is the generally accepted range for variables (O'Brien 2007). Robustness tests were conducted to examine the effects of potential outliers using the Stata command *winsor*, and interaction terms were tested on a mean centered basis. These models revealed that hypothesized relationships did not alter the significance or direction of the results. Finally, in unreported models, the tests were conducted using individual fixed effects. While a limited number of variables remained similar in direction and significance, most of the variables were rendered obsolete due to the time invariance. In summary, the findings appear robust to multicollinearity, outliers, and alternative model specifications. Non-reported models are available upon request.

RESULTS

To explore differences in entrepreneurial performance between first and second ventures launched by recent college graduates ($n = 776$), a simple t-test was conducted. The results show that young serial entrepreneurs generally achieve significantly *lower* performance in their second

venture compared to the first ($t = 3.0078, p < 0.01$). This contradicts conventional experience curve theory and highlights the potential importance of barriers to learning at the earliest stages of entrepreneurial careers.

Table 2 reports the results from random-effects regressions. Based on the hypotheses, this study explores whether first venture experience can predict second venture performance and whether talent has a moderating effect. All models include constitutive terms with hierarchical introduction of independent variables, each representing potential barriers to learning. Interactions between experience and talent were included separately to advance interpretation of the models (Aiken, West et al. 1991).

INSERT TABLE 2 HERE

Hypothesis 1a argued that the duration of entrepreneurs' first venture is negatively related to the financial performance of their second venture. In Model 1a, this hypothesis is explored by adding the duration of the first venture to the base model while controlling for talent. Because the coefficient for the duration of the first venture is negative and significant ($\beta = -0.472, p < 0.01$), Hypothesis 1a is supported: the duration of entrepreneurs' first venture has a negative effect on their ability to achieve superior performance in their second venture.

Hypothesis 1b predicted that talent mitigates the negative effect of first venture duration. In Model 1b, the interaction term of talent and the duration of the first venture were added to the model. The coefficient for the interaction term "startup1years*talent" is positive and weakly significant ($\beta = 0.061, p < 0.10$). Since interpretations of individual coefficients are insufficient to

assess the presence of a moderator when variance is not equal across values (Brambor et al., 2006, p. 74), the marginal effects of duration on performance were plotted at various levels of talent (i.e., at a sample mean as well as at a one standard deviation above and below the sample mean). The results exhibited in Figure 1 underscore a positive linear and slightly increasing relationship interaction effect between first venture duration and entrepreneurial talent. Therefore, Hypothesis 1b is also supported.

INSERT FIGURE 1 HERE

Hypothesis 2a argued that the level of complexity of entrepreneurs' first venture is negatively related to the financial performance of their second venture. This relationship is explored in Model 2a (Table 2) through the introduction of level of complexity in the equation. Since the coefficient for complexity is negative but not significant ($\beta = -0.078$, $p = 0.19$), Hypothesis 2a is rejected: the complexity of the first venture does not seem to represent a barrier to learning that diminishes the likelihood of achieving superior second venture performance. For a more nuanced understanding of complexity, the role of talent was introduced in Hypothesis 2b, which suggested that talent and complexity interact positively, thus resulting in better performance. Model 2b in Table 2 shows that the coefficient for the interaction term "complexity*talent" is positive and significant ($\beta = 0.070$, $p < 0.01$). To explore the source of this interaction in greater detail, the marginal effects of complexity on performance were plotted at various levels of talent. The results, exhibited in Figure 2, suggest that medium and higher levels of talent generally yield positive returns to entrepreneurial experiences in complex ventures, whereas individuals with talent below the mean are distracted by experiences gained in complex

contexts. This finding confirms Hypothesis 2b in that talent seems to positively moderate the rate of learning from more complex venture experiences.

INSERT FIGURE 2 HERE

Hypothesis 3a proposed a negative relationship between the financial performance of entrepreneurs' first and second ventures. Model 3a in Table 2 examines this hypothesis. Since the coefficient for performance in the first venture is positive and significant ($\beta = 0.211, p < 0.001$), Hypothesis 3a is rejected. Entrepreneurs performing well in their first venture are more likely to continue creating successful ventures. Interestingly, when investigating the squared term of performance in the first venture (Model 3c), we see a negative and statistically significant relationship ($\beta = -0.059, p < 0.001$). This indicates that highly successful outcomes in an entrepreneur's first venture may turn into a disadvantage for achieving superior performance in his or her second venture; rather, moderate outcomes may be more predictive of future success. Further, in Model 3b, past entrepreneurial performance is interacted with talent. This interaction term "performance1*talent" yielded a negative and weakly significant relationship with performance of the second venture ($\beta = -0.036, p < 0.10$). Marginal plots of this effect (Figure 3) show that at the sample mean level of talent (the red line), prior performance has a negative impact on second venture performance. This negative effect is markedly stronger for entrepreneurs with a talent-level one standard deviation below the sample mean (the blue line). However, the effect becomes positive for entrepreneurs with a talent level one standard deviation above the sample mean (the green line). This finding supports Hypothesis 3b as strong past performance is valuable *only* for entrepreneurs with high levels of talent.

INSTERT FIGURE 3 HERE

The final set of hypotheses investigated the role of dissimilarity between entrepreneurs' first and second ventures. Hypothesis 4a argued that the level of dissimilarity between entrepreneurs' first and second ventures is negatively related to the financial performance of their second venture. Model 4a in Table 2 confirms this hypothesis as the coefficient for dissimilarity is negative and statistically significant ($\beta = -0.600, p < 0.001$). This indicates that dissimilarity does represent a barrier to learning at the earliest stages of an entrepreneurial career. Finally, Hypothesis 4b suggested that entrepreneurial talent mitigates the negative effect of dissimilarity. This relationship is examined in Model 4b of Table 2. The interaction term "dissimilarity*talent" was found to be positive and significant ($\beta = 0.092, p < 0.001$). To investigate the interaction between talent and dissimilarity, the marginal effects of dissimilarity on second venture performance were plotted at various levels of talent. The slopes of the plotted effects, exhibited in Figure 4, underscore that the negative effect of dissimilarity on second venture performance is stronger for entrepreneurs with a talent level at the sample mean (red line) or at a one standard deviation below the sample mean (blue line). Therefore, Hypothesis 4b, suggesting that entrepreneurial talent is likely to improve venture performance by moderating the rate of learning from dissimilar contexts, is also confirmed.

INSTERT FIGURE 4 HERE

DISCUSSION

Serial entrepreneurship represents an important source of economic activity and a unique opportunity for researchers to learn about the effect of experience in complex, uncertain, and resource-constrained environments (MacMillan 1986; Ucbasaran, Alsos et al. 2008). Recent research on serial entrepreneurship—emphasizing the role of the entrepreneur rather than the firm—has challenged established learning theories (Eesley and Roberts 2012; Parker 2012; Frankish, Roberts et al. 2013; Toft-Kehler, Wennberg et al. 2014). With this background, the present study set out to explore a basic research question: *how do recent college entrepreneurs financially benefit from first venture experiences and individual-level entrepreneurial talent in their second venture after college?* To answer this question, a multi-level dataset was used to analyze the entrepreneurial performance of recent college graduate entrepreneurs in their second venture as a function of their experience during their first venture taking into consideration their level of entrepreneurial talent. Through investigations of four distinct types of first venture experience—each constituting a potential barrier to learning—and the potentially contingent effect of entrepreneurial talent, this paper seeks to provide an understanding of whether certain experience types and levels of entrepreneurial talent are more likely to overcome potential barriers to learning in entrepreneurship.

This paper contributes to the literatures on experience curves and entrepreneurship in three primary ways. First, it highlights the need for the experience curve literature to account for negative experience transfer. Second, it shows that entrepreneurial talent can be an important moderator of the experience-performance relationship in serial entrepreneurship. Third, it provides evidence that early career experience contradicts the established experience curve

literature with potential implications for practitioners considering how to build entrepreneurial careers. These contributions, along with their implications for theory, research, and practice, are discussed in the following sections.

Negative effects of experience

In the theory section, two central assumptions of experience curve theory were highlighted that are of key importance to this paper. First, experience curve theory assumes a constant rate of learning across all spells of experience and does not account for variation in rate of learning between spells (Wright 1936; Yelle 1979). Second, it assumes that experience contributes positively to performance and thus fails to acknowledge that experience may be disadvantageous (Barkema and Schijven 2008; Unger, Rauch et al. 2011).

This paper seeks to challenge these fundamental assumptions of experience curve theory by including barriers to learning from experience into the equation. Specifically, this paper shows that extended experience in one venture (duration of the first venture), higher levels of dissimilarity between venture contexts, and even extreme levels of entrepreneurial success can lead to negative subsequent performance. These effects are novel to the literature on entrepreneurial experience and accumulation of expertise, yet the effects are supported by findings related to knowledge relatedness (Gick and Holyoak 1987; Barnett and Ceci 2002; Schilling, Vidal et al. 2003), superstitious learning (Levitt and March 1988), and hubris, which may in particular strike highly confident entrepreneurs upon success (Hayward, Shepherd et al. 2006). The essence is that experience does not necessarily translate into better performance and may even yield negative returns. This finding is in accordance with Levinthal and Rerup (2006) and highlights the importance and potential insights to be gained from testing experience curve theory in contexts characterized by complexity, novelty, and resource constraints.

The role of entrepreneurial talent in overcoming barriers to learning

An emerging stream of research suggests that entrepreneurial talent is of key importance for venture performance (Baron and Henry 2010; Eesley and Roberts 2012; Chen 2013). This study's findings reveal that entrepreneurial talent may help entrepreneurs overcome liabilities related to duration, complexity, or dissimilarity between first and second ventures, supporting the notion that talented entrepreneurs are better at overcoming barriers to learning. Further, the findings suggest that the returns to talent generally increase as barriers to learning increase (Figures 1–4). For instance, the moderating effect of talent becomes stronger as the dissimilarity between the first and second ventures increases. These results offer new knowledge to support recent research by Eesley and Roberts (2012) and Chen (2013) highlighting talent as an important and positive moderator of performance in entrepreneurship.

This study also reveals an inverted U-shaped relationship between the interaction of first venture performance and entrepreneurial talent and second venture performance. This finding can be explained by the literature on overconfidence in entrepreneurship since it is considered that talented individuals are well aware of their status, which in turn makes them inclined to overconfidence (Koellinger, Minniti et al. 2007; Hayward, Forster et al. 2010) and consequently exposed to competence traps (Levitt and March 1988). Such patterns have previously been found among particularly outspoken young entrepreneurs (Forbes 2005). Finally, further investigations into less talented entrepreneurs show that these individuals—compared to their more talented counterparts—face more barriers to learning when engaged in complex ventures early in their career (Figure 2). This finding again suggests that talent plays an important role in serial entrepreneurs' ability to generate venture successes and that complexity does indeed represent a barrier to learning but only for less talented individuals.

In summary, the findings related to entrepreneurial talent suggest that young talented entrepreneurs are—with certain limitations—better at overcoming barriers to learning and more likely to become successful serial entrepreneurs. Talented entrepreneurs may be more adept at extracting relevant knowledge from experience and apply such knowledge appropriately in new contexts. Entrepreneurial talent may also be associated with advanced abstraction skills that allow talented individuals to form heuristics and diverge their thinking to break established frames (Easley and Roberts 2012). The combination of entrepreneurial experience and talent addresses a dual challenge of new venture establishment by effectively enabling entrepreneurs to deal with the well-known and the unknown by harnessing prior experience.

Early career experience-performance relationships

The final contribution relates to a largely neglected phenomenon in the field of entrepreneurial learning—namely, the experience-performance relationship in the earliest stages of an entrepreneurial career (Sarasvathy 2004; Sarasvathy and Venkataraman 2011; Åstebro, Bazzazian et al. 2012). This is an interesting avenue for research for at least two reasons. First, psychology research suggests that younger individuals are more adept at learning and are therefore more likely to increase performance on the basis of early experience (Maurer 2001). Second, the experience curve literature emphasizes “diminishing returns” to experience, suggesting that individuals in the earliest stages of their entrepreneurial career are most likely to demonstrate progression from one venture to another (Yelle 1979). While this study’s methodological approach did not allow for a comparative test of different age groups, the findings indicate that young entrepreneurs are indeed exposed to barriers to learning and therefore do not support predictions of conventional experience curve theory (Thurstone 1919). These findings highlight the importance of considering entrepreneurship as a long-term career opportunity (Aldrich and Yang 2012; Sarasvathy, Menon et al. 2013). Aspiring entrepreneurs should acknowledge that

entrepreneurship is a skill that takes time to develop. As such, new entrepreneurs are likely to benefit from engaging in entrepreneurship based on long-term aspirations and from re-engaging in several new ventures—preferably within the same domain—to build on recent experience, learn, and eventually succeed.

The finding that the duration of an entrepreneur's first venture is negatively related to second venture performance suggests that young entrepreneurs should not remain with their first venture for too long because doing so may reduce the likelihood of achieving superior performance in their second venture. While this paper strictly focuses on the earliest stages of an entrepreneurial career (i.e., first and second ventures) and reveals nothing about the effects of the duration of the first venture on the third, fourth, or fifth ventures, this finding challenges the view that individuals should remain within a particular organization to maximize learning (Huckman and Pisano 2006; Eesley and Roberts 2012). Entrepreneurs' reduced ability to learn from staying in their first venture too long could stem from the fact that while founding new ventures may seem to be a continuous evolution, it is in fact a sequence of independent challenges, which call for different skills and solutions. The skills needed for building new ventures may change dramatically from venture inception to later venture phases (Vohora, Wright et al. 2004). Thus, longer durations of entrepreneurial commitment in a single venture, spanning across multiple phases, may provide poor basis for building expertise in the individual phases of venture evolution. Instead, entrepreneurs should build their career based on multiple shorter-term engagements with different ventures at certain phase of development (Eesley and Roberts 2012). This approach seems particularly relevant for individuals with higher levels of entrepreneurial talent, who are more capable of overcoming the barriers to learning inherent in each transition.

Limitations and future research

Measuring and analyzing the role of entrepreneurial talent is an emergent theme for entrepreneurship research. Recent publications have highlighted the need for researchers to obtain a better understanding of entrepreneurial talent and have argued that foundational questions remain: what is entrepreneurial talent? What does it do? How can it be measured and evaluated? The present study merely scratches the surface of this topic by offering a suggestion for how entrepreneurial talent can be defined. As such, the approach of this paper stands to be challenged, and new approaches are welcome. In particular, mixed-methods research may provide a more nuanced understanding of what really defines *entrepreneurial talent*. Within the field of entrepreneurship, talent could very well be a blend of traits, including the usual suspects of intelligence, social capital, creativity, and drive, but traits like mindfulness, agility, and humility may also be central to the definition.

The link between experience and performance in the context of entrepreneurship is also an emerging theme in research. This paper highlights that experience and performance are not automatically linked but are moderated through barriers to learning, causing both positive and negative effects of prior experience. Although the barriers investigated in this paper extend those of previous research, the list is far from exhaustive or conclusive. Different types of barriers to learning exist with distinct implications for performance, which is an important area for future work (Delmar and Shane 2006; Parker 2012). For example, the present paper argues that the timing of experience within a career path in and of itself represents an empirical gap in the literature and a potential barrier to learning that could yield new insight into the importance of early experiences in entrepreneurship. Further research is needed to understand the presence, importance, and very construct of barriers to learning in greater detail. Specifically, when knowledge is difficult to extract from a given context (“barriers to extraction”) and, equally

important, when prior knowledge is difficult to apply (“barriers to application”) remain open questions, the answers to which could advance our understanding of experience-performance relationships.

This study’s findings are based on a Swedish sample and inferences are drawn from a relatively small number of post graduate serial entrepreneurs. The strict definition of recent graduates, who founded at least two ventures within a limited timeframe after college, has advantages but may also limit the generalizability of the findings. Yet, the positive effects of this empiric focus include a mitigation of left censoring since we know that these entrepreneurs are unlikely to have gained substantial entrepreneurial experience before their graduation in 1989 or 1990. Accordingly, the selection effect is considered to outweigh the negative effects related to reduced generalizability (Yang and Aldrich 2012). Despite the above, not all relevant experiences are considered by the data. For example, experiences obtained during schooling such as ‘lemonade stands’ are rarely captured by databases, but may still be a rich source of entrepreneurial learning. It is however plausible that having entrepreneurial parents (included in the models of the analyses as a control) is correlated such activities. Additionally, different academic degrees may lead to variance in opportunity identification patterns as well as opportunity costs and thus have implications for who eventually becomes a serial entrepreneur and what type of venture the individual pursue. Larger and richer datasets covering entrepreneurs’ lifetime would offer new opportunities to gain insight into the long-term effects of first and second venture experience as well as new insights about entrepreneurial career building.

Conclusions

This paper offers new insights into how barriers to learning impact the value of early entrepreneurial experience and how entrepreneurial talent moderates entrepreneurs’ ability to

overcome such barriers. The findings of this paper highlight that experience does not automatically lead to the accumulation of expertise and may even have a negative impact on later venture performance. This suggests that at the earliest stages of their career, entrepreneurs should consider whether an entrepreneurial career, spanning several new ventures, aligns with their aspirations. If so, these individuals are more likely to continue starting new ventures, overcome inherent barriers to learning, and eventually build expertise to make new ventures succeed. In particular, talented individuals are likely to benefit from such a long-term career perspective and ultimately become successful serial entrepreneurs.

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Table 1: Descriptive statistics and correlations

Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13
1 performance of second venture	10.082	3.562	1.000												
2 age of individual	31.739	5.830	0.081	1.000											
3 gender of individual	1.507	0.500	0.056	-0.045	1.000										
4 marital status	0.525	0.499	0.001	0.115	0.120	1.000									
5 number of children	1.088	1.137	0.016	0.206	0.201	0.656	1.000								
6 years of education	15.246	0.917	0.027	0.162	-0.062	0.072	0.014	1.000							
7 years of parental self-employment	0.269	1.040	0.014	-0.042	-0.070	0.023	0.023	-0.014	1.000						
8 duration of startup2	2.534	2.155	0.270	0.007	-0.017	-0.018	-0.052	-0.005	0.039	1.000					
9 duration of startup1	1.934	1.412	0.013	0.153	0.011	0.029	0.052	0.036	-0.050	-0.030	1.000				
10 performance in the first venture	10.080	2.840	0.121	0.050	-0.075	0.005	0.000	0.040	-0.004	0.152	0.100	1.000			
11 dissimilarity	-2.882	1.980	-0.183	-0.099	-0.075	-0.067	-0.087	0.011	0.124	0.146	-0.148	-0.004	1.000		
12 talent	5.356	2.471	0.257	0.025	0.002	0.034	0.013	0.038	0.033	0.771	0.467	0.178	0.032	1.000	
13 complexity	2.091	2.264	-0.044	0.099	-0.153	-0.012	0.014	0.015	-0.029	-0.040	-0.033	0.038	-0.016	-0.070	1.000

Table 2: Random effects regressions on second venture performance

VARIABLES	Base	Model1a	Model1b	Model2a	Model2b	Model3a	Model3b	Model3c	Model4a	Model4b
gender of individual	0.826** (0.286)	0.819** (0.285)	0.831** (0.285)	0.799** (0.286)	0.818** (0.285)	0.849** (0.283)	0.824** (0.282)	0.683* (0.281)	0.664* (0.266)	0.648* (0.264)
age of individual	-0.066 (0.044)	-0.073+ (0.044)	-0.075+ (0.044)	-0.068 (0.044)	-0.066 (0.044)	-0.079+ (0.045)	-0.079+ (0.045)	-0.062 (0.045)	-0.064 (0.043)	-0.054 (0.043)
marital status	-0.506 (0.379)	-0.518 (0.379)	-0.524 (0.379)	-0.516 (0.379)	-0.500 (0.380)	-0.509 (0.378)	-0.509 (0.378)	-0.468 (0.377)	-0.522 (0.373)	-0.531 (0.373)
number of children in household	0.100 (0.166)	0.081 (0.166)	0.087 (0.167)	0.082 (0.167)	0.068 (0.167)	0.078 (0.166)	0.077 (0.166)	0.079 (0.165)	0.065 (0.163)	0.071 (0.163)
years of education based on highest	0.260+ (0.152)	0.241 (0.151)	0.239 (0.152)	0.230 (0.151)	0.246+ (0.149)	0.193 (0.150)	0.197 (0.150)	0.232 (0.153)	0.129 (0.142)	0.105 (0.141)
years of parental self-employment	0.050 (0.122)	0.010 (0.123)	0.013 (0.120)	0.015 (0.122)	-0.004 (0.122)	0.029 (0.113)	0.028 (0.113)	0.052 (0.118)	0.128 (0.115)	0.099 (0.116)
number of years with startup2	0.321*** (0.068)	0.055 (0.097)	0.028 (0.097)	0.055 (0.097)	0.058 (0.095)	0.046 (0.097)	0.076 (0.098)	0.109 (0.099)	0.076 (0.102)	0.066 (0.098)
entrepreneurial talent - abbreviated r	0.229** (0.072)	0.547*** (0.124)	0.474*** (0.130)	0.535*** (0.125)	0.428*** (0.126)	0.506*** (0.123)	0.861*** (0.233)	0.467*** (0.124)	0.472*** (0.126)	0.717*** (0.148)
number of years with startup1		-0.472** (0.163)	-1.011** (0.374)	-0.459** (0.164)	-0.488** (0.165)	-0.565*** (0.167)	-0.476** (0.176)	-0.229 (0.187)	-0.613*** (0.167)	-0.533** (0.171)
startup1years*talent			0.061+ (0.034)							
complexity - R&D intensity in startup				-0.079 (0.068)	-0.444* (0.176)	-0.079 (0.068)	-0.078 (0.068)	-0.023 (0.067)	-0.095 (0.063)	-0.091 (0.062)
complexity*talent					0.070** (0.027)					
Logged sum of yearly performance ii						0.211*** (0.063)	0.377** (0.128)	0.975*** (0.200)	0.194** (0.060)	0.186** (0.061)
log_performance1*talent							-0.036+ (0.021)			
log_performance1*log_performance								-0.059*** (0.014)		
dissimilarity between final year of stz									-0.600*** (0.072)	-1.068*** (0.170)
dissimilarity*talent										0.092*** (0.027)
Constant	4.721+ (2.409)	5.284* (2.392)	6.124* (2.411)	5.442* (2.395)	5.743* (2.368)	4.510+ (2.391)	2.690 (2.713)	1.804 (2.597)	3.955+ (2.259)	2.697 (2.275)
Observations	1966	1966	1966	1966	1966	1966	1966	1966	1966	1966
Number of lind	776	776	776	776	776	776	776	776	776	776

Standard errors clustered on individu
 *** p<0.001, ** p<0.01, * p<0.05, + |

Figure 1: The effect of first venture duration on the performance of the second venture at various levels of talent

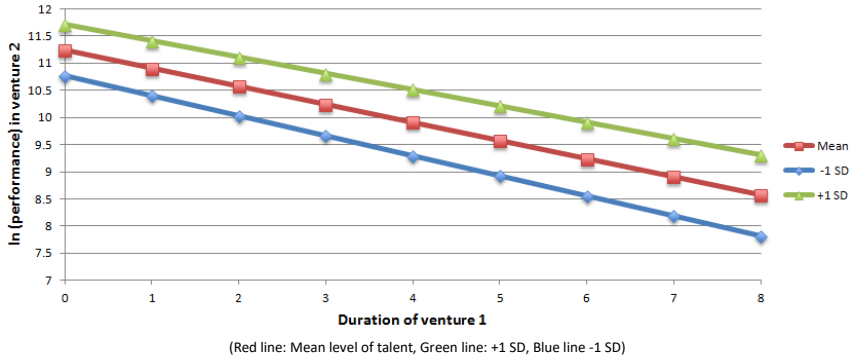


Figure 2: The effect of industry complexity on the performance of the second venture at various levels of talent

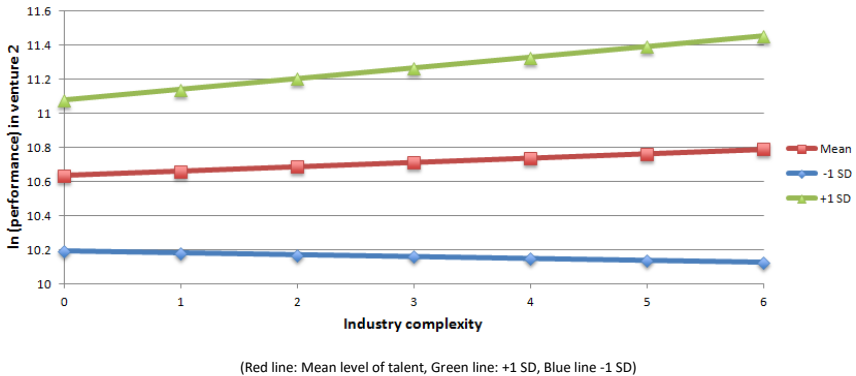


Figure 3: The effect of first venture performance on the performance of the second venture at various levels of talent

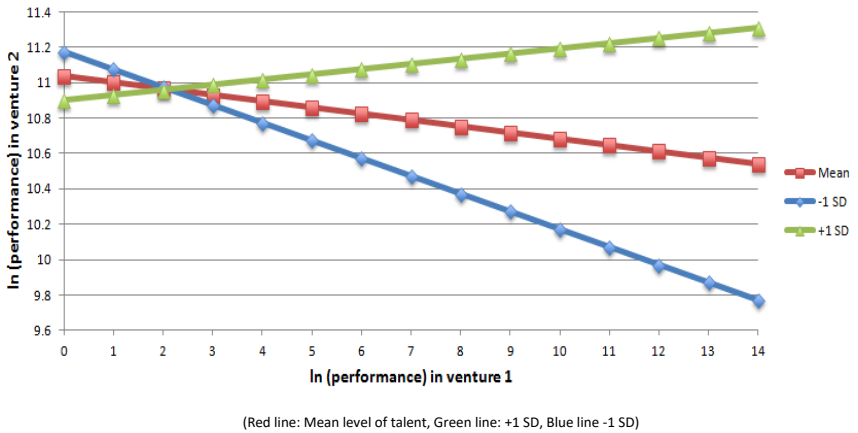
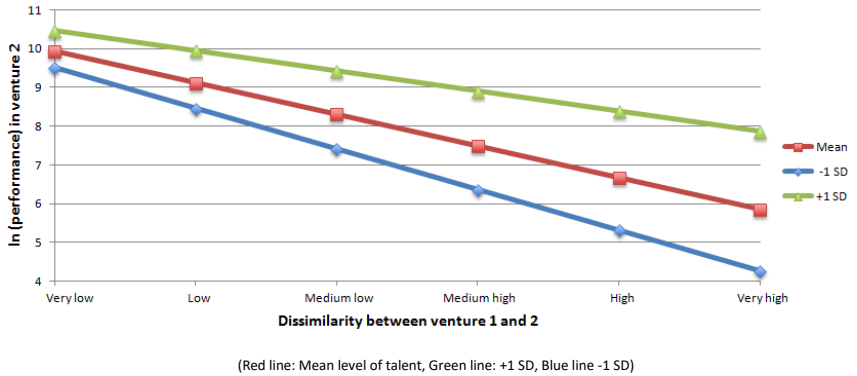


Figure 4: The effect of dissimilarity between the first and second ventures on the performance of the second venture at various levels of talent



Appendix A: Abbreviated Mincer equation regression to predict entrepreneurial talent

Log Performance	Coef.	Std. Err.	z	P>z
years of education	0.072	0.003	21.050	0.000
duration of startup1	1.413	0.008	169.230	0.000
duration of startup1 squarred	-0.042	0.001	-38.970	0.000
duration of startup2	1.312	0.024	55.200	0.000
duration of startup2 squarred	-0.050	0.003	-14.620	0.000
duration of startup3	0.985	0.067	14.730	0.000
duration of startup3 squarred	-0.027	0.012	-2.180	0.029
duration of startup4	0.668	0.269	2.480	0.013
duration of startup4 squarred	0.067	0.070	0.960	0.337
gender of individual	-0.104	0.007	-15.930	0.000
household wealth	0.000	0.000	-2.270	0.023
years of parental self-employment	0.042	0.005	9.140	0.000
marital status	0.031	0.005	5.970	0.000
number of children	0.071	0.003	27.880	0.000
_cons	-0.909	0.055	-16.500	0.000
R-sq:	0.686			
Chi2	146212.570			

Paper 3

A LITTLE BIT OF KNOWLEDGE IS A DANGEROUS THING: ENTREPRENEURIAL EXPERIENCE AND NEW VENTURE DISENGAGEMENT

Authors: Rasmus Vendler Toft-Kehler, Karl Wennberg and Phillip H. Kim

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A little bit of knowledge is a dangerous thing: Entrepreneurial experience and new venture disengagement



Rasmus Vendler Toft-Kehler^{a,b,*}, Karl Wennberg^{c,d}, Phillip H. Kim^e

^a Copenhagen Business School, Kilevej 14a, 2000 Frederiksberg, Denmark

^b Accelerace, Fruebjergvej 3, 2100 Copenhagen, Denmark

^c Stockholm School of Economics, P.O. Box 6501, 113 83 Stockholm, Sweden

^d Institute of Analytical Sociology, Linköping University, Sweden

^e Babson College, Arthur M. Blank Center for Entrepreneurship, 231 Forest Street, Babson Park, MA 02457, USA

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ABSTRACT

Existing research has offered conflicting narratives of how entrepreneurial experience influences whether founders will continue working on or disengage from their ventures. We theorize and test how entrepreneurs with varying levels of experience disengage from early-stage companies. Findings reveal a U-shaped relationship, such that novices and highly experienced entrepreneurs are more likely to quit their ventures, while moderately experienced entrepreneurs are more likely to persist in their pursuits. We offer both theoretical and empirical explanations for how the propensity to disengage from new ventures evolves with entrepreneurial experience.

1. Introduction

Entrepreneurs gain many skills as they launch their ventures. Scholars and practitioners alike expect that with more entrepreneurial attempts, founders will become better at creating profitable businesses (Gompers et al., 2010; Holland and Shepherd, 2013; Lévesque et al., 2009). Yet, most ventures do not develop as anticipated and eventually, founders must determine whether to persist or disengage from their ventures. By *disengage*, we mean a decision to withdraw from full-time work on the business due to unmet expectations and pursue other career opportunities. While practitioners have urged entrepreneurs to gain awareness of when to quit (Ries, 2011), we argue that disengagement-as-a-skill has been underemphasized by academics analyzing how experience influences venture performance (Sarasvathy et al., 2013; Wiltbank et al., 2006). Research on the experience-disengagement relationship has yet to reveal consistent patterns. One reason for this may be because experience is perceived to have a linear relationship on disengagement. We develop an alternate theory that portrays experience as having a non-linear relationship on disengagement, such that novice and expert entrepreneurs will disengage at different rates than those with moderate experience. Our longitudinal analysis offers evidence for this relationship and its corresponding implications for scholars and practitioners.

2. Entrepreneurial experience and venture disengagement

Conventional thinking suggests experience's influence is linear – additional experience will more strongly influence entrepreneurial outcomes. However, research on the experience-disengagement relationship has yielded inconsistent conclusions. A comprehensive review (Please see Appendix A) led us to a total of 22 papers on this topic, the majority of which were based on

* Corresponding author at: Copenhagen Business School, 2100 Copenhagen, Denmark

E-mail addresses: rasmus@toft.us (R.V. Toft-Kehler), karl.wennberg@hhs.se (K. Wennberg), pkim1@babson.edu (P.H. Kim).

small, cross-sectional samples. Ten studies showed insignificant effects between experience and the likelihood of disengagement, seven showed a negative relationship, two had mixed findings, and three revealed a positive relationship. None of the studies presented or reported findings of curvilinear results. As such, we propose a framework that revisits the fundamental assumption about experience and its influence on entrepreneurial trajectories. We turned to research demonstrating the non-linear influence of experience. A closer examination of cognition, strategic management, and entrepreneurship studies reveals that novices, the moderately experienced, and experts all leverage their experience differently in their pursuits (Cormier and Hagman, 1987; Haleblan and Finkelstein, 1999; Toft-Kehler et al., 2014). This research reveals that “a little bit of experience can be a dangerous thing” – at low levels, actors inappropriately apply experience to seemingly similar, yet inherently different, tasks. We argue that the differential effects of experience may also produce a non-linear relationship on the decision to disengage.

3. Methods and data

To answer our research question we created a longitudinal dataset with information about founders and their ventures. We constructed our sample using two databases maintained by Statistics Sweden: RAMS (yearly data on all firms) and LISA (yearly data on all Swedish inhabitants from 1989). From RAMS we sampled three full cohorts of firms started 1994, 1995, and 1996, followed until 2002.¹ From LISA we created experience variables for all prior venturing activities from 1989 to 1993 and used National Tax Board data to gather financial information. To decrease industry heterogeneity, we limited our sample to firms in knowledge-intensive sectors based on OECD classifications (Götzfried, 2004).² As a result, our sample consists of the full population of 29,338 new knowledge-intensive ventures founded in Sweden between 1994–1996.

3.1. Dependent variable

The dependent variable, *likelihood of disengagement*, is based on a yearly indicator of whether an individual is still working full-time in their venture (1= disengaged, 0=working full-time). The founder disengages when they begin work on or at another firm. We highlight two other decisions related to this variable: We retained bankrupt firms in our sample, since this is a viable pathway for disengagement, and bankruptcy and liquidation are rare (Thorburn, 2000). However, we dropped firms that experienced a trade sale which is generally considered an exit-outcome which does not reflect disengagement due to unmet expectations (Arora and Nandkumar, 2011).³

3.2. Independent variable

Our independent variable is *entrepreneurial experience*, defined as years of full-time involvement as a founder or co-founder in a prior venture. To reduce the effect of individuals arbitrarily entering and exiting (e.g. tax speculation or engaging in “portfolio entrepreneurship” (Westhead and Wright, 1998)), we required a two-year gap between ventures in the same industry and location to be considered a separate venturing activity.

3.3. Control variables

To address alternative explanations, we included several control variables. We control for founders’ basic demographic characteristics: *gender* (1=male), *age*, and *number of children* living at home (updated annually). To account for entrepreneurs’ ability to support the firm, we included household *wealth* based on equity reported to tax authorities, which tracks wealth excess of 800,000 SEK (~100,000 USD). Firms in our data are either incorporated (limited liability) or unincorporated (partnerships and proprietorships with unlimited liability). Since financial liability may affect the likelihood of disengagement, we controlled for *legal form* (1= incorporations). To account for additional investments in underperforming firms, we included a *new investments* variable based on yearly equity injections (Wennberg et al., 2010). We controlled for *entrepreneurial earnings* as a measure of performance. We used firm-level performance variables from RAMS and individual-level data from LISA to calculate earnings based on Hamilton’s (2000) definition [revenues – expenses = money taken out + entrepreneurial earnings] and used its natural log value to correct for skewness. *Education* was measured in years. We also controlled for other types of experience: *Management experience* was based on a “personal responsibility” categorical variable in the 1990 census (0=no experience, 1=some experience, and 2=extensive experience). *Industry experience* was a count of years within the focal industry. *Venture similarity experience* was based on Finkelstein and Haleblan’s (1999) measure of comparing industry affiliations of prior ventures. Last, we controlled for industry (at the SIC-2 level) and time-varying effects (year dummies).

¹ To minimize right censoring and incorporate up to five years of data prior to the focal venture.

² In Sweden, 35% of all new firms belong to these sectors, including information technology, healthcare, medicine, telecom, finance, business services, education and research (Folta et al., 2010).

³ We deleted 1102 trade sales (representing 1.2% of disengaged founders) from the dataset. One limitation of our sample is that we are unable to directly measure the number of bankruptcies. However, according to the Swedish census data, the recent average number of annual bankruptcies is 0.19% of all privately held firms (from 2010 to 2015).

Table 1
Descriptive statistics and correlation matrix.

#	Variable	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Disengagement	0.15	0.35	0	1														
2	Sex	0.689	0.463	0	1	0.01													
3	Age	45.45	10.75	0	95	-0.11	0.02												
4	Children	0.83	1.08	0	8	0.01	-0.03	-0.31											
5	Wealth	359,663	1,908,581	0	237,000,000	0.00	-0.01	0.14	-0.04										
6	Legal form	41.10	15.54	0	99	0.19	0.08	0.01	0.02	0.04									
7	New investments this year	60,800	42,400	-9,150,000	1,340,000,000	0.02	0.00	0.00	0.00	0.00	0.02								
8	Ent. earnings (ln)	7.41	5.66	0	15,584	-0.45	-0.07	0.12	0.01	0.04	-0.38	-0.02							
9	Years of education	12.93	2.50	0	20	-0.01	0.05	-0.01	0.07	0.04	0.02	0.00	0.09						
10	Management experience	0.51	0.56	0	2	-0.02	0.14	0.23	-0.01	0.06	0.03	0.00	0.10	0.29					
11	Industry experience	1.41	1.97	0	5	-0.03	0.04	0.11	0.00	0.01	0.13	-0.04	-0.10	0.00	0.08				
12	Venture similarity	2.70	1.94	0	12.41	0.02	-0.07	-0.18	0.01	-0.01	-0.17	-0.01	0.10	0.00	-0.13	-0.41			
13	Entrepreneurial experience	0.34	0.74	0	5	-0.01	0.06	0.12	-0.02	0.01	0.04	0.01	-0.10	0.00	-0.08	0.02	-0.01		
14	Ent. experience ²	0.66	2.03	0	25	0.00	0.04	0.10	-0.01	0.01	0.01	0.00	-0.04	0.01	-0.07	0.00	0.00	0.91	

Table 2
Cox regression on new venture disengagement.

	Model 1	Model 2	Model 3
Sex	0.891*** (0.018)	0.902*** (0.019)	0.905*** (0.019)
Age	0.995*** (0.001)	0.996*** (0.001)	0.997*** (0.001)
Children	1.013 (0.008)	1.017* (0.008)	1.017* (0.008)
Wealth	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)
Legal form	1.043*** (0.002)	1.043*** (0.002)	1.043*** (0.002)
New investments this year	1.000** (0.000)	1.000** (0.000)	1.000** (0.000)
Ent. earnings (ln)	0.799*** (0.002)	0.798*** (0.002)	0.798*** (0.002)
Years of education	1.006 (0.004)	1.008+ (0.004)	1.007 (0.004)
Management experience	1.109*** (0.020)	1.096*** (0.020)	1.098*** (0.020)
industry experience	0.991 (0.006)	0.990 (0.006)	0.991 (0.006)
Venture similarity	1.071*** (0.006)	1.070*** (0.006)	1.070*** (0.006)
Entrepreneurial experience		0.885*** (0.012)	0.686*** (0.020)
Ent. experience ²			1.108*** (0.011)
Log-likelihood value:	-115,649	-115,605	-115,558
Likelihood ratio test:		87.26***	88.42***
Akaike Information Criterion (AIC)	78,264	78,261	78,246
Ventures:	29,338	29,338	29,338
Disengaged ventures:	12,719	12,719	12,719
Venture-year observations:	89,296	89,296	89,296

Note:

Coefficients in hazard rate form; standard errors clustered on the venture level in parenthesis. All models include industry dummies and time dummies.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

3.4. Empirical strategy

We used a Cox proportional hazard model to estimate the likelihood of disengagement. The Cox model does not require assumptions about the underlying shape of the hazard distribution. To address “tied events” in the data, we used the Efron procedure. All coefficients in the regressions are displayed as Hazard Ratios (HR) to ease interpretation of marginal effects. A coefficient of 0.95 can be interpreted as “a one-unit increase in covariate X *decreases* the likelihood of the outcome variable by 5%,” while 1.05 indicates that “a one-unit increase in covariate X *increases* the likelihood of the outcome variable by 5%.”

To ensure that predicted effects did not deviate abnormally from observed values and that proportional-hazard assumptions were met, we plotted Kaplan–Meier survival curves for relevant variables and compared them with predictions from the Cox models. Table 1 includes means, standard deviations, and a correlation matrix for the variables. We saw no evidence of multicollinearity (VIF < =4).

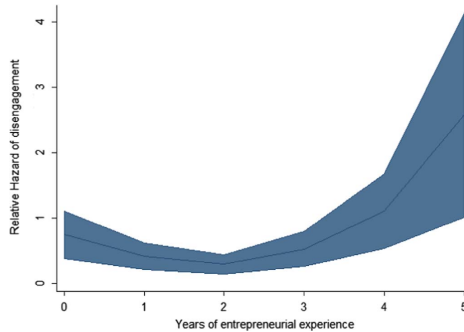


Fig. 1. : Marginal effects of entrepreneurial experience on disengagement.

4. Results

Table 2 provides the Cox model results predicting disengagement. Model 1 is the base model with control variables only. Models 2 and 3 introduce the independent variables hierarchically. The increase in fit statistics (log-likelihood and AIC values) across Models 1–3 demonstrates that the independent variables add explanatory power to the model beyond the controls.

To summarize Model 1: founders who were men, with children, greater wealth, incorporated ventures, who received additional investments and had management experience or experience with similar ventures were all more likely to disengage. Founders who were older or running more profitable ventures were less likely to disengage. In Model 2, the hazard ratio for entrepreneurial experience is less than one ($HR=0.885$; $p < 0.001$). In Model 3, the quadratic hazard ratio is positive ($HR=1.108$; $p < 0.001$), while the linear term remains negative and statistically significant. Plotted marginal effects in Fig. 1 reveal experience to have the U-shaped effect, with the likelihood of venture disengagement lowest at moderate levels of entrepreneurial experience.

Results remained consistent after mean centering our key variables and trimming outliers. We also experimented with controls for performance in prior ventures to approximate innate entrepreneurial skills, however this did not affect the overall patterns reported (results available upon request).

4.1. Robustness checks

Since the databases are left censored at 1989, it is possible that especially older entrepreneurs may have experience unaccounted for in the dataset. As this introduces potential type-2 errors (falsely rejecting our hypothesis) the left-censored experience variable induces a conservative test of our hypotheses. Results remained consistent even with three robustness tests: First, we controlled for censoring with a dummy for entrepreneurs with 5+ years of experience. This slightly decreased effects sizes, but significance levels of the experience and experience² variables were still well below 5%. Second, we estimated our model on three previous cohorts where the experience variable was censored at 3, 4, and 5 years of experience, respectively. Although effects sizes weakened, we still observed the same U-shaped effect. Third, we estimated models including only those people ‘at risk’ of running a venture before the start of the observation period, meaning they were 19 years or older in 1989. We then compare the observed distribution of entrepreneurial experience in this dataset to that of our full data to compare whether there is a potential bias in not accounting for these older entrepreneurs who could have more extensive experience than what we observe. Results were qualitatively identical. To explore the possibility of differential effects produced by other disengagement outcomes, we also ran a competing risks model (with trade sale as the alternate event). We observed similar results for our original dependent variable, but did not observe the same relationship for the trade sale outcome.

5. Discussion

This study’s main objective is to promote a new approach to understanding the entrepreneurial experience-disengagement relationship. We argue that one reason for the inconsistencies of existing research is because experience has a curvilinear relationship with venture disengagement – a pattern not identified in prior work. Like other acquired skills, knowing when to call it quits comes with experience. Our analyses reveal that novice and highly experienced entrepreneurs are more likely to disengage with their ventures than those with moderate levels of experience, albeit for different reasons. This U-shaped pattern helps clarify why the experience-disengagement relationship can go in opposite directions under some circumstances. For example, Delmar and Shane (2006) reported a negative relationship based on analyses of a shorter timeframe (30 months), while Wennberg et al. (2010)

demonstrated a positive relationship. Although these studies operationalized experience differently, our model offers a unified framework for these seemingly contradictory conclusions.

To explain these findings, we focus on each section of the U-shaped pattern, starting with the novice entrepreneurs, proceeding to moderately experienced, and concluding with experts. *Novice entrepreneurs* are at risk of high disengagement because they are most reliant on external feedback to bridge their knowledge gaps about their business ideas and early venturing efforts. These entrepreneurs will seek out and receive unfiltered suggestions and criticisms from advisors, lead users and customers, and other stakeholders. Without first-hand experience, these novices lack perspective to discern true signals from noisy feedback generated by all new ventures. Without this perspective, novices may disengage prematurely by misinterpreting slow customer traction or stagnant user adoption as leading indicators of their prospects for growth and survival. They are most vulnerable to stakeholder skepticism and succumb to doubts about whether their ventures can actually succeed. Some ventures simply require time to achieve product-market fit, but novices may not be patient enough for their efforts to mature (Kim et al., 2015). Moreover, stress and financial uncertainties associated with the entrepreneurial lifestyle may take its toll on novices, leading them to disengage rather quickly to pursue other endeavors.

While novices are prone to disengage quickly, our results show that moderately experienced entrepreneurs are more determined to persist. We speculate that their ongoing efforts are driven in part by the competence traps they face associated with their modest expertise. Having just enough experience to exhibit some confidence, these entrepreneurs are susceptible to superstitious learning – making incorrect inferences from past events – and trust their “gut feelings” without systematically gathering and analyzing relevant data from their stakeholders (Cooper et al., 1988; Levitt and March, 1988; Toft-Kehler et al., 2014). As organizational learning research has shown, making accurate inferences from past experiences is not a trivial exercise since the mapping between experiences often occurs out of context, resulting in outdated or misguided applications. This is especially important for entrepreneurship since building a new venture is a complex undertaking and differences in industry, location, and length of time can affect the accuracy of the inferences. When moderately experienced entrepreneurs rely heavily on their limited knowledge, they become vulnerable to falling into competence traps and convince themselves their ventures can succeed if they only persist longer. Thus, these entrepreneurs are least likely to disengage, even if it may be in their best interest.

For our last group – the expert entrepreneurs – we speculate that their past experiences enable them to be most discerning than their less-experienced counterparts, enabling them to disengage quickly from unpromising ventures (Raffiee and Feng, 2013; Shepherd et al., 2007). With extensive experience, expert entrepreneurs can assess venture potential more quickly. With the perspective gained from their experiences, these entrepreneurs also know how and where to obtain reliable information to validate nascent opportunities and can analyze incoming information more accurately. They are more decisive about disengaging, because they understand the opportunity costs of persisting in less-promising ventures. While expert entrepreneurs are as likely to disengage as novices, the reasons for doing so differ considerably.

In summary, we show how entrepreneurial experience provides a basis for concrete strategic actions to disengage from unpromising ventures (Delmar and Shane, 2006; Holland and Shepherd, 2013; Zahra and Wright, 2011). Our work highlights disengagement – in addition to venture creation and growth – as an important outcome of experience (Arora and Nandkumar, 2011; Dimov, 2010). Our findings suggest expert entrepreneurs are best positioned to determine when to persist or disengage from new ventures (Sarasvathy, 2008). Our work highlights how experience helps entrepreneurs discern when to stop devoting resources to unsustainable efforts (Sarasvathy and Venkataraman, 2011) and more effectively manage entrepreneurial risk (Gunther McGrath, 1999). Over the arc of a career, time and capital are also valuable resources, so knowing when to quit may also increase overall career success (Burton et al., 2016; Dimov, 2010).

We offer several opportunities for future research to further refine our study. One popular technique amongst practitioners is to “pivot” quickly when the business model is not working. Our study design cannot capture these fine-grained but substantive changes, but this limitation opens up opportunities for future studies on disengagement *within* firms (e.g., Bakker and Shepherd, 2015). For example, highly experienced entrepreneurs may pivot more quickly based on their unwillingness to bear the opportunity costs of underperformance (Blank, 2013; Ries, 2011). Future research may also seek to pinpoint the mechanisms jointly contributing to disengagement and the likelihood of re-entry as a way to further probe these practitioner recommendations (Parker, 2013; Rocha et al., 2015). While our study provides one empirical analysis of a non-linear, U-shaped relationship between experience and disengagement, future work in other contexts and with longer observation windows can help further generalize these insights and determine more precisely the inflection point on the experience curve to differentiate novice, moderately experienced, and expert entrepreneurs.

6. Conclusion

Findings of a U-shaped relationship between entrepreneurial experience and the likelihood of disengagement showed that novices and highly experienced entrepreneurs are more likely to disengage from new ventures as compared to moderately experienced entrepreneurs. Our study offers clarity into the conflicting outcomes of prior research, emphasizes disengagement as an acquired skill, and offers empirical support to behaviors advocated by entrepreneurial practitioners.

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Appendix A: Review of empirical literature on entrepreneurial experience and disengagement

In our review of papers associating entrepreneurial experience and disengagement we searched the Journal of Business Venturing Insights, Journal of Business Venturing, Entrepreneurship Theory and Practice, and Strategic Entrepreneurship Journal, Academy of Management Journal, Administrative Science Quarterly, Journal of Management Studies, Organization Science, Strategic Management Journal, and Small Business Economics for papers with the key words "entrepreneurial experience", "start-up experience", "business ownership experience", "serial entrepreneur", "habitual entrepreneur", "expert entrepreneur", "repeat entrepreneur", "repeat business owner" and "experienced entrepreneur". We added all papers identified through Web of Science and Google Scholar, as well as papers cited in prior literature reviews (e.g. [Delmar and Shane, 2006](#); [Ucbasaran et al., 2008](#)).

We selected only empirical papers correlating entrepreneurial experience with an outcome denoted as "exit", "survival", "duration", or "disengagement", noting sample, operationalization of experience, outcome variable(s) and key findings. We excluded qualitative papers and papers with a strict focus on firm failure (e.g. financial distress/bankruptcy) since a singular view on failure may reflect a forced exit from a given venture and not a volitional decision of the entrepreneur to disengage. One paper by [DeTienne, McKelvie and Chandler \(2014\)](#) that used age as a proxy for experience was excluded.

In summary, 22 studies were found to empirically test the effect of entrepreneurial experience on disengagement. Of these, 10 studies show insignificant effect of entrepreneurial experience on disengagement. 3 studies show lower likelihood of disengagement. 2 find mixed results and 7 studies find that prior entrepreneurial experience decreases likelihood of disengagement (many of which are cross sectional and small sample studies). Only one of the 22 studies ([Shane and Delmar, 2006](#)) mentioned to have investigated the potential of curvilinear effect of entrepreneurial experience on disengagement in unreported models, but found no apparent curvilinear effects of entrepreneurial experience on founders' venture disengagement during the first 30 months of venturing efforts.

See [Table A1](#).

Table A1
Empirical papers on entrepreneurial experience and survival.

Author and year	Sample	Measure of entrepreneurial experience	Entrepreneurial experience impact on survival	Lower likelihood	Higher likelihood	Mixed findings	Not significant	Curvilinear effect
Adams, Fontana and Malerba (2016)	936 start-ups in the US semiconductor industry between 1997 and 2007	Entrepreneurial experience measured as a binary variable equal to one if the founder, or a member of the founding team, had previously founded another firm	Impact of prior entrepreneurial experience was insignificant. In terms of performance, firms founded by serial entrepreneurs have a lower hazard of exit by acquisition.	1				
Baptista, Karatz, and Mendonça (2014)	A longitudinal matched employer-employee dataset built from information submitted annually by all firms with at least one wage earner to the Portuguese Ministry of Employment and Social Security covering the period from 1986 to 2005.	Entrepreneurial experience was measured as a binary variable	Prior entrepreneurial experience increases likelihood of survival	1				
Bosma et al. (2004)	896 new businesses started in the Netherlands in 1994 and registered in database of Dutch chamber of commerce. Surveyed annually until 1997.	Previous business ownership experience measured as a binary variable.	Start-up experience not significantly related to new venture survival	1				
Bridger, Preisdorfer and Ziegler (1992)	Retrospective survey data from 1849 business founders in Germany.	Self-employment experience measured as a binary variable.	Self-employment experience is associated with extended new firm survival.	1				
Ciavarella, Ruchholzb, Rotwand, Gatewood and Stokes (2004)	Survey data of 111 US entrepreneurs based on their experiences from 1972 to 1995.	Binary measure of prior start-up experience	Start-up experience not significantly related to new venture survival	1				
Coad, Frankish, Roberts and Storey (2013)	Longitudinal study of 6247 UK start-ups which began trading in the same quarter of 2004 and were customers of Barclays Bank.	Dummy variable equal to 0 if the owner-manager(s) has previous experience from managing a business.	Prior business experience not significantly related to likelihood of exit	1				
Delmar and Shane (2003)	Longitudinal survey of 223 entrepreneurs in the Swedish PSED 1998–2000.	Founding team joint entrepreneurial experience	Team entrepreneurial experience lower likelihood of exit	1				
Delmar and Shane (2006)	223 new Swedish ventures followed over a 30-month period	Previous start-up experience measured at the founder team level as the log of the total number of firms previously founded by the members of the founding team. On average, the founding teams had started three previous firms, but 52 percent of the teams had no previous start-up experience.	Founding teams with prior start-up experience more likely to survive. The marginal effect of prior founding experience is decreasing and is almost exclusively denoted by the difference between any and no prior start-up experience	1				
Dencker, Gruber and Shah (2009)	436 individuals in the Munich region who founded their own firms as an alternative to continued unemployment.	Prior founding experience measured as a binary variable (included as a control variable).	Prior founding experience does not have any significant effect survival	1				

(continued on next page)

Table A1 (continued)

Author and year	Sample	Measure of entrepreneurial experience	Entrepreneurial experience impact on survival	Lower likelihood	Higher likelihood	Mixed findings	Not significant	Curvilinear effect
Gimeno, Folta, Cooper and Woo (1997)	1547 entrepreneurs of new businesses in the US founded in 1983–1985. Yearly data collections from 1985 to 1987.	Entrepreneurial experience measured as a binary variable.	Entrepreneurial experience not significantly related to exit.				1	
Head (2003)	U.S. Census Bureau's Business Information Tracking Series (BITS) used to track status of new employers during the early 1990s. U.S. Census Bureau's Characteristics of Business Owners (CHO) used to analyze status of closed businesses.	Entrepreneurial experience measured as a binary variable	Prior entrepreneurial experience increases likelihood of survival	1				
Kalleberg and Leicht (1991)	411 companies in the computer sales and software, food and drink, and health industries in South Central India from 1985–1987	Longitudinal studies of organization's mortality used to measure entrepreneurial experience.	Prior entrepreneurial experience increase likelihood of exit for male entrepreneurs, but not for women		1			
Lafontaine and Shaw (NBER Working Paper 2014)	All new business establishments started any time between 1990 and 2011 to sell taxable goods and services in the state of Texas. In total 2.3 million retail businesses. 25 percent were started by owners who had started at least one business before.	Owner's prior experience at starting a business measured as a binary variable.	Prior experience increases the survival although not in the restaurant sector				1	
Oberschachtsiek (2012)	645 self-employment observations (1998: n = 184; 1999: n = 292; 2000: n = 169) with a maximum observation period of 55 months.	Self employment was defined as the difference between the start-up date and the point in time at which the self-employment ended.	The results show that previous self-employment experience is associated with early exits.		1			
Paik (2014)	Panel data from 172 U.S. VC-financed semiconductor firms that entered the market during 1995–1999 – including firms founded by teams.	Previous business ownership experience in the founding team (at least one team member's experience) measured as a binary variable.	Prior entrepreneurial experience extends survival	1				
Rafiee and Feng (2014)	Longitudinal data on 1,093 entrepreneurs followed from 1994 to 2008	Entrepreneurial experience measured the cumulative number of businesses started	The main effect of entrepreneurial experience associated with an increased likelihood of exit		1			
Reuber and Fischer (1994)	43 Canadian biotechnology and telecom firms with mean annual revenues of 23.2m USD and 68 employees in 1992.	Previous start-up experience measured as number of start-ups.	Previous start-up experience has insignificant effect on survival				1	
Schollhammer (1991)	Cross-sectional survey data of 138 start-ups	Successful and unsuccessful prior entrepreneurial experience	Successful prior experience led to prolonged survival. Failed prior experience led to reduced survival.			1		
Shane and Stuart (2002)	134 firms founded to exploit MIT-assigned inventions during	Binary variable coded 1 if at least one member of the founding team	Start-up experience not significantly related to new venture survival				1	

(continued on next page)

Table A1 (continued)

Author and year	Sample	Measure of entrepreneurial experience	Entrepreneurial experience impact on survival	Lower likelihood	Higher likelihood	Mixed findings	Not significant	Curvilinear effect
Taylor (1999)	the 1980–1996 period A nationally representative random sample of some 5,500 households and 10,000 individuals.	had previously launched a new company. Lifetime job history data and labors market activity.	Prior entrepreneurial experience lower likelihood of exit	1				
Van Praag (2003)	Longitudinal survey of 12,000 respondents between 14 and 22 years from 1979–1989	Self-employment experience measured as a binary variable.	Prior entrepreneurial experience not significantly related to likelihood of exit				1	
Wennberg, Wiklund, DeTienne & Cardon (2010)	1735 new Swedish ventures and their founders followed over eight years	Number of years of experience between 1989–1995	Experienced entrepreneurs more likely to exit via harvest sale over continuation, liquidation, distress liquidation, and distress sale. In unreported models, entrepreneurial experience found to increase likelihood of exit.		1			
TOTAL	22 papers			7	3	2	10	0

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Concluding Remarks

New ventures play an increasingly important role in the modern economy and in finding solutions to some of the world's greatest challenges. Therefore, this PhD was initiated with a goal to obtain a better understanding of the complex interplay between entrepreneurial experience, entrepreneurial talent, and entrepreneurial performance in search for clues to inform thinking on how to advance our expertise to build better performing ventures.

The three constitutive papers of the dissertation contribute with complementary perspectives on the relationships with a dominant focus on experience-performance mechanisms (Paper 1), experience-talent mechanisms and their association with entrepreneurial performance (Paper 2) and experience-behavior relationships (Paper 3). Each paper utilizes multi-level longitudinal data as the basis for quantitative regression analyses.

The dissertation concludes that entrepreneurial experience and entrepreneurial talent play significant roles in entrepreneurial performance and further that entrepreneurial experience moderates entrepreneurial behavior. The introduction of the dissertation and the constituent papers discuss implications for entrepreneurs, investors, educators, policymakers and researchers.

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