POURYA DARNIHAMEDANI

Individual Characteristics, Contextual Factors and Entrepreneurial Behavior

Individual Characteristics, Contextual Factors and Entrepreneurial Behavior

Individual Characteristics, Contextual Factors and Entrepreneurial Behavior

Individuele Kenmerken, Contextuele Factoren en Ondernemend Gedrag

THESIS

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the
rector magnificus

Prof.dr. H.A.P. Pols

and in accordance with the decision of the Doctorate Board.

The public defense shall be held on
Friday, 9 September 2016, at 9:30 hours

by

Pourya Darnihamedani
born in Teheran, Iran.

Erasmus University Rotterdam

Doctoral Committee

Supervisor:	Prof.dr. A.R. Thurik
Other members:	Prof.dr. J.H. Block
	Prof.dr. H.P.G. Pennings
	Prof.dr. W. Naude
Co-supervisor:	Dr. S.J.A. Hessels

Erasmus Research Institute of Management – ERIM
The joint research institute of the Rotterdam School of Management (RSM)
and the Erasmus School of Economics (ESE) at the Erasmus University Rotterdam
Internet: http://www.erim.eur.nl

ERIM Electronic Series Portal: http://hdl.handle.net/1765/1

ERIM PhD Series in Research in Management, 360
ERIM reference number: EPS-2016-360-S&E
ISBN 978-90-5892-440-7

Design: PanArt, www.panart.nl

This publication (cover and interior) is printed by Tuijtel on recycled paper, BalanceSilk®
The ink used is produced from renewable resources and alcohol free fountain solution.
Certifications for the paper and the printing production process: Recycle, EU Ecolabel, FSC®, ISO14001.
More info: www.tuijtel.com

Contents

Preface (Voorwoord)

On 25 April, 2012, I met Doctor Jolanda Hessels and Professor Roy Thurik, my Ph.D. supervisors, for the first time. I did not know H building very well, so I had to follow signs in order to find their offices! Unlike most Ph.D. candidates who work with their potential supervisors long before starting a Ph.D., I did not know my supervisors before. Additionally, I needed to familiarize myself more with recent research questions in the field of entrepreneurship and with the tradition of doing research in the school of economics. These are mainly because I did my research master in the strategic management field at Rotterdam School of Management (RSM). Well, the first things I noticed about Roy and Jolanda were their humbleness, honesty and friendliness. After having a tough life for more than a year working as a business consultant, these were exactly the things that I appreciated and would have liked to see in my colleagues.

In retrospect, I can say that my Ph.D. journey had its several ups and downs, as it is the case for the majority of other Ph.D. journeys. Nevertheless, and overall, it was joyful and I am very glad it has successfully come to an end after four years of hard work. I have learned many important life lessons, next to doing research and writing papers, of course. I have learned that although talent is an important factor, hard-work and consistency play a much more important role in success, particularly in the long-run. This pleasant and fruitful expedition would not have been conceivable without the support of many people to whom I wish to express my deep gratitude.

First and foremost, I am extremely grateful to my supervisor and co-supervisor, Professor Roy Thurik and Doctor Jolanda Hessels who helped me to go through my Ph.D. journey. Roy provided the right people next to me to collaborate with and learn from as he guided me from a distance. I enjoyed (and value) my conversations with him about a number of subjects that, though were not seemingly related to my Ph.D. but, will stay with me throughout my life. Jolanda, on the other hand, was very engaged with my day-to-day progress and cared a lot about delivering high-quality work.

In addition, I would like to express my thanks to my co-authors and colleagues. First, I would like to thank Andre van Stel whom I wrote with two out of the four papers in this dissertation. Andre is not only a great and hard-working co-author but also a very nice human being. I also would like to thank Professor Joern Block and his Ph.D. candidates whom I visited in Germany for three months when we wrote a paper together. I believe those three months were a turning point in my Ph.D. and made me better able to focus on my work. I would like to express my thanks to Professor Justin Jansen from the Rotterdam School of Management who was my master thesis supervisor and inspired me to do a Ph.D. with his positive attitude and high-spirit. Let me extend my gratitude to other es-

teemed committee members who helped me to improve my dissertation with their careful comments: Professor Enrico Pennings, Professor Wim Naude, Professor Erik Stam and Professor Marcus Dejardin.

Moreover, I would like to thank my family members (in Farsi):

پدر ، مادر ، خواهر ، خاله میترا ، آقا سهراب و همه عزیزانم بدون حمایت و زحمات بی شائبه شما پیمودن مسیر دکتری ناممکن بود. شما لحظه لحظه این مسیر را با من بودید و همواره امیدواری خود را نشان دادید. صمیمانه از وجود پر خیر و برکتتان متشکرم و خدا را شکر میکنم. همسر عزیزم ، آتنا ، ازت متشکرم چرا که همیشه قدم های آخر دشوارترین هستند. حضور ، مشورت و دلگرمی های تو کمک بزرگی در برداشتن این قدم ها بودند.

Furthermore, I was grateful to be among a small but welcoming entrepreneurship group in the School of Economics. Peter, Brigitte, Niels and Ronald, it was very nice to work with you and I am certainly going to miss the pleasant atmosphere that I experienced in the group. We will certainly keep in touch and I plan to keep visiting you in Rotterdam in the future (as I have done this year). Hopefully, we can work on a project in the future together.

Last, but not least, I would like to thank my great friends particularly my “para-nymphen”, Iman and Hossein, who have always been there when I needed it most. I feel very fortunate to be among such a nice circle of friends, who are an asset particularly if you live abroad.

Pourya Darnihamedani
Rotterdam, July 2016

Chapter 1

Introduction and Conclusion

Abstract

This thesis is concerned with entrepreneurship in general, and innovative entrepreneurship in particular. It contributes to three main developments in the field of entrepreneurship: sub-groups of entrepreneurs, the role of start-up motivations and the role of contextual factors in shaping entrepreneurial behavior. This thesis is concerned with the entrepreneurial entry of individuals with different labor market statuses (Chapter 2) and the conditions that determine whether someone is involved in one type of entrepreneurial activity instead of another (i.e., innovation versus imitation) (Chapters 3, 4 and 5). Overall, this thesis contributes to a better understanding of determinants of entrepreneurial entry and innovative entrepreneurship at various levels of analysis.

1.1 Motivation

The entrepreneurship field has received considerable scholarly attention in recent decades. One often-mentioned reason for this is that societies around the world witnessed several structural changes in the 1970s and 1980s, such as economic downturns, oil crises, technical progress and extensive political changes in favor of market-oriented ideologies (Wennekers and Thurik, 1999; Cornelius et al., 2006). These changes generated a substantial amount of uncertainty and disequilibrium in business activities that motivated academics to pay attention to innovation and entrepreneurship. Entrepreneurship is a young research field and has grown considerably over a short period of time. Despite significant progress in this field, scholars have disputed and disagreed over the definition of entrepreneurship (Shane, 2012; Landstrom et al., 2012).

Scholars have provided several alternative conceptualizations of the term 'entrepreneurship' that are often abstract in nature e.g., the identification, evaluation and exploitation of opportunities (Hebert and Link, 1989; Landstrom et al., 2012; Shane, 2012). In the past decade, considerable scholarly attention has been devoted to the field of entrepreneurship as the study of firm formation (Klyver et al., 2008; Reynolds, 2009) in both empirical (Reynolds et al., 2005) and conceptual studies (Gartner, 1988; Aldrich and Martinez, 2010). By providing a pragmatic approach to and a dynamic perspective on entrepreneurship (i.e., studying what entrepreneurs do rather than who they are), such a conceptualization has proven advantageous to studying entrepreneurship (Gartner, 1988; Sarasvathy and Venkataraman, 2011). Following this tradition (i.e., considering entrepreneurship as the study of firm formation) entrepreneurship is usually broadly defined encompassing the activities of all market participants, from retail shops to high-tech ventures. Using such a broad definition of entrepreneurship, given that entrepreneurship is a heterogeneous phenomenon (Reynolds and Curtin, 2007; Parker, 2009), has led to mixed findings about, for example, the characteristics of entrepreneurs, and the drivers of their behavior and decisions (Sarasvathy, 2004; Parker, 2009). Five recent developments in the field of entrepreneurship contribute to generating more consistent findings in this field.

First, studying sub-groups of entrepreneurs (e.g., export-oriented, solo self-employed) has broadened understanding of the determinants, characteristics and post-entry performance of entrepreneurs compared with the approach of classifying individuals broadly into entrepreneurs and non-entrepreneurs (Sarasvathy, 2004). Additionally, further cognitive development of the entrepreneurship field in recent years has revealed that not all entrepreneurs contribute to economic progress in equal measure (Baumol, 2010; Stam and Van Stel, 2011; Acs et al., 2008; Wong et al., 2005). A small group of high-potential and innovative entrepreneurs seems to be responsible for the majority of entrepreneurs' contributions to economic growth (Schumpeter, 1934; Wong et al., 2005), suggesting that for both entrepreneurship scholars and policy-makers, it would be interesting to study the sub-

group of high-potential innovative entrepreneurs. Surprisingly, there have been very few studies, primarily at the individual level, that have investigated the determinants of innovative entrepreneurship (Koellinger, 2008; Baumol, 2010).

Second, studies that have adopted the theory of occupational choice view entrepreneurship as a labor market state that individuals can embrace or not (Parker, 2009; Grilo and Thurik, 2008). More recent studies, which have considered entrepreneurship to be a more "dynamic" phenomenon, have argued that starting a business is a process that includes several stages such as intention for entrepreneurship, nascent entrepreneurship and early-stage entrepreneurship (Van der Zwan et al., 2010). The Global Entrepreneurship Monitor (GEM) project is inspired by this process-based view of entrepreneurship.[1] (Potential) entrepreneurs go through several stages of setting up a business (also called "the entrepreneurial ladder"). Each stage has its own determinants (and conditions) that could differ from those of other levels. For example, the determinants of aspiring to become an entrepreneur could differ from those of taking the first actual steps toward becoming an entrepreneur (i.e., nascent entrepreneurship). Hence, investigating entrepreneurship as a process composed of various stages has proved fruitful for better understanding entrepreneurial behavior and decisions.

Third, conditions in which individuals start a business have long-lasting effects on the decisions taken by entrepreneurs and the performance of the venture (Shane et al., 2003; Baum and Locke, 2004; Block et al., 2015). Conditions such as start-up motivations, which expedite start-up decisions, can for example, indicate the extent to which the entrepreneur is well prepared and committed to the business idea (Baptista et al., 2014). Some previous studies have referred to necessity-based motivation, i.e., starting a business as a last resort, versus opportunity-based motivation, i.e., starting a business to exploit an opportunity (Reynolds et al., 2005; Acs et al., 2008). While studying necessity-based versus opportunity-based motivations has provided some interesting insights regarding the differences between these entrepreneurs and the performance of their ventures (Block and Wagner, 2010; Baptista et al., 2014), it deserves further scholarly attention to investigate the intra-group differences since the group of necessity-based entrepreneurs, for example, is composed of heterogeneuous individuals with different backgrounds (Block and Wagner, 2010).

The fourth development in the field of entrepreneurship that has improved understanding of the characteristics and performance of entrepreneurs delves into the relationship between entrepreneurship and human biology. One strand of this research examines the genetic predispositions to entrepreneurial behavior by studying twins (e.g., Johnson, 2009) and candidate genes and genome-wide association (GWAS) molecular genetics studies (Van der Loos et al., 2010). Another strand applies a biological perspective to the entrepre-

[1] Website: www.gemconsortium.org

neurship literature, and, for example, examines the role of hormones for individual entrepreneurial behavior. One finding of such studies is that high levels of testosterone are associated with the decision to become an entrepreneur as testosterone affects status-seeking and risk-taking behavior of individuals (White et al., 2006). The third strand, which is to some extent newer than the other two, relates neuroscience to entrepreneurship. Neuroscience can help to understand how different aspects of entrepreneurial decision making (e.g. rational versus gut-feeling) are associated with the wiring, structure and functioning of the brain (Nicolaou and Shane, 2013). Neuroscentific studies, for example, investigate how entrepreneurs think and identify opportunities by studying neural mechanisms behing their decisions (Mitchell and Randolph-Seng, 2014).

Fifth, there have been calls recently in the entrepreneurship literature to investigate the role of contextual factors for entrepreneurial decisions and behavior (Autio et al., 2013; Hoskisson et al., 2011). Entrepreneurship is affected by a range of forces at different levels and environmental forces can influence the level and the type of entrepreneurial entry by increasing (or decreasing) the relative rewards of (one type of) entrepreneurial activity. The way in which such outside forces may influence entrepreneurs may differ from those influencing large, established firms due to fundamental differences between small and young versus large and established firms. Small and young firms are, for example, more flexible, have high growth possibilities, spend less on R&D activities and have access to fewer resources compared to large, established companies (Schumpeter, 1942; Acs and Audretsch, 1987; Parker, 2009). Thus, competition intensity, for example, could push entrepreneurs to focus on innovation, while, unlike large companies, economies of scale and cost leadership is not a viable strategy for them (Porter, 1980). Hence, the question of how environmental factors (e.g., competition, taxation) can influence entrepreneurial behavior and decisions is non-trivial. However, it has remained to a large extent unclear whether and through what mechanisms these forces may influence decisions in small, young firms (Levie and Autio, 2011).

The aim of this dissertation is to contribute to the first (i.e., sub-groups of entrepreneurs), third (i.e., the role of start-up conditions) and fifth (i.e., the role of contextual factors) streams of research. Specifically, it is investigated how factors at various levels of analysis (i.e. at the individual, industry and country-level) may influence the involvement of individuals in entrepreneurship and particularly their engagement in innovation. Thus, this dissertation contributes to our understanding on determinants of entrepreneurship, in general, and innovative entrepreneurship, in particular.

From a policy perspective, it is beneficial to understand the determinants of (innovative) entrepreneurship in a country. This is primarily because, in line with the suggestion of Baumol (1990) and North (1990), governments can set the “rules of the game” (e.g., through competition and intellectual property policies) and influence the relative rewards

of (one type of) entrepreneurial activity (over another). For instance, policy-makers could think of (not) providing direct (e.g., start-up subsidies) and indirect (e.g., lower tax rates for entrepreneurs) incentives for start-ups if they better understood which types of individuals opt for entrepreneurship and which types of entrepreneurs tend to engage in innovation. As Naudé (2010) explains, an important gap in the entrepreneurship literature is that the "black box" of institutional explanations of entrepreneurship has yet to be unpacked, despite the entrepreneurship literature's recognition of the importance of institutions.

In addition to policy-makers and scholars, private and institutional investors can make use of this dissertation's findings. By understanding the determinants of sub-groups of entrepreneurs (e.g., innovative, opportunity-based) at the individual and market levels, investors can obtain better insight into the future performance of entrepreneurs. Such information can be beneficial for investors because they determine their investment in a new venture based on its potential and possible future performance.

The following section explains in greater detail, how this dissertation aims to contribute to the above-mentioned developments in the field of entrepreneurship.

1.2 Contribution

This dissertation complements existing knowledge on entrepreneurship in several respects. As explained above, it contributes to three main developments in the field of entrepreneurship: sub-groups of entrepreneurs, the role of start-up motivations and the role of contextual factors in entrepreneurship. This dissertation makes three main contributions that correspond to each of the three above-mentioned developments. The first is to study innovative versus imitative entrepreneurship, as an important classification contributing to the first development (i.e., sub-groups of entrepreneurs). The second contribution is to explore the extent to which individual level characteristics such as human capital investment may influence entrepreneurial entry and entrepreneurs' propensity to innovate through start-up motivations (the third development). The third contribution of this dissertation is to investigate the role of contextual factors for entrepreneurial decisions corresponding to the fifth development. Each contribution is further explained below.

1.2.1 A comprehensive view on innovative entrepreneurship

It is important to study the quality of entrepreneurs as new players entering the market. Innovative entrepreneurs are of particular importance because they offer new high quality products to the market and contribute to the welfare of a country by providing society with a broader range of products (Schumpeter, 1934; Acs and Audretsch, 1987). Innovative entrepreneurs challenge larger and more established firms in the product market and may contribute to re-shape/transform industries in a process of creative destruction (Schumpeter, 1934; Klepper, 1996; Shane and Venkataraman, 2000). Furthermore, innovative entre-

preneurs have a higher propensity to create jobs and to export their products, compared to imitative entrepreneurs (Wong et al., 2005; Hessels and Van Stel, 2011), because they offer a product that is superior, at least in some respects, compared to existing products in the market. This can disproportionally increase the entrepreneur's chances to grow their business - by hiring new resources and buying new equipment - and export their products overseas (Henrekson and Sanandaji, 2011).

So far, determinants of innovative entrepreneurship in a country are poorly understood. Entrepreneurship studies have mostly studied determinants of (nascent) entrepreneurship (e.g., Blanchflower and Oswald, 1998; Davidsson and Honig, 2003) or factors that influence the performance of entrepreneurs e.g. in terms of their survival and profitability (Bosma et al., 2004; Berglann et al., 2011). Although antecedents of innovation at the industry and firm level have been studied extensively (Pavitt, 1998; Dosi, 1988; Acs and Audretsch, 1987), there has been little focus on small young firms' propensity to innovate. Yet, very few studies, mostly at the individual level, have investigated determinants of innovative entrepreneurship (Koellinger, 2008; Baumol, 2010). Small young firms have their own unique characteristics and conditions (e.g., flexibility, informality, limited access to capital) and they are not smaller versions of large firms (Acs and Audretsch, 1987; Storey, 1994; Audretsch and Thurik, 2001). Hence, it is not so clear, particularly at the environmental level, what factors can stimulate entrepreneurs' decisions to engage in a new innovative venture.

This dissertation tries to provide a comprehensive perspective on what factors may influence entrepreneurs' engagement in innovative activities. Defining innovation as introducing a new product or service to the market, we provide individual-, market-, and country-level evidence of determinants of innovative entrepreneurship. Our inquiry would suggest that, at the individual level, entrepreneurs' level of human capital and their perception of competition can greatly influence their propensity to innovate. At the market-level, we find that market structure, particularly competition intensity, can affect the entry of innovative entrepreneurs into the product market. At the country-level, our results would suggest that costs imposed by regulations, especially start-up costs and taxes, matter for the likelihood of innovative entrepreneurship, possibly due to affecting the relative rewards of innovation. In sum, our findings suggest that entrepreneurs' characteristics, as well as their context, can influence their decisions (or their ability) to introduce a new product or service to the market.

1.2.2 Extending the role of individual characteristics

Entrepreneurship studies have found mixed results regarding the role of a number of important individual characteristics, such as formal education and risk taking propensity, for entrepreneurial decisions of individuals (Parker, 2009). One reason for such results may be

excluding start-up conditions and their possible influence on entrepreneurial entry. Individuals engage in entrepreneurial activities with different motivations. Some start their businesses as their last resort while others discover and exploit entrepreneurial opportunities. The reasons on which individuals base their decisions to start up a business are of great importance to understand the type and post-entry performance of a new venture (Shane et al., 2003). This dissertation contributes to understanding the role of individual characteristics for entrepreneurial entry and entrepreneurs' propensity to innovate through employing start-up motivations. This dissertation makes use of two main perspectives on entrepreneurial motivations to better understand how a number of important characteristics may influence entrepreneurial behavior of individuals.

The first perspective is concerned with expected utility from forming a new venture. Entrepreneurial profit, at least since Schumpeter (1934), has been discussed to be an important driver of starting a new venture. Shane (2000) argues that when a discovered opportunity has high expected returns, the entrepreneur is more likely to make every effort to exploit it. Yet, most studies on entrepreneurship motivations have paid attention to factors such as need for achievement, locus of control and independence (McClelland, 1961; Parker, 2009; Shane et al., 2003; Aldridge, 1997). This dissertation explores several important individual characteristics (i.e., human capital investments) that may influence the level of expected returns of a new venture. Our findings support the argument that human capital investments such as in formal education can greatly influence entrepreneurial entry possibly by affecting the expected returns on the new venture.

The second perspective is based on opportunity-based versus necessity-based start-up motivations. The first group corresponds to the view that entrepreneurs create their venture based on identifying and exploiting an opportunity (Kirzner, 1973; Shane and Venkataraman, 2000), whereas the second group of entrepreneurs are those who have been pushed by unpleasant conditions to start their own business (e.g. by a lack of alternative career options) (Block and Wagner, 2010; Reynolds et al., 2005). Recent studies suggest that necessity-based entrepreneurs differ from opportunity-based entrepreneurs in their characteristics and post-entry performance (McMullen et al., 2008; Acs, 2006). Although the distinction between necessity and opportunity entrepreneurs has helped to better understand some differences between entrepreneurs, one often mentioned critique is that the opportunity-necessity distinction is too crude and does not do justice to the diversity in underlying motivations of both group members (Williams and Williams, 2011; Block and Wagner, 2007). Besides inter-group differences between necessity-based and opportunity-based entrepreneurs, there may be intra-group dissimilarities that may also play a role for the performance of entrepreneurs. Here the dissertation aims to shed some light on how individual characteristics of necessity-based entrepreneurs may influence their propensity to innovate considering that they are pushed into entrepreneurship.

In sum, this dissertation, by investigating start-up motivations, attempts to provide a better understanding of the decision of individuals to become an entrepreneur and of the decision of entrepreneurs to innovate.

1.2.3 Incorporating contextual factors into entrepreneurial decisions

The majority of entrepreneurship studies have either focused on individual-level or country-level determinants of (innovative) entrepreneurship (e.g., Hessels et al., 2008; Koellinger, 2008). As Acs et al. (2014) assert, individuals may or may not behave entrepreneurially, but it is much less obvious what the notion of an "entrepreneurial country" means. On the one hand, entrepreneurship studies have indicated that the context in which individuals operate influences their entrepreneurial decisions (Levie and Autio, 2011). Hence, the context in which individuals are embedded can provide the "rules of the game" by influencing the relative rewards for specific types of entrepreneurial activity (Baumol, 1990; 2010). On the other hand, entrepreneurship studies that have examined the role of environmental factors and used the rate of entrepreneurship, for example in a country or a region, (e.g., Van Stel et al., 2005), have overlooked the critical point that entrepreneurship is an individual-level endeavor (Stephan and Uhlaner, 2010).

A number of studies have used measures of individuals' perceptions of the environment (e.g., Tang, 2006) to understand the role of context in entrepreneurial behavior. While these studies are informative for understanding how the perception of a contextual variable can influence entrepreneurs, they ignore the fact that many environmental factors (e.g., tax rates, product market competition) are collective- or market-level constructs (Henrekson and Sanandaji, 2011), as well as the fact that entrepreneurs' perceptions might not enitrely reflect the reality due to, for example, entrepreneurs' biases and over-confidence (Moore et al., 2007; Parker, 2009). Hence, it is important to objectively investigate the role of the above mentioned collective- or market-level constructs for entrepreneurial decisions in addition to studying entrepreneurs' perceptions and understanding of such constructs.

While cross-country entrepreneurship data (e.g., Global Entrepreneurship Monitor, Flash Eurobarometer surveys) have primarily been collected in the past decade, only recently have adequate data analysis methods become available that provide the opportunity to combine variables from various levels of analysis (e.g., multi-level regression methods). Hence, in the past, it was quite difficult, if not impossible, to empirically test the influence of environmental variables on individual-level entrepreneurial decisions (Autio et al., 2013). In fact, the link between country-level or industry-level variables and individual-level entrepreneurial behavior has rarely been studied in the entrepreneurship literature (Baumol, 2010; Hoskisson et al., 2011; Autio et al., 2013). This dissertation goes a step further to understand the role of the environment in the individual-level decisions of entrepreneurs. Unlike many other studies, this dissertation admits that countries "are not king

size individuals" and that "eco-logic differs from individual psycho-logic" (Hofstede, 2001, p. 17). This dissertation develops arguments to understand how contextual factors can influence individuals' decisions and calculations to start a business, e.g., by influencing the expected returns on a new venture. Combining variables from the individual, market and country levels helps us to account for potential cross-level influences among the variables and provide a more integrated perspective on the determinants of (innovative) entrepreneurship. This dissertation therefore offers further evidence that entrepreneurship is influenced by a range of factors at different levels, which is in line with the arguments of Levie and Autio (2011) and Hoskisson et al. (2011).

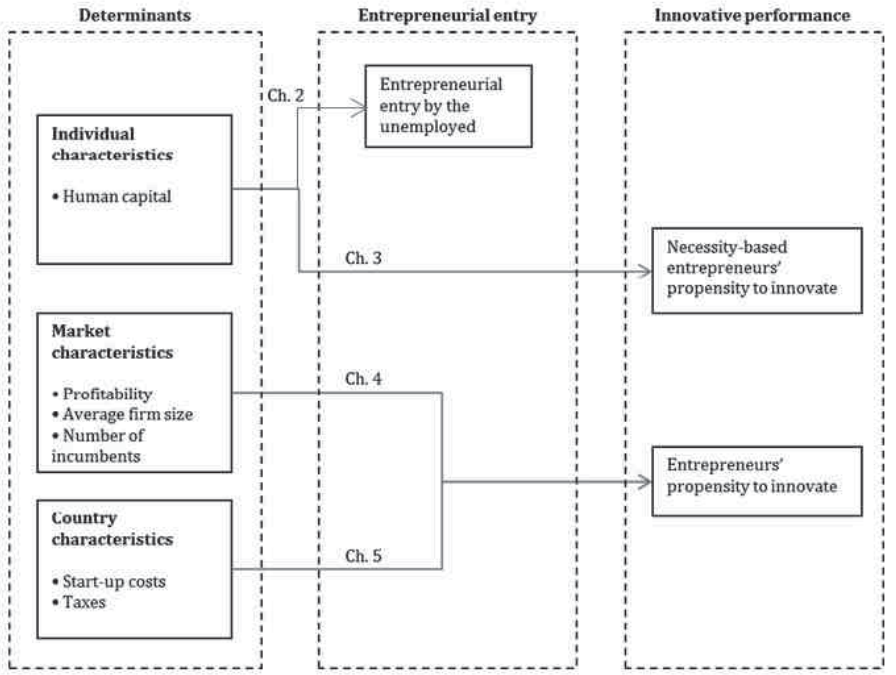
1.3 Overview of chapters

This section presents an overview of all chapters and how the chapters are connected. Figure 1-1 provides a schematic view of the structure of this dissertation. The chapters of this dissertation will be divided into two main parts. The first part addresses the relationship of individual characteristics with entrepreneurship and the second part the relationship of contextual characteristics with entrepreneurship.

1.3.1 Part I: Individual characteristics and entrepreneurial activity (Chapters 2 and 3)

The first part of the dissertation focuses on the relationship between individual characteristics and entrepreneurial activity. Specifically, the first two chapters investigate whether and to what extent individual-level factors (i.e., various human capital investments) relate to entrepreneurial entry and strategic decisions (e.g., to develop a new product) of early-stage entrepreneurs, defined as entrepreneurs who have started their own business in the last 42 months. In dividing individuals into sub-groups based on their recent employment status (Chapter 2) and based on their start-up motivations (Chapter 3), it is investigated how such characteristics are related to entry decisions, as well as the post-entry propensity to innovate.

Figure 1-1: dissertation schema



1.3.2 Part II: Environment and innovative entrepreneurship (Chapters 4 and 5)

In the second part, the focus is on whether the context in which entrepreneurs operate influences the allocation of entrepreneurial activity. Hence, this part examines the role of market structure and competition in determining an entrepreneur's propensity to innovate (Chapter 4). In addition, at the country level, it is investigated whether and how the costs that regulations (i.e., start-up regulations and taxes) impose on entrepreneurs can influence their likelihood of being innovative (Chapter 5).

1.4 Research questions, relevance and contribution

1.4.1 Part I: Individual characteristics and entrepreneurial activity

Research question 1: How do individual characteristics, particularly human capital factors (i.e., level of formal education, prior entrepreneurship experience), relate to the self-employment decision of the unemployed? ***(Chapter 2)***

Relevance:

Although the entrepreneurship literature has extensively investigated the effects of a number of individual characteristics on individuals' propensity to become an entrepreneur (Parker, 2009), usually no distinction is made between individuals that enter self-employment from different prior labor market statuses (i.e., unemployment versus paid-employment). While the entrepreneurship literature suggests that the unemployed start a business mostly because they are pushed to find a source of income, it is not clear yet what types of the unemployed have a higher propensity to become self-employed. In this study, we investigate how human capital investment factors, in particular formal education and prior entrepreneurship experience, may influence engagement into nascent entrepreneurial activity of the unemployed and how the influence of these factors on nascent entrepreneurship may differ for their paid-employed counterparts.

Although it is understandable that on average human capital levels of the unemployed who opt for entrepreneurship are lower than those of the paid-employed (Deli, 2011), we do not know yet whether the unemployed with higher and lower human capital attainments have different tendencies to start a business. Human capital investments influence both the utility from entrepreneurship and the opportunity costs of entrepreneurship, but the relative magnitude of these two effects may depend on the current labor market status, i.e., being unemployed versus being paid employed. We argue that a distinction based on labor market statuses is important as it may influence expected returns on entrepreneurship as well as its opportunity costs due to differing employment options that the unemployed and the paid-employed have. Thus, the impact of human capital investments on nascent entrepreneurship is expected to be different among unemployed and paid employed individuals. This is important in light of the potential success of stimulation policies which target the entry of unemployed individuals into self-employment. If the unemployed who become an entrepreneur tend to have higher levels of human capital, there is perhaps not much ground for the concerns that formerly unemployed individuals are likely to end up as mediocre entrepreneurs.

Contribution:

This study contributes to the analysis of whether the concerns about a lack of required skills to start and run a viable business by the unemployed are overstated. Since human capital obtained through education has been found to be one of the strongest drivers of entrepreneurship performance (Unger et al. 2011; Van der Sluis et al., 2005; Parker, 2009) we investigate whether human capital variables drive the decision for the unemployed to enter self-employment instead of staying unemployed (and perhaps searching for a job).

We make use of the rationality assumption which states that individuals aim to maximize their utility from their career decisions. One of the aspects determining such expected (net) utility is an individual's human capital investments (Van Praag, 2005). These are important inquiries in light of the potential success of stimulation policies targeting unemployed individuals to enter self-employment. Several authors have argued that such policies may be counter-productive because the unemployed are less likely to possess the required skills to successfully run a new business so that over time, these businesses are likely to fail (Shane, 2009; Santarelli and Vivarelli, 2007; Greene et al. 2004). If the unemployed who become a nascent entrepreneur tend to have higher levels of human capital, there is perhaps not much ground for the concerns that formerly unemployed individuals are likely to end up as mediocre entrepreneurs.

Research question 2: To what extent does human capital (i.e., level of education, past entrepreneurial experience and perceived entrepreneurial skills) of necessity-based entrepreneurs relate to their propensity to innovate? ***(Chapter 3)***

Relevance:

Necessity-based entrepreneurs, who form a considerable percentage of entrepreneurs, start a business as their last resort (Reynolds et al., 2005). Prior studies would suggest that necessity-based entrepreneurs have lower levels of human capital (e.g., education), as compared to opportunity-based entrepreneurs (Block and Wagner, 2009). Thus, one may expect that due to their inferior start-up conditions, necessity-based entrepreneurs are less likely to be involved in innovation than opportunity-based entrepreneurs. Yet, Koellinger (2008) suggests that necessity-based entrepreneurs are more likely to start an innovative venture than an imitative venture mainly because innovation can help them to survive in the market with a reasonable income level. The existence of such contrasting views implies that necessity entrepreneurs' propensity to innovate and the factors that can influence this warrant further investigation. This is an important inquiry, because, necessity entrepreneurs form a sizable percentage of entrepreneurs andtheir propensity to innovate reflects the quality and the performance of their ventures. Engagement in innovation is an important early-stage entrepreneurial decision that is influenced by individual characteristics of the entrepreneur, next to his/her startup conditions. Individual characteristics, such as human capital factors, can influence the creativity, critical thinking ability and propensity of finding and realizing a novel idea by the entrepreneur.

Contribution:

The entrepreneurship literature would suggest that heterogeneity in terms of individual characteristics (e.g., human, social and financial capital characteristics) can explain a considerable amount of entrepreneurial success (Pena, 2002; Bosma et al., 2004; Blanchflower and Oswald, 1998). One may suspect that necessity- and opportunity-based entrepreneurs are heterogeneous groups consisting of different types of entrepreneurs in terms of their determinants and profiles (Hinz and Jungbauer-Ganz, 1999; Kloosterman, 2010). However, and to some extent surprisingly so, heterogeneity within the groups of necessity and opportunity entrepreneurs has not been a major theme in entrepreneurship research so far (Binder and Coad, 2013; Baptista et al., 2014). We build our arguments mainly on human capital theory to investigate the determinants of innovation among necessity entrepreneurs (Becker, 1993; Schultz, 1959). Human capital theory implies that investments in human capital would enable someone to produce higher amounts of economic value in the future (Becker, 1993; Schultz, 1959). In the case of necessity entrepreneurs, higher levels of human capital can help to find more novel business ideas in the market or to be in a better position for engagement in innovation (e.g., finding external sources of financing innovation).

Research question 3: How do actual and perceived competition influence entrepreneurs' propensity to innovate? ***(Chapter 4)***

Relevance:

In spite of positive effects of competition for the economy and social welfare, such as an increasing supply of goods, the relationship between competition and the tendency of entrepreneurs to innovate remains debated. As Ahuja et al. (2008) summarize, prior empirical literature proved inconclusive regarding the relationship between competition and innovation, as previous studies have found positive, negative or even insignificant relations between competition and innovation (e.g., Schumpeter, 1942; Aghion et al., 2005; Gilbert, 2006). Although methodological problems, such as endogeneity issues, poor controls and non-random samples, are partly responsible for such diverse findings, we believe that there are three main reasons for these inconclusive findings. First, the relation of competition with innovation may be different for different groups of companies which can be deluded if we relate competition to companies in aggregrate (Aghion et al., 2005; Schmutzler, 2010). Second, the approach by which competition is defined and measured can also influence the relation. While some papers used Price Cost Margin (PCM) to measure competition, other papers have adopted concentration ratio, Lerner Index, Boone Indicator or perception of competition (Nickell, 1996; Tang, 2006; Gilbert, 2006). Lastly, while some

studies used innovative efforts (e.g., R&D activities) and others used innovative output (e.g., new products) as the measure of innovation, these two cohorts of studies may lead to different findings regarding the relationship between competition and innovation relation (Ahuja et al., 2008).

Contribution:

The above-mentioned issues affecting prior studies concerning the relationship between competition and innovation have stimulated us to concentrate on this relationship specifically in the context of small, young firms with a focus on innovative output (i.e., whether entrepreneurs provide new products or services to the market). Several measures of actual competition are adopted while also considering perceived competition to gain a more comprehensive understanding of how competition relates to entrepreneurs' propensity to innovate. Actual competition provides entrepreneurs with conditions (e.g., a market for ideas, learning from competition) that could stimulate them to be innovative (Gans and Stern, 2003; Teece and Pisano, 1994). In addition to using measures for actual competition, using an indicator for perceived competition allows us to determine the deviation of such perceptions from the actual degree of competition. Deviation partly reflects misperceptions of entrepreneurs and partly reflects information about entrepreneurs and their firms such as their abilities or access to resources. It is relevant to consider such deviations because. When entrepreneurs, for example, perceive competition to be more intense than it actually is (i.e., perceived competition deviates positively from actual competition) this might discourage them from innovation, as this would lower expected returns on their ideas compared to when entrepreneurs perceive competition to be as intense or less intense than it actually is (Schumpeter, 1934; Gilbert, 2006).

Research question 4: How do start-up costs and taxes contribute to entrepreneurs' likelihood to be innovative? ***(Chapter 5)***

Relevance:

Various studies suggest that costs imposed by regulations can influence the relative rewards of different business activities (Atkinson and Stiglitz, 1980; McGuire, 1982; Pizer, 2002). The level and the type of entrepreneurial activity play an important role in determining economic prosperity of a country (Baumol, 1990; Gries and Naude, 2011).Start-up costs and taxes, two important types of costs imposed by regulations, may influence the level and the type of entrepreneurs in a country. A number of studies have shown that start-up costs and taxes negatively influence the level of entrepreneurial activity within and across economies (Djankov et al., 2002; Lundstrom and Stevenson, 2002; Gentry and

Hubbard, 2000; Braunerhjelm and Eklund, 2014). Start-up costs and taxes, however, may not only influence entrepreneurial entry but also the likelihood of innovative entrepreneurship in a country, as these costs can change the relative rewards of innovation (Schumpeter, 1934; Baumol, 1990; 2010). Little is known about how how start-up costs and taxes influence the likelihood for entrepreneurs to innovate. Studies addressing innovative entrepreneurship tend to concentrate on industry-level characteristics (e.g., Acs and Audretsch, 1987; Cohen and Klepper, 1996; Gilbert, 2006) or refer to country-level characteristics other than regulations, such as the level of education (Koellinger, 2008), knowledge generation/spill-over (Audretsch et al., 2006) and corruption (Anokhin and Schultze, 2009).

Contribution:

Previous studies have linked start-up regulations and taxes to economic growth (e.g., Djankov et al., 2002; Lee and Gordon, 2005) although the intermediate mechanisms of such growth, for example innovative start-ups, have been overlooked. While these studies place emphasis on the detrimental effects of start-up regulations and taxes on economic growth, such as through the negative impact of taxes on inwardforeign direct investments, it is not clear how these regulations may influence the strategic decisions of business owners and entrepreneurs such as their investments in new innovative ideas (Lee and Gordon, 2005; Schumpeter, 1934). To date, little scholarly attention has been devoted to the influence of the costs that regulations impose on innovative entrepreneurship. This suggests that regulations are not considered a source of costs that can take away the "prize" of entrepreneurial innovation. From a policy perspective, this study contributes to understanding how the government, through setting the "rules of the game", may stimulate innovative or non-innovative entrepreneurship (Baumol, 1990). This is primarily because innovative entrepreneurs play an important economic role, for example by enhancing competition and by providing buyers with new and higher quality products or services (Schumpeter, 1934; Da Rin et al., 2011; Baumol, 2010).

1.5 Data

This dissertation follows an empirical approach. That is, expected relationships between individual, industry and country level variables and the type of entrepreneurial activity are tested with data on individuals and industries from various countries. In the following, a brief description is given of the two individual level datasets, one industry level dataset and two country level datasets used. Additionally, limitations of these datasets are discussed.

1.5.1 Individual level data

The results in this dissertation are derived mainly from two individual level datasets. First, chapters 2, 3, 4 and 5 use data from the Global Entrepreneurship Monitor (GEM) data from the years 2002-2011. We use annual individual-level data of 89 countries that participated in the adult population survey (APS) carried out as part of the GEM project from 2002 to 2011. GEM - the world's largest entrepreneurship study - is an annual assessment of entrepreneurial activity, aspirations and attitudes of individuals across many countries (Reynolds et al., 2005). The GEM survey collects data about different aspects of entrepreneurship, such as entrepreneurs' ambitions, motivations, activities and their human capital, which makes GEM a suitable dataset to use for this dissertation. Each country has a GEM team in place responsible for collecting data. GEM teams need to fulfill certain sampling criteria asked by the GEM global team. Notable criteria for the APS are 1) the sample size for each country should be larger than 2,000 randomly selected individuals (entrepreneurs and non-entrepreneur). 2) For the individual national surveys data is collected in the same way and at the same time of the year in order to assure reliability of cross-national and longitudinal comparisons.

Second, the Flash Eurobarometer Survey on Entrepreneurship (No. 283) is used for chapter 2 of this dissertation. This survey was conducted in 36 countries (32 European and 4 non-European countries) in 2009 by the European Commission with the aim to investigate entrepreneurial behavior and attitudes mainly among European citizens. The survey has typical sample sizes of 500 or 1,000 respondents per country.

A clear advantage of these two datasets is the inclusion of many countries around the globe. The GEM includes higher- as well as middle- and lower-income countries, whereas the Eurobarometer data mainly cover European countries and the US. In addition, another important benefit of these datasets is that the samples are representative of the entire adult population (in terms of gender, age and education in case of GEM and in terms of gender, age and employment status in case of the Eurobarometer), including non-entrepreneurs and those with no intention of becoming an entrepreneur. This feature helps to reduce the risk of sample selection bias because the sample is representative for the population of countries.

1.5.2 Limitations

Despite the merits of these two datasets, there are some drawbacks that should be mentioned. First, although several years of GEM data are used, these surveys collect data as repeated cross-sections. Hence, no panel structure is implemented, which inhibits us from examining causal relationships in a longitudinal fashion. A panel data structure would be beneficial regarding the relationship between the main predictors and the entrepreneurial decisions of individuals. A second drawback is related to the measurement of several vari-

ables in the datasets. For example, the GEM dataset contains a subjective measure for innovation i.e., a self-reported measure. Other more objective measures of innovation (e.g., new products' sales in percent of total sales, entrepreneurs' number of applied patents) were not available in the datasets. Lastly, some potentially relevant control variables are not available in the datasets. The exclusion of certain determinants in understanding entrepreneurial entry or innovation (e.g., marital status, minority information, job experience) might lead to an omitted variable bias.

1.5.3 Industry level data

Chapter 4 of the dissertation makes use of industry level data to analyze the role of competition for entrepreneurs' propensity to innovate. Several measures reflecting competition at the industry level are taken from the OECD iLibrary. More specifically, data are taken from the Structural Analysis (STAN) and the Structural and Demographic Business Statistics (SDBS) databases of OECD iLibrary. The data are collected at the industry level (SIC two digits) for 19 upper-middle and high-income European countries.

1.5.4 Country level data

At the country level, two data sources are used for obtaining information on regulations: the World Bank Doing Business (WBDB) database and the World Competitiveness Yearbook (WCY). WBDB database provides various aspects and measures of business regulations and their enforcement in a country. The Doing Business measures are provided annually for more than one hundred countries since 2004 to present. These demonstrate the regulatory expenses and procedures of undertaking business and have been used by scholars to analyze the influence of a number of regulatory measures on productivity and growth of entrepreneurs (e.g., Levie and Autio, 2011; Dreher and Gassebner, 2013; Braunerhjelm and Eklund, 2014).

The World Competitiveness Yearbook (WCY) is used forinformation about corporate and personal income tax rates. WCY, according to its website, provides data to "analyze the facts and policies that shape the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people". It includes annual data for 18 years of around sixty countries which participate in the executive survey conducted by the IMD World Competitiveness Center. Several previous studies have used WCY measures to study country-level factors' impact on entrepreneurship (e.g., Hessels et al., 2008; Van Stel et al., 2007).

1.6 Declaration of contribution

In this section, I declare my contribution to the various chapters of this dissertation and acknowledge the contribution of other parties where relevant.

Chapter 1: The majority of the work in this chapter has been done by the author of this dissertation and the feedback from the daily supervisor and promotor has also been incorporated.
Chapter 2: An early draft of this chapter was prepared by the author of this dissertation and was improved based on comments of the daily supervisor and a co-author. The team added another co-author to better shape the theory section of the second draft of the paper. Other sections of the chapter were majorly improved by comments of the co-authors and work of the author of this dissertation.
Chapter 3: The majority of the work in this chapter has been done independently by the author of this dissertation. The daily supervisor gave constructive comments in order to improve this chapter. In addition, the handling editor provided a number of comments to improve this chapter.
Chapter 4: The majority of the work in this chapter has been done by the author of this dissertation. Several constructive comments and ideas were provided by the daily supervisor and two co-authors of the paper. This chapter is still being reviewed by one of the co-authors of the paper before submission to a journal.
Chapter 5: The idea of this chapter was jointly developed by the author of this dissertation, the daily supervisor and another co-author. The chapter was mainly written by the author of this dissertation while incorporating constructive suggestions of the daily supervisor and the co-author.

1.7 Main findings

Research question 1: How do individual characteristics, especially human capital factors (i.e., level of formal education, prior entrepreneurship experience) relate to the self-employment decision of the unemployed? ***(Chapter 2)***

This chapter's findings show the importance of human capital for the entrepreneurial decisions of the unemployed. More specifically, it is found that the unemployed with higher levels of education are more likely to become self-employed, compared to the unemployed with lower levels of formal education. Comparing the unemployed and the paid-employed samples, we cannot exclude that the effect of formal education on nascent entrepreneurship is similar for the unemployed and the paid employed. This is because the difference in marginal effects was not statistically significant. We find that prior entrepreneurship experience, for the unemployed, has no significant relationship with nascent entrepreneurship. However and for the paid-employed, prior entrepreneurship experience has a positive relationship with nascent entrepreneurship which is significant at the 1% level.

Research question 2: To what extent does human capital (i.e., level of education, past entrepreneurial experience and perceived entrepreneurial skills) of necessity-based entrepreneurs relate to their propensity to innovate? ***(Chapter 3)***

Based on our results in this chapter and regarding the role of human capital factors, we find that necessity-based entrepreneurs with higher levels of formal education are more likely to engage in product and process innovations than necessity-based entrepreneurs with lower levels of education. Additionally, we find a strong positive relationship between prior entrepreneurship experience and selection into necessity-based entrepreneurship while there is no significant relation of entrepreneurship experience with necessity entrepreneurs' propensity to innovate. Finally, when necessity-based entrepreneurs perceive to have entrepreneurial skills this also shows a significant positive relationship with innovation, in addition to its positive relation with entrepreneurial entry.

Research question 3: How do actual and perceived competition relate to entrepreneurs' propensity to innovate? ***(Chapter 4)***

In distinguishing between actual competition (i.e., competition measures at the industry level) and perceived competition by entrepreneurs, our findings suggest that intense actual competition in the form of low profitability in the product market can enforce entrepreneurs to innovate. Possibly entrepreneurs need innovation to survive and to enter "blue oceans" i.e., the unknown market space, untainted by competition where there are ample opportunities for growth. Furthermore, when entrepreneurs perceive competition to be more intense than its actual level, they are discouraged from engagement in innovation. This could be because perception of a high level of competition by lowers entrepreneurs' expected returns on their innovative ideas.

Research question 4: How do start-up costs and taxes contribute to the likelihood of innovative entrepreneurship in a country? ***(Chapter 5)***

The evidence in this chapter supports the argument that costs imposed by regulations in the form of start-up costs and taxes have significant effects on whether starting entrepreneurs innovate. In sum, our results support the argument that start-up costs, as one-off costs in the beginning of the venture cycle, can increase the likelihood for entrepreneurs to be innovative. Thus, entrepreneurs with no or limited innovative ideas or low faith in their abilities, are discouraged to enter when entry costs are high, as their profit expectations are limited and, therefore, they may not be willing to incur such costs.

In addition, we find that corporate as well as income tax rates have significant negative relationships with entrepreneurs' likelihood to innovate. Thus, in countries with lower corporate and income tax rates entrepreneurs show a higher propensity to engage in inno-

vation. The underlying reason for this could be that higher rates of corporate and income taxes can adversely affect the prize of innovation for entrepreneurs. Moreover, a high tax rate can lower possibilities of investments in innovation.

1.8 Implications and discussion

This dissertation is concerned with the entrepreneurial entry of individuals with different labor market statuses (Chapter 2) and the conditions that determine whether someone is involved in one type of entrepreneurial activity instead of another (i.e., innovation versus imitation) (Chapters 3, 4 and 5). The second chapter investigates the influence of several human capital investment factors on nascent entrepreneurial activity of the unemployed. We find that more educated unemployed individuals are more likely to become self-employed compared to less educated unemployed individuals. Based on this finding, we can conclude that concerns about a lack of required skills to start and run a viable business by the unemployed might be overstated. In the same spirit, Frankish et al. (2014) conclude that "entrepreneurship can be a route out of deprivation"; however, their results do not specifically apply to formerly unemployed entrepreneurs. Hence, the question of whether the government should provide incentives for the unemployed to become self-employed remains open. Clearly, if entrepreneurship stimulation programs are to be implemented, incentives for participants must be such that adverse selection (i.e., selection of the unemployed with lower levels of human capital) into entrepreneurship is avoided (Van Stel and Storey, 2004).

The third chapter provides some insights into how various aspects of human capital can influence necessity entrepreneurs, who are a major sub-group of entrepreneurs (Reynolds et al., 2002), to be innovative. The results suggest that necessity-based entrepreneurs, specifically those who have attained higher levels of formal education, are more likely to be innovative than less-educated necessity-based entrepreneurs. Hence, the provision of equal opportunities for formal education, particularly higher education, to individuals can help to achieve not only lower rates of necessity-based entrepreneurs but also higher rates of innovative necessity-based entrepreneurs in a given country.

Concerning the relationship between competition and entrepreneurs' propensity to innovate, the divergent findings for various definitions of competition show that these definitions should not be seen as substitutes but as different aspects of competition that differently influence innovative entry. It is suggested that facilitating the creation of a more competitive environment can increase the likelihood that entrepreneurs will be innovative. Competition, as a disequilibrating force, can stimulate innovative entrepreneurship in the product market. However, if entrepreneurs perceive the intensity of competition to be higher than it actually is, they are less likely to engage in innovation. Hence, this result suggests

that it is beneficial to provide entrepreneurs with unbiased information on competition intensity and the strength of incumbent firms.

A significant negative relation of start-up costs and taxes is found with the likelihood of innovative entrepreneurship in a country. Several policy implications can be derived from these findings. First, the extent to which costs imposed by regulations are directly linked to the expected returns on innovation can influence entrepreneurs' propensity to innovate. The government can stimulate innovative entrepreneurship by attaching regulatory costs *less directly* to the rewards of innovation. For example, as Baumol et al. (2007, p. 106) suggest, taxes on goods are preferred to taxes on income and profit if the goal is to promote innovative business activities and growth. Second, regarding start-up costs, the results propose that despite a possible negative influence on the supply of entrepreneurship (Klapper et al., 2006), such costs actually have a significant and positive relationship with the likelihood of entrepreneurs to be innovative, at least for upper-middle- and high-income countries. Hence, this suggests that policy-makers should think more carefully about the consequences of reducing start-up costs. Reducing these costs, on the one hand, can increase the rate of entrepreneurs, leading to less unemployment and a more dynamic business environment (Branstetter et al., 2013). On the other hand, lower start-up costs may decrease the likelihood of entrepreneurs to be innovative due to the (excessive) entry of imitative entrepreneurs. Third, regarding the role of taxes, evidence from prior studies would suggest that corporate and income taxes have a significant and negative relationship with economic growth (Lee and Gordon, 2005), despite the contribution of taxes to providing public goods for citizens (Baumol et al., 2007). The negative link between taxes and innovative entrepreneurship found in this study could be one of the explanations for the negative relationship between taxes and economic growth. Hence, in countries with severe tax systems, firms, particularly start-ups, have a low propensity to innovate, which can have adverse consequences for economic growth.

1.9 Suggestions for future studies

In the Motivation (sub-section 1.1), five main recent developments in the field of entrepreneurship are discussed, and this dissertation primarily focuses on three of these. Thus, two developments (i.e., the entrepreneurial ladder, and entrepreneurship and human biology) are not explored in this dissertation. Future studies in the field of entrepreneurship could attempt to further develop these two strands. Below, three avenues for future research are suggested.

First, while individual level determinants of engagement levels have been studied before (e.g., Van der Zwan et al., 2010), future studies could focus on contextual level determinants that have been discussed in this dissertation. Prior studies have shown that determinants influencing nascent entrepreneurial activity might not necessarily be the same as

those influencing the persistence in venture creation or progress in the entrepreneurial process. For example, competition intensity, in terms of the presence of many firms in the market, can attract nascent entrepreneurial activity because individuals may be stimulated to enter when they see other entrepreneurs or businesses that are active in a market (Moore et al., 2007; Shane and Venkataraman, 2000). However, competition intensity can have a negative influence on the persistence of new ventures because many entrepreneurs may be forced to exit the market in a process of selection.

Second, insights from the cross-disciplinary field of entrepreneurship and human biology can help to more objectively study characteristics and determinants of entrepreneurial activities and decisions. As Hyttinen et al. (2013) and Parker (2009) argue, prior cross-sectional and panel studies of entrepreneurs, despite being insightful, may suffer from unobserved heterogeneity and biases related to the dynamics of entrepreneurial entry and exit. Hence, it could certainly be insightful if, for example, genetic predispositions to entrepreneurial decisions such as engagement into launching an innovative venture were known and were compared with genetic predispositions to human capital investments such as attaining higher levels of education.

Finally and extending research on determinants of start-up motivations (Block et al., 2015), it is not very well understood how individual characteristics such as investments into human capital may influence push or pull motivations to start and run a business. One may expect that higher levels of human capital would increase the likelihood to start a business out of opportunity rather than necessity. However, there are multiple pathways from human capital investments to start-up motivation that should be considered. One pathway, for example, could be through peer pressure. Individuals may compare their status with former colleagues/classmates. If individuals are highly educated it is likely that their former classmates would be successful when they run their own business. This may put peer pressure on these individuals to have a successful venture when they start their own business in order to match with the high status or income of their former classmates. Thus, higher levels of education may include a push element to start and run a venture.

.

Chapter 2

Which Types of the Unemployed Select Into Nascent Entrepreneurship?

Based on Darnihamedani, Hessels, van Stel and Burke (2015a)

Abstract

This chapter investigates which types of unemployed individuals are more likely to select into nascent entrepreneurship. We investigate the role of human capital investment factors (i.e., formal education and prior entrepreneurship experience) on the likelihood of the unemployed becoming nascent entrepreneurs. We explore this neglected area of enquiry through development of theory and empirical analysis involving a replication robustness test. Our findings indicate that among the unemployed, formal education rather than prior entrepreneurship experience influences the decision to become a nascent entrepreneur. We also show, both theoretically and empirically, that the impact of human capital investments on nascent entrepreneurship differs between unemployed and paid employed individuals.

2.1 Introduction

Unemployment is a major concern both for labor force participants and for policy makers, especially during periods of economic crisis. In many countries, governments have developed policies to support unemployed individuals in establishing their own businesses (Baumgartner and Caliendo, 2008), for instance by providing start-up subsidies for unemployed individuals to create their own ventures (Caliendo and Kritikos, 2010) or by providing non-financial support such as business advice. Self-employment, then, is an important labor market option for the unemployed that warrants scholarly attention (Román et al., 2013; Wolff and Nivorozhkin, 2012).

A number of prior studies have investigated the creation of new businesses as a way for individuals to escape unemployment (Tervo and Niittykangas, 1994; Block and Wagner, 2010). The literature identifies a "refugee effect" that suggests that the unemployed engage in self-employment out of push considerations, e.g., as a result of the pressure to find a source of income (Bergmann and Sternberg, 2007; Deli, 2011; Koellinger, 2008). At the aggregate level, a positive relation has been found between the unemployment rate and the number of newly created businesses, which seems to confirm such a "refugee effect" (Storey, 1991; Thurik et al., 2008). However, although the pressure to start a business may indeed be stronger for unemployed relative to paid-employed individuals, within the group of unemployed there is no clear encompassing view yet regarding the types of the unemployed (e.g., in terms of human capital endowments) who are more likely to actually start a business.

At the individual level, unemployment is often associated with low levels of human capital (Becker, 1993; Parker, 2009). However, this does not necessarily mean that those unemployed engaging in entrepreneurship are the ones with lower human capital endowments. For instance, formal education has been found to positively influence entrepreneurial earnings (Van Praag, 2005), hence it is not unlikely that also among the unemployed, the higher educated select into entrepreneurship. As a counterargument, the higher educated unemployed may also have higher chances to find an appealing job in paid employment (Evans and Leighton, 1990; Becker, 1993). Moreover, the influence of formal education on entrepreneurial engagement may differ between paid employed and unemployed individuals, for instance because the opportunity costs of entrepreneurship are likely to be different for these two groups (Kher et al., 2012). Thus, distinguishing individuals based on their prior labor market status can help scholars to better understand whether and how human capital may influence individuals' entrepreneurial decisions. Having mainly compared entrepreneurs with non-entrepreneurs (Sarasvathy, 2004), prior studies have rarely focused on the individual characteristics of the sub-group of entrepreneurs who were unemployed prior to starting a new business.

In this study, we investigate how human capital investment factors, in particular formal education and prior entrepreneurship experience, may influence engagement into nascent entrepreneurial activity of the unemployed and how the influence of these factors on nascent entrepreneurship may differ for their paid-employed counterparts. We make use of the rationality assumption which states that individuals aim to maximize their utility from their career decisions. According to occupational choice theory (e.g., Lucas, 1978; Kihlstrom and Laffont, 1979), individuals can choose between wage employment and entrepreneurship and this choice depends on the expected utility of both alternatives as well as on the opportunity costs (e.g., the wage that an employee has to give up).[2] This theory assumes individuals act rationally (rationality assumption) and only become an entrepreneur if the utility –net of opportunity costs– they expect to derive from entrepreneurship exceeds that from wage employment (Parker, 2009). One of the aspects determining such expected (net) utility is an individual's human capital investments (Van Praag, 2005). In our theoretical framework we will explain that human capital investments influence both the utility from entrepreneurship and the opportunity costs of entrepreneurship, but that the relative magnitude of these two effects depends on the current labor market status, i.e., being unemployed versus being paid employed. Consequently, the impact of human capital investments on nascent entrepreneurship is expected to be different among unemployed and paid employed individuals.

Furthermore, we explore the wider ramifications of the rationality assumption to highlight the roles of a direct pull effect of entrepreneurship, an indirect pull effect of potential future employment on nascent entrepreneurship and a peer group comparison push effect as means through which human capital investment factors may impact on the decision to enter nascent entrepreneurship. We argue that both pull (directly and indirectly) and push (through a peer group comparison effect) factors can draw the unemployed and the paid employed towards (nascent) entrepreneurship. These three causal pathways are used together to provide a comprehensive and balanced assessment for how human capital investment factors impact on the decision to engage in nascent entrepreneurship among the unemployed and the paid employed.

In our empirical analysis we use two different data sets (i.e., the Global Entrepreneurship Monitor (GEM) and the Flash Eurobarometer), to investigate individual-level determinants of nascent entrepreneurship separately for unemployed and paid employed individuals, focusing particularly on determinants related to human capital investments (Unger et al., 2011). When studying determinants of entrepreneurship it is common to make a distinction between the entrepreneurial process during firm creation and after firm creation

[2] In the present paper's set-up, unemployed individuals can also choose to remain unemployed, if utility from unemployment (e.g., in terms of unemployment benefits and leisure time) is higher than utility from paid employment or entrepreneurship.

(Spulber, 2009b). During firm creation the entrepreneur is someone who actively takes steps to establish a new firm, i.e., a nascent entrepreneur. After firm founding the nascent entrepreneur usually becomes a business owner who actually owns and runs the new business. Once the new firm is up and running, the main concern for the entrepreneur is to optimize firm performance, e.g., in terms of profits and firm survival. This distinction between during and after firm creation leads to three different metrics of entrepreneurship: (1) individuals in the process of starting a business, i.e., nascent entrepreneurs; (2) actual new businesses, and; (3) the (early-life) performance of these newly founded businesses.

As the determinants of these three metrics may differ (Marvel et al., 2014), it is important to highlight which metric is being used. In the current chapter we focus on the first metric, i.e., nascent entrepreneurship. Studying nascent entrepreneurs and their determinants can help to understand why some individuals, and not others, discover and exploit opportunities to try and establish a new business (Davidsson and Honig, 2003). This is important, since new businesses often result from an idea or profit opportunity in the mind of the nascent entrepreneur (Shackle, 1979). Furthermore, studying determinants of nascent entrepreneurship helps to understand what characteristics lead to a start-up decision (Delmar and Davidsson, 2000) and hence provides insight into why new businesses emerge in the first place. Nevertheless, not all nascent entrepreneurs (metric 1) will succeed in creating an actual new business (metric 2) though. One advantage of studying nascents compared to actual business start-ups is that the former can be measured fairly consistently across countries and over time, whereas the latter tends to suffer from "undercoverage of the smallest and youngest entities and the non-comparability across countries that typically signify available business data bases from statistical organizations" (Davidsson, 2006, p. 3).

In the chapter we first examine which sub-groups of the unemployed, in terms of human capital investment factors, are more likely to become nascent entrepreneurs. Secondly, we investigate whether such factors differently influence the entrepreneurial decisions of unemployed and paid employed individuals.

More specifically, we intend to answer the following research questions:

- *How do the level of formal education and prior entrepreneurship experience relate to the engagement of the unemployed into nascent entrepreneurship?*
- *How does the role of these human capital investment factors for engagement into nascent entrepreneurship differ between the unemployed and the paid-employed?*

These are important questions in light of the potential success of stimulation policies targeting unemployed individuals to enter self-employment. Several authors have argued that such policies may be counter-productive because the unemployed are less likely to

possess the required skills to successfully run a new business so that over time, these businesses are likely to fail (Shane, 2009; Santarelli and Vivarelli, 2007; Greene et al. 2004). It has been suggested that human capital levels of nascent entrepreneurs who were formerly unemployed are not sufficient to successfully start and run a viable business (Block and Wagner, 2010; Deli, 2011). However, this suggestion may be debated. Although it is certainly conceivable that on average, the human capital levels of the unemployed are lower than those of the paid-employed, it is not clear whether and how human capital investments can stimulate the unemployed to engage into founding a new venture. Since human capital obtained through education has been found to be one of the strongest drivers of entrepreneurship performance, i.e., the third metric of entrepreneurship identified earlier in this introduction (Unger et al. 2011; Van der Sluis et al., 2005; Van Praag, 2005), it is particularly interesting to investigate whether and how human capital variables drive the decision of the unemployed to become a nascent entrepreneur. If the unemployed who become a nascent entrepreneur tend to have higher levels of human capital, there is perhaps not much ground for the concerns that formerly unemployed individuals are likely to end up as mediocre entrepreneurs.

The rest of the chapter is organized as follows. First, we review the literature and discuss what occupational choice theory and the rationality assumption would suggest about the engagement into founding a new venture by individuals with different labor market statuses. In particular, we distinguish between three different causation paths through which human capital investments may influence nascent entrepreneurship. Based on this discussion, a number of hypotheses are developed regarding the role of formal education and prior entrepreneurial experience for unemployed (and also paid employed) persons' propensity to become a nascent entrepreneur. Next, we describe the two data sources and variables that are used and we present the method that will be employed to analyze the data and test the hypotheses. Subsequently, the results of the empirical analysis are presented. We conclude with a discussion section including some policy implications and limitations of our study.

2.2 Literature review

2.2.1 Theoretical background

In this section we begin by explaining the foundations of the rationality assumption in models of career choice and then use this to move on to explain how human capital can affect the propensity for a person to engage in nascent entrepreneurship. We then investigate how two different forms of human capital – education and prior entrepreneurial experience – work through three channels and play varying roles in this career choice process.

In predicting entrepreneurship, prior employment status plays an important role (Thurik et al., 2008). Although entrepreneurship is often viewed as the act of an individual, it is

also shaped by positions that individuals, as social actors, hold (Dobrev and Barnett, 2005). Thus, whether or not an individual has a job affects his/her propensity to engage in entrepreneurial activity. The unemployed have basically three career options: to stay unemployed, to search for a job or to engage in founding a new venture. Some studies suggest that unemployed individuals have, on average, lower levels of human capital than the paid-employed (Foreman-Peck, 1985) and that they often lack the entrepreneurial personality traits required to start and run a business (Parker, 2009). However, prior studies found that, compared to the paid-employed, the unemployed are more likely to become self-employed (e.g., Carrasco, 1999). Whereas such prior studies compared the propensity of the unemployed, relative to the paid-employed, to become self-employed, it is much less clear what individual characteristics may drive the unemployed to actively try to start a new business. Hence, the question "what factors may stimulate the unemployed to engage in (nascent) entrepreneurship instead of accepting unemployment as a permanent state or searching for opportunities in paid employment?" is non-trivial and worth-investigating.
The rationality assumption provides a firm basis for addressing this question. Prior studies on occupational choice have used the rationality assumption to understand how individuals choose between entrepreneurship and some other outside option (usually paid-employment) (e.g., Bhide, 2000; Wu and Knott, 2006). These studies usually build on both Knight's (1921) and Kihlstrom and Laffont's (1979) notion that individuals cannot be considered as either born entrepreneurs or born non-entrepreneurs and that they choose an occupation from which they derive the greatest expected utility. From this perspective, individuals, as opportunists, may become entrepreneurs when risk-adjusted returns on entrepreneurship are more attractive than wage work. However, these studies do not distinguish between current labor market status (i.e., unemployment versus paid-employment) when they apply the rationality assumption to understand entrepreneurial entry and its determinants. Below, in our hypotheses development, we will argue that such a distinction is important as it may influence expected returns from entrepreneurship as well as its opportunity costs.

Based on the rationality assumption it can be expected that an unemployed individual starts a new venture when the expected utility (monetary and non-monetary) of a new venture exceeds that of staying unemployed and looking for a job. Factors that increase the expected benefits of entrepreneurship or decrease the opportunity costs of entrepreneurship can positively influence the tendency to become a nascent entrepreneur. For example, the provision of self-employment subsidies for the unemployed can increase the benefits of entrepreneurship (Caliendo and Kritikos, 2010). Similarly, higher levels of human capital investments have been found to be associated with higher ability in entrepreneurship (Burke et al., 2000, Van Praag, 2005), which, in turn, can increase the utility of entrepreneurship (Lucas, 1978; Evans and Jovanovic, 1989). We will now discuss how human

capital plays a role in influencing the propensity of an individual to choose to engage in nascent entrepreneurship.

2.2.2 The role of human capital

Human capital can be gained in the forms of tacit and explicit knowledge (Polanyi, 1966). Tacit knowledge refers to non-codified and often experience-based or personal knowledge while explicit knowledge refers to codified knowledge, such as found in documents. An important pathway to accumulate explicit knowledge is through formal education (i.e., primary, secondary and post-secondary education). The impact of higher education on the probability of becoming an entrepreneur is at best ambiguous, as scholars have reached contradicting results (Parker, 2009; Arenius and Minniti, 2005). For example, Blanchflower (2004) finds that in richer countries, graduate studies have a positive impact on high-tech start-up rates, while Burke et al. (2002) find that high investment in one's human capital may discourage entrepreneurial risk-taking, while low investment may stimulate a person to become an entrepreneur.

We re-assess these findings for the unemployed in relation to making initial steps towards start-up (i.e., nascent entrepreneurship). To this end, we note that human capital can influence the utility of entrepreneurship compared to possible outside options. Becker (1993) defines human capital as knowledge and skills that people acquire by investing in schooling, training programs and experiences. Inspired by this definition, Unger et al. (2011) provide two distinct conceptualizations of human capital attributes: human capital investments versus outcomes of human capital investments. They explain that human capital investments encompass the time and efforts allocated to education and work experience, while the outcomes of human capital investments are the attained knowledge and skills.

In this chapter we focus on investments in human capital and not on its outcomes. This is because investments in human capital (e.g., formal education, prior entrepreneurship experience) are easier to measure, compared to the outcomes of human capital investments (e.g., entrepreneurial skills and knowledge), which measurement often suffers from self-reporting issues. Furthermore, human capital investments can be more directly pursued, so that the implications of studying such investments can be of direct use for policy-makers and entrepreneurs. As mentioned, in this chapter we study formal education and prior entrepreneurship experience. We will now deal with each of these forms of human capital investments in turn. For each form we will derive a hypothesis on its relation with nascent entrepreneurship for the unemployed, as well as separate hypotheses on how this relation may be different for the paid employed. Both are highly significant for the purposes of re-appraising the long standing view that unemployment push effects into entrepreneurship are predominantly what Foreman-Peck (1985) described as 'chaff' rather than 'seedcorn'.

Level of formal education

We believe there are three routes through which education can have an impact on the propensity of unemployed individuals to choose to engage in nascent entrepreneurship. Furthermore, we will argue that these same causation paths also affect the propensity of more highly educated paid-employed to engage in nascent entrepreneurship and that these are likely to differ from highly educated unemployed. We now outline each causation path.

A direct pull effect of entrepreneurship

This is driven by three means through which education affects the net gain in utility for an unemployed person who chooses to become self-employed. First, it can be expected that the unemployed who have higher levels of education will have a greater chance to recognize promising opportunities in the market. According to Davidsson and Honig (2003) and Baron and Ensley (2006), human capital is vital for entrepreneurial discovery and, further, opportunities remain solely dormant until they emerge in human minds as the consequence of active cognitive processes. Education is a key part of this. Formal education is, for example, positively associated with imagination, foresight, computation and communication skills, which are necessary to discover entrepreneurial opportunities (Shane, 2000). Education can also help to provide an "information advantage" that is required to discover entrepreneurial opportunities before others know about them (Venkataraman, 1997; Hayek, 1945). Such an information advantage is particularly important for the unemployed because, due to their absence in the workplace, it is typically more difficult for them to be ahead of others in terms of having promising business ideas.

Secondly, higher educated unemployed ought to have a greater capacity to exploit entrepreneurial opportunities. Higher levels of education can, *ceteris paribus*, help the unemployed to more easily prepare for entrepreneurship because education can facilitate the provision of means for entrepreneurship, such as ideas and skills (Evans and Jovanovic, 1989), the required start-up capital (Hebert and Link, 1989), and the ability to implement a promising business idea (Pfeiffer and Reize, 2000; Block and Wagner, 2010).

Thirdly, the unemployment state reduces the opportunity cost of entrepreneurship that is normally associated with educated persons. This occurs because unemployment can be viewed as a penalty for the individual because he/she cannot immediately obtain another job (Shapiro and Stiglitz, 1984; Blau and Robins, 1990). According to Gibbons and Katz (1991), "outside" firms often perceive laid-off workers to have lower levels of ability as these firms base their judgments on revealed information (e.g., being fired). Hence, unlike the employed where individuals with high human capital have a high opportunity cost of entrepreneurship because they forgo an attractive wage rate in employment, the unemployed have already proved to have less employee wage options and hence have lower

opportunity cost in entrepreneurship. This lower opportunity cost combined with the boost that education can have on raising the returns from entrepreneurship in terms of both finding and exploiting profit opportunities, may give rise to higher education having a net positive effect on nascent entrepreneurship among the unemployed (Hypothesis 1A below). Moreover, and as already touched upon above, the impact of education on the opportunity costs of entrepreneurship may also differ substantially between the unemployed and the paid-employed. The educated paid-employed usually have a decent job with a relatively high salary and possibly favorable secondary benefits. They are also in a good position to find other attractive employment possibilities if they would like to change their current job. So in fact, they have much to lose if they decide to pursue an entrepreneurial path. The educated unemployed, however, do not have such a stable job with a high salary and benefits. Moreover, as mentioned above, their prospects to find an attractive wage job also tend to be lower. Thus, opportunity costs of entrepreneurship for the educated unemployed are likely to be much lower than those of the educated paid-employed meaning they are more likely to engage in nascent entrepreneurship (Hypothesis 1B below).

An indirect pull effect of potential future employment on nascent entrepreneurship

Intertemporal career choice considerations are also likely to influence the manner in which education affects the propensity for the unemployed to want to choose to become self-employed and hence engage in nascent entrepreneurship. This is caused by asymmetric information in the labor market when employers find it hard to distinguish between high and low ability people. The higher educated unemployed may particularly suffer from this asymmetric information as unemployment may be seen by employers as a signal of low ability (Gibbons and Katz, 1991). In addition, the unemployed suffer from a loss of reputation that can negatively influence their chances to find a job (Doiron, 1995; Frederiksen et al., 2013). In this setting, an educated unemployed person has greater chances of realizing the value of their education in the labor market if they use entrepreneurship to signal the value of their skills to future employers. So, for example, a marketing graduate showing that she can run a good marketing campaign in her own business or an architecture graduate showing that she can win contracts and design quality buildings in a self-employed capacity (Hypothesis 1A below).[3]

The higher educated employed are less likely to signal their ability through entrepreneurship, for two reasons. First, they already have a job in wage-employment. Second,

[3] In a similar vein, Burke (1997) discusses the case of the recording industry where music recording artists who could not get record deals from major international record companies would often become entrepreneurs by setting up their own record label to release their recordings in order to demonstrate the commercial worth of their music.

even if they would like to change jobs, they are less likely to choose entrepreneurship to signal their ability to future employers because employers prefer employees with a low tendency for self-employment (Burke and To, 2001; Baptista et al., 2012; Koellinger et al., 2015). Hence, paid employed individuals wanting to change jobs will more likely find it not beneficial to signal in this way - as the low beneficial signal effect will be outweighed by the high reputational costs of being associated with self-employment. Thus, from this indirect pull effect perspective, one might expect a relatively weaker positive effect of formal education on nascent entrepreneurship among the employed than the unemployed (Hypothesis 1B below).

A peer group comparison push effect

Research on the economics of happiness has demonstrated the importance of comparison groups in terms of being an influence on people's sense of well-being and behavior (Clark et al., 2008). Luttmer (2005) shows that people's relative income position in their local neighborhood affects their happiness. Likewise, a person's income relative to one's own aspirations also affects happiness (Stutzer, 2004; Knight and Gunatilake, 2012). The impact of relative career performance is not restricted to monetary measures. Easterlin (2002) shows that lower social status from being unemployed reduces the sense of well-being. These negative consequences of unemployment have been shown to have long-term negative effects (scarring) on happiness even after the person finds employment (Clark et al., 2001; Knabe and Ratzell, 2011). In sum, we can conclude that being unemployed is an undesirable state in terms of social status and that this negative state will be worse the greater the relative career success of the comparison group. So since highly educated persons will have more success (in employment and self-employment) than less educated persons, this peer comparison group puts greater pressure on other educated people to match this career success. Therefore, more educated unemployed people will face higher peer comparison group pressure to try to achieve a relatively high job status through any means possible which includes self-employment - where the person can appoint herself to a senior management position (e.g. CEO, COO or CFO) of the business. Less educated persons will have a higher proportion of peers who are unemployed and in less senior employment positions and hence face less of this peer comparison group pressure. Therefore, the more educated unemployed will have a greater incentive, through comparison with a relatively more successful peer group, to become nascent entrepreneurs (Hypothesis 1A below).

Correspondingly, educated employees will have a lower incentive to use self-employment as a means of status building because they will already have status from their paid employment job roles. Therefore, one would expect higher education to be a stronger

positive determinant of nascent entrepreneurship among the unemployed than among the employed (Hypothesis 1B below).

These three causation paths give rise to the following hypotheses:

Hypothesis 1A: Formal education has a positive association with nascent entrepreneurship among the unemployed.

Hypothesis 1B: The positive association of formal education with nascent entrepreneurship will be stronger for the unemployed compared to the paid employed.

Prior entrepreneurship experience

As another form of human capital investment, prior entrepreneurial experience has similarities with the causation paths that relate the education of the unemployed to nascent entrepreneurship. However, the operation of these causation paths is sufficiently different to motivate a separate discussion and distinct hypotheses. In general, we find weaker hypotheses due to the presence of countervailing effects. We deal with each causation path in the same sequence as before.

A direct pull effect of entrepreneurship

Prior entrepreneurship experience can provide tacit knowledge for individuals regarding how to set up and run a new business. Prior knowledge about entrepreneurship may help to "connect the dots" that allows the unemployed to comprehend or to interpret new information and its relation to other information (Baron and Ensley, 2006; Eckhardt and Shane, 2010). As Smilor (1997) states, it helps individuals "learn from what works and, more importantly, from what doesn't work". Thus, prior entrepreneurship experience can be associated with increased expertise and insider knowledge about how to start a new business and hence may foster nascent entrepreneurship among the unemployed.

In spite of such positive evidence of the role of entrepreneurship experience for nascent entrepreneurship, one can argue that taking the knowledge and learning from one venture experience to the next is very difficult since the circumstances that the entrepreneur faces and the decisions that she should take can differ considerably (Cassar, 2014). Such a difference can stem from having a new business idea dissimilar to the previous idea and targeting a different market with new competitors and customers. Even if the entrepreneur enters the same market with the same idea, market conditions (e.g., technology, rivalry) are likely to change over time. Hence, the value of learning in subsequent ventures may become dated and so may depreciate rapidly over time (Parker, 2013). This may weaken the positive effect of prior start-up experience on nascent entrepreneurship, although, overall, a pull effect is sufficiently plausible given that the other aforementioned positive forces may also have an influence (Hypothesis 2A below).

Since prior entrepreneurial experience involves previous exit, a significant proportion of these ventures will have been unsuccessful (Coad, 2014). Prior research suggests that the experience of failure or success can influence the future entrepreneurial behavior and decisions (Shepherd, 2003; Ucbasaran et al., 2010). The current occupational status of individuals matters for how they interpret their past experiences (Clark and Oswald, 1994). Even when the prior entrepreneurship experience was positive or similar for the unemployed and the paid-employed, it can be viewed differently by both groups. For instance, unemployment may lead to lower levels of internal locus of control among individuals (Goldsmith et al., 1996; Paul and Moser, 2009), i.e., the unemployed may believe that their current situation will not be much affected by decisions or actions that they take themselves. Furthermore, unemployment can lead to lower levels of self-esteem and confidence among individuals (Theodossiou, 1998). Such a decrease in internal locus of control and in self-esteem can decrease the likelihood of the unemployed giving themselves credit if they had a successful venture in the past. This, in turn, may discourage unemployed individuals with prior entrepreneurship experience to try to set up a new business again. Overall, one might expect the direct pull effect from prior entrepreneurial experience on nascent entrepreneurship to be stronger for the employed than the unemployed (Hypothesis 2B below).

An indirect pull effect of potential future employment on nascent entrepreneurship

Unlike education which can raise the probability of employment, prior entrepreneurship experience indicates a propensity for start-up and so it can deter employers from hiring such an individual for fear that she/he may take knowledge and customer/supplier contacts from their employer and start-up a competing business (Burke and To, 2001). In addition, prior entrepreneurship experience may imply that a person is a better fit for the start-up environment than for traditional employment (Markman and Baron, 2003; Zhao et al., 2010). Hence, prior entrepreneurship experience may signal to employers some undesirable traits such as being less manageable and adaptable. Employers, then, are less likely to hire persons with prior entrepreneurship experience compared to their counterparts without such experience (Koellinger et al., 2015). The ramifications of these type of effects for the employment earnings of former entrepreneurs are evident in Baptista et al. (2012), who find evidence in Portugal that the reward to business ownership experience is lower than the reward to paid-employment experience indicating that the labor market sets a penalty for prior entrepreneurship experience. Therefore, for the unemployed and in contrast to being more highly educated, having prior entrepreneurial experience is unlikely to generate an indirect pull effect of future employment on nascent entrepreneurship. This argument is therefore not in line with Hypothesis 2A below.

However, there is also a counterargument making the unemployed with prior entrepreneurship experience more likely to re-engage in entrepreneurship. Since much of the skills

learnt in entrepreneurship (both functional skills such as sales, marketing, and financial management as well as sector skills such as technology and industry specific social capital) have a value in employment, the only way that a person may be able to signal the possession of these valuable skills is to demonstrate them through practice. Therefore, if this has not been possible to do through employment, then one would expect an unemployed person to seek to demonstrate them in the only available economic activity left which is (another spell of) entrepreneurship (Hypothesis 2A below).

Likewise, if a person is already employed then there is a lower need to signal these skills as many can already be observed through their current job and therefore one would expect a weaker positive effect of prior entrepreneurial experience on nascent entrepreneurship for the employed than the unemployed (Hypothesis 2C below).

A peer group comparison push effect

We already noted the importance of social status (Easterlin, 2002) as a determinant of happiness. The entrepreneurial community typically holds senior executive positions in their businesses and entrepreneurs command much respect in society. Both stand in stark contrast to the social status of the unemployed. Therefore, an entrepreneur who finds her/himself unemployed might feel a strong peer group comparison push effect into nascent entrepreneurship in order to raise their sense of well-being. Likewise, the relationships that are formed from their peer group are important components of social capital that affect their sense of well-being (Helliwell and Putnam, 2004, Powdthavee, 2008). So former entrepreneurs who are currently unemployed will find a strong peer comparison group push effect into nascent entrepreneurship in order to avoid a sense of alienation from this entrepreneurial community. Therefore, the unemployed with prior entrepreneurial experience would be expected to have a greater tendency to engage in nascent entrepreneurship (Hypothesis 2A below).

Since employment can generate social status (and often in entrepreneurial domains such as innovation and intrapreneurship), one would imagine that this comparison group push effect from prior entrepreneurship experience would be weaker for the employed than the unemployed (Hypothesis 2C below).

Although predictions about the relationship between prior entrepreneurship experience and nascent entrepreneurship for the unemployed that follow from our three causation paths are to some extent mixed, the positive arguments tend to dominate. Therefore, we propose the following hypothesis:

Hypothesis 2A: Prior start-up experience has a positive association with nascent entrepreneurship among the unemployed.

Regarding the paid employed, we found arguments for a stronger effect (relative to the unemployed) according to the direct pull effect, and arguments for a weaker effect according to the indirect pull effect and the peer group comparison push effect. Therefore, we formulate two competing hypotheses:

Hypothesis 2B: The positive association of prior entrepreneurship experience with nascent entrepreneurship will be stronger for the paid-employed compared to the unemployed.

Hypothesis 2C: The positive association of prior entrepreneurship experience with nascent entrepreneurship will be weaker for the paid-employed compared to the unemployed.

2.3 Methodology

2.3.1 Data and sample

We make use of two separate individual-level datasets for the analysis: the Flash Eurobarometer and the Global Entrepreneurship Monitor (GEM). In particular, we use the Flash Eurobarometer survey number 283 and the GEM data, both for 2009, for 22 countries.[4] We choose these two specific datasets for two reasons. First, GEM and Eurobarometer are the largest datasets available allowing to study engagement in nascent entrepreneurship. Second, the richness of these datasets makes it possible to study determinants of nascent entrepreneurship separately among unemployed and paid employed individuals. Not only do these datasets make it possible to distinguish between nascent entrepreneurs from these two different labor market statuses, but, importantly, control groups are also available for both groups (i.e., unemployed and paid employed individuals *not* engaging in nascent entrepreneurship). We choose 2009, i.e., a year of economic crisis, as in times of crisis there are more unemployed individuals, making it more likely that we can find a big enough sample –with sufficient variation in characteristics– of unemployed individuals in the datasets.

Our samples include all unemployed and paid-employed individuals who participated in these two surveys. Both datasets contain information on whether someone is unemployed or paid-employed and on whether they were setting up a business at the time of the survey. In addition, both datasets have collected data on individuals' human capital and psychological traits. This, as a unique novel element of the current study, enables us to compare the findings of both datasets and to check which findings are robust.

[4] The 22 countries are: Greece, the Netherlands, Belgium, France, Spain, Hungary, Italy, Switzerland, Romania, the UK, Denmark, Norway, Germany, Iceland, Finland, Latvia, Croatia, Slovenia, the US, China, Japan, and Korea. We focus on these 22 countries since information on these countries is available in both datasets.

Table 1 shows a comparison between the two datasets in terms of sample size, gender, age, job status and the percentage of nascent entrepreneurs. This comparison shows that although the Eurobarometer sample size is much smaller, we do not see extensive differences in terms of sample characteristics.

Table 1: Sample characteristics of the two datasets

	GEM	***Eurobarometer***
Sample size	47,525	6,814
Gender (male % of total sample)	52.9%	46.0%
Age (average; in years)	41.9	43.5
The unemployed (% of total sample)	13.7%	10.3%
Nascent entrepreneurs (% of total sample)	3.7%	5.7%

2.3.2 Variables

Our dependent variable is a dummy indicating whether individuals are nascent entrepreneurs (i.e., whether they are actively taking steps to start up their own business) or not. According to the GEM survey, a person is considered a nascent entrepreneur if three conditions are fulfilled: if (s)he has taken some action to create a new venture in the past year, if (s)he expects to own at least part of the new venture, and if the firm has not paid wages or salaries for more than three months (Reynolds et al., 2002). The Flash Eurobarometer uses the following question to identify nascent entrepreneurs "are you currently taking steps to start a business?". A number of prior studies have used this dependent variable from either one of these two datasets (e.g., Grilo and Thurik, 2008; Van der Zwan et al., 2010; Minniti and Nardone, 2007). Unemployed individuals are identified in the usual manner, i.e., respondents answering affirmative to the statement "I am currently seeking employment" (GEM; see Koellinger, 2008, or Bergmann and Sternberg, 2007, for studies using this measure) or "I am currently seeking a job" (Eurobarometer).

Due to differences between the two surveys, the measures of our independent (i.e., human capital investment factors) and some of the control variables (i.e., (perceived) entrepreneurial skills, risk-taking attitude, optimism, and household income) are articulated somewhat differently in each dataset, as illustrated in Table 2.

Table 2: Independent and control variables' measures

Variable	GEM question/variable type	Flash Eurobarometer question/variable type
Level of formal education	A medium level of education is defined as completing secondary school. A high level of education is defined as having a post-secondary degree/ Two dummy variables for medium and high levels of education	Age at which individual finished full-time education.
Prior entrepreneurship experience	"Have you, in the past 12 months, sold, shut down, discontinued or quit a business you owned and managed, any form of self-employment, or selling goods or services to anyone?"/ A binary variable coded 1 if the answer is yes and 0 otherwise.	No question.
Perceived entrepreneurial skills	"Do you have the knowledge, skills and experience required to start a new business?"/ A binary variable coded 1 if the answer is yes and 0 otherwise.	An indirect set of measures based on the following four statements: 1) "My school education gave me skills and know-how that enable me to run a business." 2) "My school education helped me to develop my sense of initiative- a sort of entrepreneurial attitude." 3) "My school education helped me to better understand the role of entrepreneurs in society." And 4) "My school education made me interested in becoming an entrepreneur."/ Binary variables coded 1 when the responses to the statements are "strongly agree" or "agree" and 0 otherwise.
Risk taking attitude	"Would the fear of failure prevent you from starting a business?"/ A binary variable coded 1 if the answer is yes and 0 otherwise.	The general willingness to take risks, which has been scaled from 1 (strongly agree) to 4 (strongly disagree)/ A binary variable that is coded 1 when the answer is "strongly agree" or "agree" and 0 otherwise.
An optimistic view of the future	No question.	To what extent is the respondent optimistic about the future?/ A binary variable that is coded 1 when the answer is "strongly agree" or "agree" and 0 otherwise.
Household income	Income recorded into thirds (lowest 33%tile, middle 33%tile and upper 33%tile) and coded as 1, 2	"Which of the following statements best describe your feelings about your household's income

or 3 accordingly.	these days? / A categorical variable coded as 1 if the answer is "live comfortably on current income", 2 if the answer is "get by on current income", 3 if the answer is "find it difficult to manage on current income or 4 if the answer is "find it very difficult to manage on current income".

Entrepreneurial skills and knowledge are included as a control variable since these can influence alertness and consciousness regarding the discovery of opportunities (Davidsson and Honig, 2003), which may positively influence nascent entrepreneurship. Risk-taking attitude and an optimistic view of the future are included as two important psychological traits which can cause people to view new information in the form of opportunities rather than risks (Sarasvathy et al., 1998). This can subsequently influence the decision to engage into nascent entrepreneurship. We also include entrepreneurial networks as a control variable (a dummy variable coded 1 when respondents personally know someone who started their own business in the past 2 years; only available in GEM), since such networks may serve as role models or help to assemble the relevant resources needed for entering entrepreneurship (Bosma et al., 2012) as well as a variable on how entrepreneurs are perceived (dummy variable labeled 'perception of entrepreneurs', coded 1 for those agreeing with the statement that "entrepreneurs only think about their own wallet", only available in Eurobarometer), since this may affect whether entrepreneurship is viewed as a desirable career choice and hence may impact decisions to become a nascent entrepreneur. Besides, a number of other variables including gender (a dummy variable coded 1 for males) age (in number of years), age-square, and (perception of) household income (see Table 2) are added to the regression models as further control variables. The selection of these additional control variables is derived from prior literature on the determinants of entrepreneurship (e.g., Davidsson and Honig, 2003). We also include country dummies in order to account for structural country differences in the propensity for nascent entrepreneurship. Moreover, these dummies help control for differences in sampling frames among countries. Current occupational status, i.e., unemployment (coded 1) versus paid employment (coded 0) is also included in our first model variant (as explained in the following section).

2.3.3 Method

Given the binary nature of the dependent variable, we use logistic regression models to test our hypotheses. The first model includes the full sample of unemployed and paid-employed individuals. In this model, we investigate whether labor market status (i.e. being unemployed versus being paid-employed) is associated with being a nascent entrepreneur as has been put forward in prior studies (Evans and Leighton, 1990; Carrasco, 1999). If

this is the case it provides a further rationale for distinguishing the unemployed from the paid employed as we do in our study. The second model focuses exclusively on unemployed individuals and investigates whether human capital investment factors are associated with the entrepreneurial decisions of the unemployed. This model is used to test hypotheses 1A and 2A. In the third model, we conduct the same exercise while focusing only on the group of paid-employees. The third model is developed to compare the results for the unemployed with those for the paid-employed to test hypotheses 1B, 2B, and 2C.

2.4 Results

2.4.1 Results using GEM data

Tables 3-5 show the descriptive statistics and correlation coefficients between the dependent and independent variables of the model for the full GEM sample, the unemployed and the paid-employed, respectively. Correlations between independent variables are generally low, except for the medium and high education dummies which are correlated by construction. The highest variance inflation factor (VIF) value related to our regressions (including control variables) is as low as 2.17 though, effectively ruling out problems of multicollinearity (the lower bound above which multicollinearity may be present is usually taken to be five).

Table 3: Descriptive statistics and correlations for the full sample (GEM data)

	No of Observations	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*
1. Nascent entrepreneurship	47,525	0.037	0.189						
2. Job status *(i.e. unemployed versus paid-employed)*	47,525	0.137	0.345	0.018***					
3. Medium level of education	47,525	0.305	0.460	0.004	-0.025***				
4. High level of education	47,525	0.468	0.499	0.031***	-0.096***	-0.620***			
5. Entrepreneurial experience	47,496	0.033	0.178	0.085***	0.061***	0.005	-0.005		
6. Entrepreneurial skills	47,525	0.515	0.500	0.140***	-0.014***	-0.034***	0.094***	0.120***	
7. Fear of failure	47,525	0.430	0.490	-0.070***	0.040	-0.018***	-0.020***	-0.030***	-0.120***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 4: Descriptive statistics and correlations for the unemployed (GEM data)

	No of Observations	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*
1. Nascent entrepreneurship	6,524	0.046	0.209					
2. Medium level of education	6,524	0.276	0.446	0.017				
3. High level of education	6,524	0.348	0.476	0.063***	-0.450***			
4. Entrepreneurial experience	6,522	0.060	0.238	0.080***	0.014	0.020*		
5. Entrepreneurial skills	6,524	0.497	0.500	0.168***	-0.011	0.126***	0.170***	
6. Fear of failure	6,524	0.477	0.500	-0.098***	-0.007	-0.054***	-0.010	-0.130***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 5: Descriptive statistics and correlations for the paid-employed (GEM data)

	No of Observations	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*
1. Nascent entrepreneurship	41,001	0.036	0.185					
2. Medium level of education	41,001	0.309	0.462	0.002				
3. High level of education	41,001	0.487	0.487	0.027***	-0.653***			
4. Entrepreneurial experience	40,974	0.029	0.167	0.086***	0.006	-0.003		
5. Entrepreneurial skills	41,001	0.517	0.500	0.136***	-0.038***	0.088***	0.110***	
6. Fear of failure	41,001	0.419	0.493	-0.070***	-0.020***	-0.019***	-0.025***	-0.120***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%

Table 6 shows the results of the logistic regression using GEM data. At the top of the table, we report the predicted probabilities of being a nascent entrepreneur. The predicted probabilities slightly differ from the prevalence rates reported in Tables 3 to 5 (descriptive statistics) due to missing observations for some control variables in the regression analyses. Each model has three columns. The first column demonstrates the absolute marginal effects that have also been adopted by prior entrepreneurship studies (e.g., Caliendo et al., 2009; Millán et al., 2013). Absolute marginal effects show how much the predicted probability (or P(Y=1)) changes if the independent variable changes with one unit (for dummy variables: from 0 to 1), holding all other variables constant at their means. The second and the third columns show coefficients and t-statistics, respectively.

As we expected, there is a significant positive relationship between being unemployed and the likelihood to engage in nascent entrepreneurship (model I of Table 6). Since the job status variable is a dummy, the interpretation of the marginal effect is rather straightforward. When someone is unemployed, a marginal effect of 2.1%-point is reported. This means that the predicted probability of nascent entrepreneurship increases from 4.1% to 6.2% when the person is unemployed compared to being paid-employed. Furthermore, model I shows a significant positive relationship between the human capital investment factors (i.e., formal education and prior entrepreneurship experience) and the probability of being a nascent entrepreneur for the full sample. The control variables are either non-significant or are significant with the expected sign.

Before we go on discussing the results for models II and III, i.e., the models we use to test our hypotheses, it is important to mention that a likelihood-ratio Chow test testing the null hypothesis that the model coefficients are similar between the unemployed and paid-employed subsamples, was strongly rejected (at 0.0001 significance level). Hence, it is clearly relevant to estimate the model separately for unemployed and paid employed individuals. However, this result does not imply that each individual variable has a different effect for the two subsamples.

Model II focuses on whether and to what extent the human capital investments of the unemployed may be associated with their entrepreneurial decisions. Regarding formal education, our results show that a high level of education has a significant positive association with becoming a nascent entrepreneur, providing support for hypothesis 1A. Comparing Model II and Model III, we find that the marginal effect for the unemployed (2.7%-point) is more than twice as high as that for the paid-employed (1.2%-point), where both effects are significantly different from zero at the 1% level. However, a comparison of coefficients and t-values shows that the 95%-confidence intervals overlap, i.e., that this difference in marginal effects is not statistically significant. Hence, hypothesis 1B is not formally supported.

We find that prior entrepreneurship experience, for the unemployed, has no significant relationship with nascent entrepreneurship (model II of Table 6). This finding does not support hypothesis 2A. As we saw in the theory section, there are different theoretical arguments supporting positive and negative associations. Apparently, in practice these arguments cancel each other out. From Model III, we can observe that for the paid-employed, prior entrepreneurship experience has a positive relationship with nascent entrepreneurship which is significant at the 1% level. Hence, hypothesis 2B is supported by this finding; thereby rejecting hypothesis 2C. This, in turn, suggests, that the direct pull effect explanation, stating that unemployed individuals with prior entrepreneurship experience may be discouraged to try entrepreneurship again, possibly due to a lower self-esteem and confidence associated with the state of unemployment, is more influential in practice than the indirect pull effect and the peer group comparison push effect explanations, both of which predicted a weaker effect for the paid employed, i.e., a stronger effect for the unemployed (hypothesis 2C).

2.4.2 Results using Flash Eurobarometer data

Tables 7-9 show descriptive statistics and correlations between the dependent and independent variables using the Flash Eurobarometer data for the full, unemployed and paid-employed samples, respectively. Again, there are no high correlations between the independent variables, effectively ruling out the possibility of multicollinearity (highest VIF value, including control variables, 1.73).

Table 6: Results of the logistic regression (GEM, Dependent variable: nascent entrepreneurship)

Models	*Model I (full sample)*			*Model II (the unemployed)*			*Model III (the paid-employed)*		
Predicted probabilities (for sample means)	*0.041*			*0.057*			*0.039*		
Variables	*Marginal effects*	*Coefficients*	*t-statistics*	*Marginal effects*	*Coefficients*	*t-statistics*	*Marginal effects*	*Coefficients*	*t-statistics*
Job status (i.e. unemployed versus paid-employed)	0.021	0.57***	6.67						
Human capital investment factors									
Medium education	0.0088	0.24**	2.46	0.023	0.46**	2.19	0.0064	0.18*	1.68
High education	0.013	0.38***	4.07	0.027	0.55***	2.78	0.012	0.33***	3.17
Prior entrepreneurial experience	0.024	0.66***	6.88	0.017	0.35	1.59	0.027	0.77***	7.17
Control variables									
Gender(male=1)	0.0076	0.208***	3.52	0.019	0.39***	2.59	0.0057	0.16**	2.53
Age	-0.00040	-0.011	-0.72	0.0047	0.096	2.62	-0.0012	-0.034**	-2.08
Age-square	-0.000052	-0.00014	-0.79	-0.000067	-0.0014***	-2.98	0.000040	0.00011	0.58
Household income	-0.000034	-0.00093	-0.22	0.00071	0.015*	1.66	0.000038	-0.0011	-0.23
Entrepreneurial skills	0.059	1.59***	19.20	0.088	1.79***	8.26	0.054	1.56***	17.21
Fear of failure	-0.019	-0.52***	-8.07	-0.036	-0.74***	-4.65	-0.016	-0.47***	-6.60
Entrepreneurial networks	0.027	0.75***	12.15	0.030	0.62***	4.21	0.027	0.76***	11.18
Constant		-3.76***	-11.10		-5.68***	-6.85		-3.24***	-8.92
[Country dummies added to the model]		Yes			Yes			Yes	
Sample Size		35,663			4,338			31,183	
Wald χ^2		1,558.59			265.49			1,325.67	
(Pseudo) R-Square		0.14			0.16			0.14	

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 7: Descriptive statistics and correlations for the full sample (Flash Eurobarometer data)

	No of Observations	*Mean*	*SD*	*1*	*2*	*3*
1. Nascent entrepreneurship	6,547	0.057	0.231			
2. Job status (*unemployed =1)*	6,547	0.103	0.304	0.066***		
3. Level of education	6,547	20.98	5.460	0.032***	-0.088***	
4. School helped to have entrepreneurial skills	6,547	0.419	0.494	0.0501***	0.007	0.122***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 8: Descriptive statistics and correlations for the unemployed sample (Flash Eurobarometer data)

	No of Observations	*Mean*	*SD*	*1*	*2*
1. Nascent entrepreneurship	676	0.102	0.303		
2. Level of education	676	19.560	5.100	0.046	
3. School helped to have entrepreneurial skills	676	0.429	0.495	0.063	0.070*

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 9: Descriptive statistics and correlations for the paid-employed sample (Flash Eurobarometer data)

	No of Observations	*Mean*	*SD*	*1*	*2*
1. Nascent entrepreneurship	5,871	0.052	0.221		
2. Level of education	5,871	21.150	5.480	0.037***	
3. School helped to have entrepreneurial skills	5,871	0.418	0.493	0.048***	0.129***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 10 shows the results of the logistic regression for the Flash Eurobarometer sample. The first model shows similar regression results as the GEM results in the sense that the unemployed are more likely to become nascent entrepreneurs than the paid-employed. Here, the average absolute marginal effect demonstrates that the unemployed on average are 3.1%-point more likely to be nascent entrepreneurs compared to the paid-employed. Additionally, formal education is positively associated with the probability of becoming a nascent entrepreneur. The control variables are either non-significant or are significant with the expected sign.

Again, the likelihood-ratio Chow test indicates that, considering the full model, the results for the unemployed (Model II) and paid employed (Model III) samples are significantly different, warranting separate estimation. Model II examines the relationship between the human capital investments of the unemployed and their propensity to be a nascent entrepreneur. Years of education shows a significant positive relationship with nascent entrepreneurship among the unemployed, where each additional year of education is associated with an increase in the probability of nascent entrepreneurship of 0.42%-point. This finding thus supports hypothesis 1A. Model III shows the results of the regression for the sample of paid-employed individuals. Comparing the marginal effects of an additional year of education, we see that it is much higher for the unemployed (0.42%-point) than for the paid-employed (0.12%-point). However, similar to the GEM results (Table 6), the difference is not statistically significant so that hypothesis 1B is not formally supported.

2.4.3 Combining the results from the two datasets

We have now tested our hypotheses using two separate datasets. When combining our results for the two datasets, what can we conclude overall regarding our hypotheses? First, regarding the relation between formal education and nascent entrepreneurship among the unemployed, both when using the GEM indicator (high education dummy) and when using the Flash Eurobarometer indicator (age of finishing full-time education), significant and positive relations were found among the unemployed. Hence, it is safe to conclude that our empirical analysis supports hypothesis 1A.

Second, regarding hypothesis 1B, stating that this relation is stronger for the unemployed compared to the paid employed, in both cases we found that our estimated marginal effect was considerably stronger for the unemployed, i.e., consistent with the direction of our hypothesis, but that the difference in marginal effects was not statistically significant. Hence, we cannot exclude that the effect of formal education on nascent entrepreneurship is similar for the unemployed and the paid employed. However, since we find this pattern for both datasets, where, using GEM data, the estimated marginal effect among the unemployed is more than twice as high as that for the paid employed, and using Flash Euroba-

rometer data, even more than three times as high, we take these outcomes as support, albeit somewhat weak support, for our hypothesis 1B.

Third, regarding the relation between prior entrepreneurship experience and nascent entrepreneurship, a measure for prior experience was unfortunately only available for one dataset, viz. GEM. Hence, regarding prior experience, our conclusions are the same here as discussed before (Section 4.1): we found no significant relation among the unemployed, i.e., hypothesis 2A is not supported, whereas we did find a significant positive effect among the paid employed, supporting hypothesis 2B (but not 2C).

To conclude this results section, we report on a robustness check. In particular, it might be the case that results are dependent on the stage of economic development (Wennekers et al. 2005). To test whether this makes a difference, we included only developed countries (i.e., Greece, the Netherlands, Belgium, France, Spain, Hungary, Italy, Switzerland, the UK, Denmark, Norway, Germany, Iceland, Finland, Slovenia, the US, and Japan) in the sample and, for both datasets, the results are similar to our findings using all countries. Detailed results of this robustness check are available upon request from the authors.

Table 10: Results of logistic regression (Flash Eurobarometer, Dependent variable: nascent entrepreneurship)

Models	*Model I (full sample)*			*Model II (the unemployed)*			*Model III (the paid-employed)*		
Predicted probabilities (sample means)	*0.057*			*0.109*			*0.051*		
Variables	*Marginal effects*	*Coefficients*	*t-statistics*	*Marginal effects*	*Coefficients*	*t-statistics*	*Marginal effects*	*Coefficients*	*t-statistics*
Job status (i.e., unemployed versus paid-employed)	0.031	0.62***	3.86						
Human capital investment factors									
Level of education (age finished full time education)	0.0014	0.032***	2.96	0.0042	0.052*	1.78	0.0012	0.027**	2.29
Control variables									
Gender (male=1)	0.019	0.38***	3.31	0.083	1.06***	3.52	0.013	0.29**	2.21
Age	-0.0014	-0.032	-1.06	0.0062	0.081	1.14	-0.0029	-0.061**	-2.09
Age-square	0.0000012	-0.000017	-0.08	0.000016	-0.0013	-1.45	0.000016	0.00036	0.95
Perception of household income	0.0071	0.012	0.25	0.019	0.25	1.33	-0.0036	-0.079	-0.87
My school gave me start up skills and know-how	0.0062	0.18	0.98	0.016	0.19	0.60	0.0063	0.18	0.96
My school helped me develop an entrepreneurial attitude	0.0014	0.091	0.16	-0.0011	-0.041	-0.06	0.0014	0.12	0.14
My school made me interested to become an entrepreneur	0.022	0.52***	3.34	0.050	0.081*	1.84	0.019	0.50***	2.91
Risk taking attitude	0.025	0.52***	3.68	-0.038	-0.49	-1.34	0.034	0.74***	4.63
Optimistic attitude towards future	0.018	0.37**	2.17	0.086	1.09**	2.44	0.010	0.22	1.16
Perception of entrepreneurs	-0.020	-0.42***	-3.40	-0.038	-0.50	-1.54	-0.017	-0.37***	-2.81
Constant		-5.18***	-5.22		-4.53***	-3.17		-4.01***	-3.82
[Country dummies added to the model]		Yes			Yes			Yes	
Sample size		6,547			630			5,924	
Wald χ^2		379.36			106.38			296.96	
(Pseudo) R Square		0.14			0.23			0.13	

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

2.5 Discussion and conclusion

As Sarasvathy (2004) suggests, studying specific subgroups of entrepreneurs could be more informative than classifying individuals as entrepreneurs or non-entrepreneurs. The results of this chapter indicate that distinguishing between individuals with different labor market statuses is vital to understanding determinants of engagement into nascent entrepreneurship. In line with previous studies, we find that the unemployed are more likely to opt for nascent entrepreneurship than the paid-employed. However, not much is known about characteristics, and in particular human capital investment factors, of those unemployed who choose to engage in nascent entrepreneurship. The contribution of chapter two of this dissertation is threefold. Firstly, using three different causation paths (i.e., a direct pull effect of entrepreneurship, an indirect pull effect of potential future employment on nascent entrepreneurship and a peer group comparison push effect), we theoretically derive hypotheses as to how the impact of two human capital investment factors (i.e., formal education and prior entrepreneurship experience) on the probability of being engaged in nascent entrepreneurship, may differ between the unemployed and the paid employed. Secondly, we conduct separate empirical analysis to investigate the relationship between these two human capital investment factors on the decision to enter nascent entrepreneurship for both the unemployed and the paid employed. We also conduct comparative analysis of these results for these two groups. Thirdly, we use two different data sets (GEM and Flash Eurobarometer) to corroborate our results (at least for formal education; prior entrepreneurship experience is only available in one of the two datasets).

We theorized for a positive relationship between formal education and nascent entrepreneurship among the unemployed due to: (1) a high (expected) net increase in utility resulting from entrepreneurship due to a higher ability to find and exploit profit opportunities in combination with relatively low opportunity costs (the direct pull effect of entrepreneurship), (2) a greater desire among educated unemployed (relative to uneducated unemployed) to signal the value of their skills to future employers through entrepreneurship (the indirect pull effect of potential future employment on nascent entrepreneurship), and (3) a greater pressure among educated unemployed to match the career success of their educated peers (the peer group comparison push effect). For both datasets we find that formal education is indeed positively related to nascent entrepreneurship among the unemployed. We also hypothesized that the relationship between formal education and nascent entrepreneurship would be stronger for the unemployed compared to the paid employed. Although we did indeed find that marginal effects were considerably stronger for the unemployed, the difference with the paid employed sample was not significant. Nevertheless, since we found this same pattern in both datasets, we took it as weak support that the relation might be stronger for the unemployed.

Regarding the relationship between prior entrepreneurship experience and nascent entrepreneurship, our theorizing led to more mixed predictions, both in terms of the sign of this relationship for the unemployed, and in terms of its relative strength for the paid employed compared to the unemployed. Our empirical analysis provided no evidence for a relationship between prior experience and the propensity for the unemployed to engage in nascent entrepreneurship. However, we did find evidence for a significant and positive relationship for the paid employed. These findings are in line with the argument that the paid-employed are more likely to view their entrepreneurship experience as a positive experience. This may be due to their current occupational conditions where they have a job and an income. This positive attitude can stimulate them to learn from their past experience (e.g., by collecting feedback) and not make the same mistakes again (Ucbasaran et al., 2010). In contrast, the unemployed may suffer from lower levels of self-esteem and confidence (Goldsmith et al., 1996; Theodossiou, 1998), possibly discouraging them to engage in nascent entrepreneurship, even if they have positive prior experiences.

As mentioned, for both our datasets we found a positive association between formal education and nascent entrepreneurship for the unemployed, with higher estimated marginal effects compared to the paid employed samples. Although this difference was not statistically significant, what is clear from our findings is that the importance of formal education for engagement in nascent entrepreneurship is at least as high among the unemployed as compared to the paid employed. Based on these findings, we argue that concerns about a lack of required skills to start and run a viable business by the unemployed are overstated. In fact, our study reveals that a more capable sub-group of unemployed individuals selects into nascent entrepreneurship. Nevertheless, we recognize that this does not necessarily imply that higher educated nascent entrepreneurs who were formerly unemployed are also more likely to succeed in actually starting a business or in achieving high firm performance once the firm is up and running (i.e., entrepreneurship metrics 2 and 3 identified in the Introduction). Hence, the question of whether the government should stimulate the unemployed to become self-employed remains open. Clearly, if entrepreneurship-stimulation programs are to be implemented, incentives for program participants must be such that adverse selection (i.e., the selection of the unemployed with low entrepreneurial ability) into entrepreneurship is avoided (Van Stel and Storey, 2004).

To test the robustness of our results, we estimated our models using two datasets. We believe this is a strength of our chapter, especially in a research culture that does not sufficiently emphasize replicability (Evanschitzky et al., 2007; Hubbard et al., 1998). Recent debates on the importance of replicability of results in the field of entrepreneurship (e.g., Honig and Samuelsson, 2014; Davidsson, 2015) have shown that more scholarly attention should be devoted to this matter. In our study, the robust results for formal education across the two datasets enabled us to more firmly draw conclusions.

One of the limitations of this study is our cross-sectional set-up, which makes that the statistical relations between the variables presented in this chapter should be regarded as associations rather than as causal relations. In addition, we cannot exclude that our results are to some extent driven by how nascent activity is identified in our datasets, i.e., as one snapshot in time. Higher educated people may need more time to establish their business because they aim at larger firms (Cassar, 2006). Thus, assuming that among the group of nascent entrepreneurs, the higher educated spend more time in nascent entrepreneurship than the lower educated, the chances that the GEM and Eurobarometer surveys capture highly educated nascents might be higher than for lower educated nascents. Data on the duration of nascent activity would be needed to overcome this limitation (Yang and Aldrich, 2012).

Several directions for future research are suggested. For instance, our data do not allow us to identify which of the three causation paths derived in our theory section actually drive our empirical results regarding formal education. Future research may look into this. Also, future studies could seek to include information on the type of entrepreneurship experience (e.g., success or failure) to shed further light on the influence of prior experience on engagement into nascent entrepreneurship. Another direction for future studies could be to investigate, among the unemployed, the influence of regional or country-level variables (e.g., unemployment legislation, hiring and firing costs) on the likelihood to opt for nascent entrepreneurship. For instance, higher hiring and firing costs could positively relate to the self-employment decisions of the unemployed, as high labor market rigidity will make it more difficult to find a paid job. Furthermore, new studies can investigate other important individual characteristics of the unemployed and paid-employed subgroups, such as industry experience, the locus of control and the need for success. Finally, it could be interesting to investigate, within the group of unemployed individuals, whether the relationship between human capital investments and nascent entrepreneurship is dependent on the duration of unemployment.

Chapter 3

Human Capital as a Driver of Innovation Among Necessity-based Entrepreneurs

Based on Darnihamedani and Hessels (2016)

Abstract

Although often treated as one group, necessity-based entrepreneurs are heterogeneous in terms of their backgrounds, ambitions and performance. For instance, some of them introduce new products or services to the market while others do not. To gain more insights into this heterogeneity, this chapter investigates the drivers of innovation among necessity entrepreneurs taking a human capital perspective. We apply various two stage probit models correcting for potential selection biases (in particular for entry into entrepreneurship) using individual-level data for over 80 countries from the Global Entrepreneurship Monitor (GEM) from 2002 to 2011. We find that necessity entrepreneurs with high levels of formal education are more likely to be involved in product and process innovations. Furthermore, our results suggest that prior entrepreneurship experience is not or at best weakly related to innovation whereas perception of entrepreneurial skills is positively related to (product) innovation.

3.1 Introduction

Entrepreneurs are assumed to be the source of innovation and creativity by many scholars and policy-makers. Audretsch and Thurik (2001) argued that entry stimulates existing companies and (other) entrants to innovate, mainly as a result of increased competition. Thus, entry often means more competition over customers. Existing companies, in order to keep up with rivals, either provide new products to the market or provide current products through different channels (Drucker, 1985, p. 50). Although entrepreneurs may stimulate competition and innovation in the market, they are not equally engaged in innovation. Recent empirical findings suggest that some entrepreneurs demonstrate a higher propensity to engage in innovation than other entrepreneurs (Poschke, 2013; Anokhin and Schulze, 2009; Block et al., 2015). According to these studies, start-up conditions (e.g., the reasons an entrepreneur has to start a business) are one of the main determinants of engagement in innovative activities. This is mainly because such conditions can influence the future trajectory of the firm for a long period of time (Baron and Ensley, 2006).

Triggered by empirical observations such as the Global Entrepreneurship Monitor (GEM) study, a number of researchers have pointed to two differing groups of entrepreneurs with dissimilar start-up conditions and potentially diverging macro-economic impacts i.e., opportunity versus necessity based entrepreneurs (Schjoedt and Shaver, 2007; Acs et al., 2005; McMullen et al., 2008). The first group corresponds with the view that entrepreneurs create their venture based on discovering and exploiting an opportunity, and the second group of entrepreneurs are those who have been pushed by unpleasant conditions to start their own business (e.g., by a lack of alternative career options). Prior studies find that the reasons entrepreneurs had to start a business (i.e., necessity-based versus opportunity-based reasons) influence their strategic decisions such as their competitive and marketing strategies (Block et al., 2015; Baptista et al., 2014).

Although the distinction between necessity and opportunity entrepreneurs helped to better understand the diverging impact of start-up conditions on post-entry strategic decisions and performance of entrepreneurs, one often mentioned critique is that the opportunity-necessity distinction is too crude and does not do justice to the diversity in both groups' members (Williams and Williams, 2011; Block and Wagner, 2007). Prior studies assume that there is a correlation between start-up conditions, human capital and resource endowments (Block et al., 2015; Hessels et al., 2008). While this assumption may be partly true, it does not point to the heterogeneity existing within the sub-groups of necessity (or opportunity) entrepreneurs. Individuals with diverse background (e.g., high or low levels of education) may lose their job and start a business out of necessity. Such diverse backgrounds can differently influence individuals' entrepreneurial behavior and decisions.

Thus, besides inter-group differences between necessity and opportunity entrepreneurs, there may be intra-group dissimilarities that may also play an important role for

strategic decisions of entrepreneurs. We argue that studying sub-groups of necessity (or opportunity) entrepreneurs with heterogeneity in terms of individual characteristics (e.g., human capital) can explain a considerable amount of entrepreneurs' behavior and decisions. Engagement in innovation is an important early-stage entrepreneurial decision that is influenced by individual characteristics of the entrepreneur, next to his/her startup conditions. Individual characteristics, such as human capital factors, can influence the creativity, critical thinking ability and propensity of finding and realizing a novel idea by the entrepreneur.

We build our arguments mainly on human capital theory to investigate the determinants of innovation among necessity entrepreneurs. Human capital theory implies that investments in human capital would enable someone to produce economic value in the future (Becker, 1993; Schultz, 1959). Entrepreneurship studies (Baptista et al., 2014; Davidsson and Honig, 2003) have found that higher amounts of human capital help individuals to find and exploit more novel business opportunities. Some recent findings indicate that human capital may be important for the productivity of necessity entrepreneurs. Block and Sandner (2009) for example, found that opportunity entrepreneurs stay longer in self-employment than necessity entrepreneurs, mainly due to higher levels of education. They suggest that if necessity entrepreneurs are provided with higher levels of human capital (i.e., education), they will be better prepared for self-employment and will eventually survive longer.

This chapter aims at investigating the conditions in which necessity entrepreneurs innovate in terms of product and process innovations. Hence, focusing on the role of human capital investment, which is among the most important influencers of entrepreneurial decisions (Davidsson and Honig, 2003), we try to understand to what extent and in what ways necessity entrepreneurs may decide to devote time and efforts to innovation.

Throughout the chapter, among different possible definitions of entrepreneurship, we perceive entrepreneurship as business creation or new organizational development in line with Gartner (1985). The outline of the chapter is as follows: first, we develop a number of hypotheses based on prior literature. Subsequently, the data and methodology to test the hypotheses are discussed. Since we suspect that there may be a self-selection bias (mainly because those who select into entrepreneurship might have higher levels of human capital than those who do not select into entrepreneurship), we adopt Heckman bi-probit models to correct for such a bias. After describing and discussing the regression results, we present main conclusions and highlight some (policy) implications.

3.2 Theory and hypotheses

3.2.1 Necessity entrepreneurs and innovation

Prior studies investigate determinants of innovative entrepreneurship using environmental and individual perspectives. Considering the environmental determinants, a number of scholars refer to the knowledge spillover theory of entrepreneurship and argue that entrepreneurs exploit innovative opportunities using new knowledge that was created, but not exploited, by incumbent firms (Acs et al., 2009; Agarwal et al., 2007; Ghio et al., 2015). According to these scholars, entrepreneurs convert new and unexploited knowledge into what Arrow (1962) calls economic knowledge (Acs et al., 2008). Scholars who focus on individual determinants of innovative start-ups have used the product and process innovation dichotomy to understand what types of innovative activities could be undertaken (Adner and Levinthal, 2001; Romero and Martinez-Roman, 2012; Dakhli and De Clercq, 2004). When innovation is oriented toward introducing a new product (or service) to customers, it is labeled as product innovation and when it is oriented toward introducing new procedures or technologies to create value, it is considered as process innovation (Utterback, 1978; Adner and Levinthal, 2001). Because product and process innovations differ in terms of nature and requirements, we believe that this distinction provides us with a clearer picture of how start-up companies innovate.

While several studies have investigated the propensity of small and young firms to innovate versus that of large firms (Acs and Audretsch, 1987; Acemoglu et al., 2014), the propensity to innovate of sub-groups of entrepreneurs with different start-up conditions has received far less attention so far. Koellinger (2008), as an exception, using GEM data for 2002-2004, found that individuals who were formerly unemployed, are more likely to start innovative than (purely) imitative ventures. He argues that individuals in loss are usually more inclined to take risks to get back to their reference point. Their inclination to innovation can be attributed to their extra effort to get back to their income reference point. Thus, necessity entrepreneurs are mainly under survival pressure and hence may, at least to some extent, tend to engage in innovative activities.

However, other studies, arguing that start-up conditions can influence the preparation of the entrepreneur for the new venture, found quite different results (Block et al., 2015, Aldrich and Martinez, 2015). Necessity entrepreneurs have lower access to resources important for creating a new venture and they must make do with whatever resources they can access (Aldrich and Martinez, 2015). Thus, necessity entrepreneurs as compared to non-necessity entrepreneurs are less ready, in terms of prior human and social capital investments, to start a business (Block and Wagner, 2010). Necessity entrepreneurs are also less prepared to start a new venture compared to non-necessity entrepreneurs in terms of gathering resources for starting a new venture. The main reason for this is that necessity entrepreneurs experience substantial time pressure to find income sources (Block and

Wagner, 2007). So a rational choice for necessity entrepreneurs is to imitate some other firms in the industry. This is mainly because learning is a slow process while information search is costly and time consuming (Aldrich and Martinez, 2015).

As mentioned earlier, the distinction between product and process innovation is useful to understand how start-ups and small firms can be involved in innovative activities. Necessity entrepreneurs may not be able to find novel business opportunities and even if they do, we suspect that identified opportunities are not the main stimulators for them to start a business. In fact, for necessity entrepreneurs, who are pushed into entrepreneurship due to a lack of income sources, being novel and innovative has possibly a lower priority compared to having a reliable source of income and to making the new business survive. This may discourage necessity entrepreneurs from engagement in product innovation since innovation is a risky path with possible unknown, or even undesirable, outcomes. In addition, and because of lower investments in human capital (Block and Sandner, 2009) and of being less prepared for entrepreneurship (Block and Wagner, 2010), necessity entrepreneurs may be less cognitively "open" than other entrepreneurs to novel business opportunities in the market.

Regarding process innovation, we suspect that necessity entrepreneurs are less likely to access information regarding new technologies or procedures. This is partly because necessity entrepreneurs have, on average, made lower investments in human capital compared to other entrepreneurs (Baptista et al., 2014). In addition, necessity entrepreneurs may have limited access to start-up capital (Van Stel et al., 2007). Such a financial constraint can make the adoption of new technologies even more difficult for necessity entrepreneurs. New technologies and procedures could be expensive and necessity entrepreneurs may not be able to afford these because of limited access to financial resources.

In spite of being pushed into entrepreneurship, necessity entrepreneurs may still be prone to innovation if they benefit from the right set of skills and knowledge. In the following sub-sections, we investigate the role of general and entrepreneurship-specific human capital factors to understand how these factors can influence necessity entrepreneurs' engagement in innovation.[5]

3.2.2 Human capital factors and innovativeness of necessity entrepreneurs

Becker (1993, p. 246) argues, based on evidence from American college and high school graduates, that college graduates seem to be more "able" than high-school graduates even after controlling for the effect of college education. According to Davidsson and Honig (2003), having the requisite human capital -defined as the stock of knowledge, capabili-

[5] We recognize that many (but not all) arguments provided in the discussion below apply to opportunity entrepreneurs as well.

ties, social and personality traits, embodied in the ability to carry out labor so as to produce economic value- such as relevant skills and training, is crucial for opportunity identification and exploitation. Audretsch et al. (2006) argue in the context of small and young firms that a firm's capability to exploit knowledge relies mainly on entrepreneurs' and managers' human capital. Hence, the role of human capital for finding new opportunities and for innovation has been recognized in the entrepreneurship literature.

We argued earlier that human capital theory can provide useful insights into understanding the possible heterogeneity among necessity entrepreneurs in terms of their innovative performance. In the following sub-sections, we argue how some of the most important human capital factors (i.e., formal education, prior entrepreneurship experience and entrepreneurial skills) can influence the innovative performance of necessity entrepreneurs.

Formal education

Prior studies do not look into the role of formal education for the innovative propensity of entrepreneurs who are pushed into entrepreneurship. However, there has been some evidence in the literature that formal education can increase necessity entrepreneurs' likelihood to innovate. First, higher levels of educational attainment would lead to the development of sets of skills that are useful across a wide range of occupational alternatives and show a significant positive relation with entrepreneurs' venture growth (Gimeno et al., 1997). Honig (1996) found that having a higher level of education associates positively with higher profitability among Jamaican entrepreneurs and specifically attending college or university made the biggest difference for this. Second, higher levels of formal education (e.g., engineering, marketing) can increase the knowledge and abilities of entrepreneurs (Davidsson and Honig, 2003). There are some critiques, however, on the positive relationship between education and entrepreneurs' propensity to innovate. It has been argued that the skill sets that are critical to the success of entrepreneurs may not be the same as those qualifications which are taught in formal education (Casson, 2003). In fact, it can be doubted whether formal education can be used as a proxy for entrepreneurial ability (Parker, 2009, p. 117) as it can, for example, make it difficult for individuals to see opportunities outside their domain of expertise. In addition, one may argue that formal education is very broad and does not provide cutting-edge industry specific knowledge which might be necessary for innovative entrepreneurship.

In spite of these arguments, we argue that a high level of education provides individuals with the capacity to absorb knowledge and facilitates awareness of the possibility to bring novel commercial ideas to the market. Moreover, in some fields such as technical (i.e., engineering) or pharmaceutical fields there is a close link between academic education and knowledge of or insights into designing new products (Parker, 2009). Thus, we

suspect that higher levels of education are in fact vital for necessity entrepreneurs in order to come up with new ideas.

Furthermore, a high level of education equips individuals with explicit and tacit knowledge (e.g., a better command of foreign languages, specialization in a technical field) required to absorb new industrial and technological trends (Unger et al., 2011). Additionally, a high level of formal education enhances the analytical skills of individuals to choose a suitable production technology from several available technologies. Thus, we believe that formal education can be helpful for entrepreneurs in order to adopt new production processes or technologies.

Therefore we propose the following hypotheses:

Hypothesis 1a: Necessity-based entrepreneurs who have attained higher levels of formal education are more likely to conduct product innovation than necessity-based entrepreneurs who have attained lower levels of formal education.

Hypothesis 1b: Necessity-based entrepreneurs who have attained higher levels of formal education are more likely to conduct process innovation than necessity-based entrepreneurs who have attained lower levels of formal education.

Prior start-up experience

Prior entrepreneurship experience is an important channel to gain entrepreneurship-specific human capital. Although same industry experience has been investigated as a determinant of self-employment in several studies (Cassar, 2014; Martin et al., 2013), prior entrepreneurship experience has received hardly any attention as a possible determinant of innovation (Koellinger, 2008; Cassar, 2014; Ucbasaran et al., 2011). Prior entrepreneurship experience indicates whether and to what extent individuals have invested time and resources in setting up and running businesses in the past. Prior entrepreneurship experience may indicate that a person fits better in with the entrepreneurial environment than with traditional employment (Markman and Baron, 2003; Koellinger et al., 2015; Zhao et al., 2010). We argue that such experience is likely to bring alertness towards business opportunities as well as to help necessity entrepreneurs to assess opportunities more meticulously (i.e., based on what they learned from previous start-up experiences) (Davidsson and Honig, 2003). Gruber et al. (2012) in a recent study of German technology-based start-ups found that entrepreneurial experience has a positive and significant effect on entrepreneurs' opportunity recognition in the market. Moreover, empirical findings of Bates (1995) show that entrepreneurial experience can help the self-employed to have precise estimations of their abilities, which can help them to know which opportunities may be exploitable and which ones may lead to failure.

Finally, prior start-up experience helps individuals to develop marketing, managerial, planning and problem solving skills which, in turn, lead them to become "jack-of-all-trades" (Lazear, 2005). Furthermore, individuals with prior start-up experience may be better able to exploit novel ideas and commercialize new products. Entrepreneurs with prior experience of setting up a new business may have the tacit as well as explicit knowledge of characteristics of available production technologies (e.g. their price and quality) if they start their new business in the same sector. This knowledge can help them to better assess new available production technologies and machineries in order to utilize them.

Therefore we propose:

Hypothesis 2a: Necessity-based entrepreneurs who have prior start-up experience are more likely to conduct product innovation than necessity-based entrepreneurs who do not have such experience.

Hypothesis 2b: Necessity-based entrepreneurs who have prior start-up experience are more likely to conduct process innovation than necessity-based entrepreneurs who do not have such experience.

Entrepreneurial skills

Entrepreneurs in a Schumpeterian sense are those who develop new marketable products out of inventions and "get things done" by turning an idea or scientific knowledge into "new combinations of means of production" (Schumpeter, 1934, p. 74). In this view, scientific knowledge has no or little economic impact per se unless efforts of some entrepreneurs, relying on their knowledge and skills, are made to turn it into new products/services or new ways to deliver a product/service. Entrepreneurial skills and knowledge can be considered as wide range of abilities and the comprehension needed for entrepreneurs to turn inventions and scientific knowledge into innovative products/services or in new ways of producing or delivering a service (Pyysiäinen et al., 2006).

The possession of entrepreneurial skills and knowledge is vital to commercialize the unexploited slacks of knowledge produced in research centers or R&D labs as implied by the knowledge spill-over theory of entrepreneurship (Audretsch and Keilbach, 2004; Acs et al., 2008). In case of necessity entrepreneurs, we believe that they have had less time and resource endowments to prepare to start their own business as discussed above. We argue that entrepreneurial skills can help necessity entrepreneurs with their preparation for marketing activities, in terms of finding and convincing customers, which may be critical to exploit an innovative idea.

Additionally, necessity entrepreneurs that have entrepreneurial skills and knowledge may have a better understanding of how to form a new firm and how to organize the value

chain of activities (e.g., inbound and outbound logistics, procurement, infrastructure). Such knowledge and skills may assist necessity entrepreneurs to form the organization needed to exploit an opportunity. Moreover, such skills can help necessity entrepreneurs to obtain financial resources (e.g., venture capital) due to, for example, the ability to successfully present the business idea (Pena, 2002). In addition, entrepreneurial skills can help necessity entrepreneurs to obtain a network of entrepreneurs or (skilled) employees as such skills may facilitate social networking with peers (Bosma et al., 2004). This is particularly important for necessity entrepreneurs because these entrepreneurs are pushed to start a new business and they have had little time and resources to find and exploit a novel idea. Access to financial and human resources, subsequently, may help necessity entrepreneurs to find and exploit new business ideas as well as new production technologies. Hence, we propose the following hypotheses:

Hypothesis 3a: Necessity-based entrepreneurs who perceive to have entrepreneurial skills are more likely to conduct product innovation than necessity-based entrepreneurs who do not perceive to have such skills.

Hypothesis 3b: Necessity-based entrepreneurs who perceive to have entrepreneurial skills are more likely to conduct process innovation than necessity-based entrepreneurs who do not perceive to have such skills.

3.3 Data and Methodology

3.3.1 Data

We use annual individual-level data of 89 countries that participated in the adult population survey (APS) carried out as part of the Global Entrepreneurship Monitor (GEM) project from 2002 to 2011. Some of these countries participated in the GEM project every year like the US or the Netherlands while other countries participated only in some years. GEM, as the world's largest entrepreneurship study, is an annual assessment of entrepreneurial activity, aspirations and attitudes of individuals across a wide range of countries (Reynolds et al., 2005). The GEM survey collects data about different aspects of entrepreneurship such as entrepreneurs' activities, ambitions, motivations, and about some aspects related to their human capital profiles which make GEM a suitable dataset to use for our research (Reynolds et al., 2002).

The total GEM sample for 2002-2011 includes 680,372 observations for individuals which include employees, entrepreneurs, unemployed individuals, students and retirees. Of these observations 62,347 individuals are early-stage entrepreneurs (9.2%) i.e., entrepreneurs who have started their business in the last 42 months as well as individuals who are setting up their businesses (i.e., nascent entrepreneurs). Our descriptive statistics (Table 1)

show that a considerable percentage of early-stage entrepreneurs (45.3%) state that they provide new or relatively new products or services to the market or that they employ new or relatively new (less than five years old) technologies or procedures (31.6%). Additionally, a substantial rate of entrepreneurs (40%) has had university education. Moreover, Table 1 shows that a very high rate of entrepreneurs (86.1%) believe that they have the necessary entrepreneurial skills, knowledge and experience for setting up a business. Tables 2 and 3 show the descriptive statistics for necessity and non-necessity entrepreneurs. If we compare Table 2 with Table 3, we notice that product innovation on average occurs slightly less frequent among necessity entrepreneurs as compared to non-necessity entrepreneurs, whereas there is no difference in the extent of process innovation among the two groups. In addition, non-necessity entrepreneurs attain higher levels of education but they, on average, less often have start-up experience.

Table 1: Descriptive statistics and correlations for the full sample of early-stage entrepreneurs (N=62,347)

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Innovation (product and/or process innovation)	0.578	0.494								
2. Product innovation	0.453	0.498	0.759***							
3. Process innovation	0.316	0.465	0.576***	0.171***						
4. Necessity entrepreneurs	0.242	0.428	-0.041***	-0.064***	0.003***					
5. Low level of education	0.289	0.442	-0.051***	-0.059***	-0.035***	0.132***				
6. Medium level of education	0.311	0.465	0.006	-0.020**	0.012***	0.044***	-0.405***			
7. High level of education	0.400	0.482	0.051***	0.070***	0.019***	-0.157***	-0.495***	-0.594***		
8. Prior start-up experience	0.105	0.182	0.032***	0.027***	0.033***	0.036***	0.016***	-0.004***	-0.010***	
9. Entrepreneurial skills	0.861	0.499	0.006**	0.019***	-0.015*	-0.078***	-0.048***	-0.011***	0.053***	0.036***

** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 2: Descriptive statistics and correlations for the sub-sample of necessity entrepreneurs (N=23,859)

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Innovation	0. 541	0.498							
2. Product innovation	0.441	0.496	0.728***						
3. Process innovation	0.316	0.464	0.625***	0.172***					
4. Low level of education	0.307	0.461	-0.059***	-0.057***	-0.035***				
5. Medium level of education	0.324	0.468	0.037***	0.011**	0.037***	-0.563***			
6. High level of education	0.314	0.464	0.024***	0.049***	-0.002**	-0.465***	-0.469***		
7. Prior start-up experience	0.118	0.322	0.015**	0.011	0.024***	0.023***	-0.010**	-0.014***	
8. Entrepreneurial skills	0.826	0.379	0.011	0.021***	-0.014	-0.057***	0.023***	0.036***	0.066***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

Table 3: Descriptive statistics and correlations for the subsample of non-necessity entrepreneurs (N=38,488)

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Innovation	0.592	0.491							
2. Product innovation	0.473	0.499	0.768***						
3. Process innovation	0.317	0.465	0.561***	0.172***					
4. Low level of education	0.216	0.411	-0.044***	-0.050***	-0.037***				
5. Medium level of education	0.309	0.462	-0.016*	-0.025*	0.005*	-0.361***			
6. High level of education	0.443	0.497	0.052***	0.065***	0.027***	-0.494***	-0.632***		
7. Prior start-up experience	0.100	0.295	0.039***	0.035***	0.036***	0.006***	-0.004**	-0.001***	
8. Entrepreneurial skills	0.873	0.332	-0.002	0.012***	-0.016***	-0.029***	-0.019***	0.043***	0.029***

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

3.3.2 Variables

Dependent variables

Innovation is the dependent variable. Product innovation is a dummy variable which takes the value 1 when, according to the respondent, *all* or *some* of their customers consider the product or service new and otherwise it takes the value 0. Process innovation is also a dummy variable which takes the value 1 when the respondent indicates that the technologies or procedures used have been available for *less than five years*. Otherwise, if the technologies or the procedures that are used are indicated to be older, the value 0 is assigned to the process innovation variable.

Independent variables

The human capital indicators (formal education, prior start-up experience and entrepreneurial skills) are defined as follows. Formal education is defined by three dummy variables for low, medium and high levels of education. These levels indicate that respondents have had some secondary school education (low), finished secondary school education (medium) or finished tertiary (i.e., university) education (high). In the regression analysis we include dummy variables for high and medium education and use low education as the reference category. Prior start-up experience is a dummy variable coded 1 when an individual indicates to have, in the past 12 months, sold, shut down, discontinued or quit a business he/she owned and managed, and 0 otherwise. Entrepreneurial skills reflect to what extent people perceive to have the ability (i.e., skills, knowledge and experience required) to start and run a business. Thus, it is a dummy variable coded 1 when individuals think to have such skills and 0 otherwise.

Control variables

Several control variables are taken into account in our regression analysis, including gender (a dummy which takes the value 1 for males), age of the entrepreneur, age of the entrepreneur squared, knowing someone else who started a business in the last two years, as well as year, industry and country dummies. Furthermore, the four following broad sectors have been included in the analysis using the GEM data: extractive (reference category), transforming, business services and consumer-oriented industries. The countries included in the analysis are listed in Appendix 1.

Selection variables

As we explain in the next section, we use a two-stage selection model to account for potential selection biases since our estimations for determining innovation are based on a sample

of early-stage entrepreneurs. To include the decision to become an early-stage entrepreneur in our analyses, the selection model takes entrepreneurial entry as the dependent variable which is defined as whether someone is an early stage entrepreneur (i.e., someone who started a business in the last 42 months or who is actively involved in the process of starting a business) (value 1) or not (value 0).

Independent variables in the selection model have been chosen based on a literature review on individual level determinants of entrepreneurship. Human capital factors can make people entrepreneurially active since the enhancement of cognitive ability that results from higher amounts of human capital can influence the entrepreneurial career decisions of individuals (Parker, 2009). According to Evans and Leighton (1990) and Thurik et al. (2008), the employment status of individuals can influence their decisions to become an entrepreneur. Hence, we added a number of dummy variables based on a question from the GEM questionnaire asking about the employment status of individuals. The employment statuses of individuals are full-time employment, part-time employment, retired, homemaker, student and not working. Entrepreneurial networks can also increase the likelihood for individuals to choose for entrepreneurship (Bosma et al., 2004). Therefore, we added a variable to the selection model indicating whether someone personally knows an entrepreneur who recently (in the past two years) started a business which is a dummy and gets the value 1 for those who know such a person. Furthermore, a set of control variables including age, gender as well as year and country dummies have been added to the model.

3.3.3 Method

Given the binary nature of innovation, we use several two-stage probit regressions with selection estimations (i.e., a Heckman probit model). The main reason to use a regression model taking account of selection bias is that we believe there may be a selection bias when we try to assess whether entrepreneurs innovate, mainly because those who select into entrepreneurship may have a higher level of human capital in the form of formal education, prior start-up experience and entrepreneurial skills (Gimeno et al., 1997; Koellinger and Minniti, 2009; Koellinger et al., 2007). Individuals with less experience, fewer skills or lower levels of education are less likely to become an entrepreneur. This can cause problems when we try to estimate the impact of human capital on necessity entrepreneurs' propensity to innovate as it could result in upward biased estimations for these relations. Heckman Correction and, in this case, Heckman Probit models can help to address this methodological concern. In addition, and although we have theoretical reasons to assume that there should be a selection bias for entry into entrepreneurship, we have statistically tested for the existence of a selection bias through several likelihood ratio tests. The likelihood ratio tests of rho (which compare the sum of the log likelihoods from selection and outcome models with the log likelihood of the probit model with sample selection) show

that selection models are required (Table 4) as the likelihood ratio tests are significant at a 1% level. The Heckman Probit model is similar to other Heckman Correction models (Heckman, 1976; 1979; Puhani, 2000) and is suited in this case given the binary nature of our dependent variables. Hence, we have:

$$Prob(E = 1|Z) = \varphi(Z\gamma) \quad (1)$$

and

$$E = Z\gamma + u_1 \quad (2)$$

where E indicates entry into entrepreneurship (E=1 if the person is an entrepreneur and 0 otherwise), Z is the vector of explanatory variables (e.g., human capital, entrepreneurial networks), γ is a vector of unknown parameters and φ is the cumulative distribution function of the standard normal distribution. Estimation of the model yields results that can be used to predict the probability of entrepreneurship for each individual.

The selection equation has entry into entrepreneurship as the dependent variable. Entry into entrepreneurship is defined as whether individuals are involved in early-stage entrepreneurship (i.e., nascent entrepreneurship and young business ownersship) or not.

The second stage (the outcome model), has the following form:

$$I^* = \varphi(X\beta + u_2) \quad (3)$$

Where I^* denotes entrepreneurs' propensity to innovate. It is assumed that error terms u_1 and u_2, have normal distributions and are homoscedastic. Furthermore, error terms are correlated, $corr(u_1, u_2) = \rho$. When standard probit techniques are applied to equation (3), it yields biased results, while the Heckman probit model provides consistent, asymptotically efficient estimates for all parameters in such models (Van de Ven and Van Praag, 1981).

3.4 Results

We develop four models to test the hypotheses. Model I and model II (Table 4) use the same set of independent variables for their dependent variables (product and process innovation, respectively) for the full sample of entrepreneurs. Subsequently, in model III, we focus on the role of human capital factors among necessity entrepreneurs in order to analyze their relationship with product innovation. The last model (model IV) investigates the relationship between the human capital factors and process innovation among the group of necessity entrepreneurs. It should be noted that models I and II take account of the selection into entrepreneurship whereas the last two models take account of the selection into necessity entrepreneurship.

Our results indicate that necessity entrepreneurs are less likely to be innovative in terms of introducing new products or services than non-necessity entrepreneurs (composed of opportunity-based entrepreneurs and entrepreneurs who started up their business with mixed motivations) (model I, Table 4). Since the product innovation variable is a dummy variable, the interpretation of the marginal effect is rather straightforward. Hence, when

someone is a necessity entrepreneur, a marginal effect of -5.8% percentage points is reported. This means that evaluated in the sample means, the predicted probability of product innovation moves from 0.44 to 0.38 when the person is a necessity entrepreneur as compared to a non-necessity entrepreneur. However, we find an insignificant negative relation between necessity entrepreneurship and process innovation. Our results thus indicate that there is no significant difference in the propensity to be involved in process innovation between the group of non-necessity entrepreneurs (mainly composed of opportunity-based entrepreneurs) and necessity entrepreneurs.

Models I and II in Table 4 also show the relation of human capital indicators (i.e., (level of) formal education, prior start-up experience, and entrepreneurial skills) with innovation for the full sample of entrepreneurs i.e., including both necessity and non-necessity entrepreneurs. Although we have not developed any hypotheses regarding the relationship between the human capital factors and innovation for the full sample of entrepreneurs, we will briefly discuss some of the results. In general, human capital factors, except for entrepreneurial skills, seem to be equally important for process and product innovations. Formal education and prior start-up experience show significant positive relationships with both types of innovation. Entrepreneurial skills have a significant positive relationship with product innovation, while it shows no significant relationship with process innovation.

With regard to hypotheses 1a and 1b, our analysis supports that having a higher level of formal education (as opposed to having a low level of education) is positively and significantly related to product and process innovations among necessity entrepreneurs (models III and IV). Thus these hypotheses are accepted. Hypotheses 2a and 2b anticipated a positive role of prior start-up experience for product and process innovations among necessity entrepreneurs. Prior start-up experience has a positive relationship with process innovation which is significant at 10% level whereas its relationship with product innovation is not significant. Hence, hypothesis 2a is not supported but hypothesis 2b is weakly supported. Finally, hypotheses 3a and 3b foresaw positive relationships between the attainment of entrepreneurial skills and both product and process innovations among necessity entrepreneurs. Hypothesis 3a indicating a positive relationship between perceived entrepreneurial skills and product innovation is supported by our analysis. However, we found that entrepreneurial skills are not significantly related to process innovation so we reject hypothesis 3b.

Regarding the control variables, we find that gender is not significantly related to necessity entrepreneurs' propensity to innovate (models III and IV of Table 4). In addition, age associates significant and negatively with innovation which is decelerating considering the positive sign of the coefficient for age-square. Entrepreneurial networks in the form of knowing another entrepreneur has a significant positive relationship with necessity entre-

preneurs' propensity to introduce a new product but it has a significantly negative relationship with process innovation.

Regarding the selection variables (Table 4), after controlling for employment status, country and year dummies, we found for necessity entrepreneurs that a high level of education shows a significant negative association with selection into entrepreneurship. Prior start-up experience and entrepreneurial skills show a significant positive relationship with selection into entrepreneurship. Lastly, knowing someone else who started a business demonstrates a significant positive relation with (necessity) entrepreneurial entry.

Table 4: Results of the (bi-probit) two-stage regression analysis with product and process innovation as the dependent variables

	Innovation among the full sample of entrepreneurs					Innovation among the sub-sample of necessity entrepreneurs				
	Product innovation (model I)		Process innovation (model II)		Entrepre-neurial entry (selec-tion model)	Product innovation (model III)		Process innovation (model IV)		Entrepre-neurial entry (selec-tion model)
Predicted probabilities	0.44		0.32			0.39		0.33		
	Marginal effect (%)	Coefficient	Marginal effect (%)	Coefficient	Coefficient	Marginal effect (%)	Coefficient	Marginal effect (%)	Coefficient	Coefficient
Necessity entrepreneurship	-5.8%	-0.177***	-0.6%	-0.022		NA	NA	NA	NA	
Human capital factors										
Medium level of education [a]	2.6%	0.079***	1.9%	0.068***	0.009	1.0%	0.041	2.3%	0.117***	-0.081***
High level of education [a]	6.1%	0.186***	3.8%	0.136***	0.007	2.3%	0.089**	3.6%	0.187***	-0.218***
Prior start-up experience	3.8%	0.115***	3.9%	0.141***	0.316***	1.9%	0.074	2.3%	0.116*	0.308***
Entrepreneurial skills	7.9%	0.238***	1.5%	0.055	0.754***	5.6%	0.219***	6.3%	0.093	0.490***
Control Variables										
Gender: male	-0.5%	-0.016	1.2%	0.043***	0.051***	-0.01%	-0.0001	-1.0%	-0.007	-0.034***
Age of entrepreneur	-0.6%	-0.018***	-0.3%	-0.011**	0.012***	-0.4%	-0.017**	-0.5%	-0.027***	0.012***
Age-squared	0.05%	0.0002***	0.02%	0.0007	-0.0002***	0.4%	0.015	0.6%	0.031**	-0.018***
Knowing someone who started a business	4.2%	0.127***	2.5%	0.088***	0.324***	2.4%	0.092***	-2.3%	-0.119***	0.185***
Industry dummies [a]										
Transforming	5.4%	0.164***	1.6%	0.059*		4.6%	0.179***	1.6%	0.083	
Business services	7.3%	0.222***	4.6%	0.169***		6.3%	0.247***	3.8%	0.194***	
Consumer-oriented	6.7%	0.202***	2.0%	0.073**		5.5%	0.214***	3.0%	0.157***	

Employment status: part-time work [a]					0.027					-0.068***
Employment status: retired, disabled					-0.465***					-0.536***
Employment status: homemaker					-0.509***					-0.556***
Employment status: student					-0.626***					-0.663***
Employment status: not working					0.435***					0.153***
Country dummies		Included		Included	Included		Included		Included	Included
Year dummies		Included		Included	Included		Included		Included	Included
Constant		-0.797***		6.325***	-1.929***		-1.098***		8.910***	-2.446***
Sample size		61,842		61,045	680,372		23,535		23,096	640,608
Likelihood Ratio test (rho=0)		5.50**		6.63***			7.74***		9.02***	

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

[a] Reference categories are low level of education (education level), extractive industries (industry), and full-time work (employment status).

3.5 Discussion and conclusion

This chapter aims to shed light on the conditions under which necessity entrepreneurs are more likely to innovate. Despite the considerable amount of attention for innovative activity in the entrepreneurship literature and that many entrepreneurs start their own businesses due to necessity-based reasons, it has remained unknown what factors stimulate innovative activities among this group of entrepreneurs. This is mainly due to the fact that studies on the relation between innovation and entrepreneurship have not focused on heterogeneity within the sub-groups of entrepreneurs with similar start-up motivations (e.g., Koellinger, 2008). This study, by taking an individual level approach, is, to the best of our knowledge, the first micro-level study which investigates entrepreneurs' propensity to innovate by distinguishing between subgroups of necessity and non-necessity entrepreneurs. In addition, the two stage probit regression with Heckman correction which is used in this chapter to take possible selection bias (for entry into entrepreneurship) into account, has not been used in other similar micro-level studies on the relationship between entrepreneurship and innovation (Koellinger, 2008; Zhao, 2005; Schaltegger and Wagner, 2011).

Our study looks into the role of human capital factors, particularly formal education, prior start-up experience, and entrepreneurial skills, for the innovative performance of necessity entrepreneurs. Reviewing the literature has shown that these factors are among the main variables predicting entrepreneurs' stock of tacit and explicit knowledge (Polanyi, 1967; Davidsson and Honig, 2003; Marvel and Lumpkin, 2007). According to our results, formal education positively relates to necessity entrepreneurs' propensity to innovate (i.e. product and process innovations). In line with Becker (1993), we believe that formal education associates with necessity entrepreneurs' level of cognitive development enabling them to consider or test "new combinations of means of production". The role of formal education is interesting to observe in our analyses as it has a negative influence on the entry of necessity entrepreneurs but a positive influence on their innovativeness. This suggests that education discourages the entry in the form of necessity entrepreneurship because on average, higher educated individuals are not pushed to start a business due to unpleasant conditions. Nevertheless, we found a significant positive relationship between formal education and necessity entrepreneurs' propensity to introduce new products or services to the market. As argued, higher levels of formal education, e.g., a background in engineering or pharmacy, provide a wide range of skills and knowledge that are required for designing new products (Parker, 2009). In addition, higher levels of education signal the qualification of the entrepreneur which can be important for entrepreneurs when trying to find external financing and to convince investors about new ideas. Our findings also show a significant positive relationship between formal education and process innovation. This is mainly because formal education may expose necessity entrepreneurs to new pro-

duction technologies and, again, signal the qualification of the entrepreneur that may help to acquire the financing needed to obtain such technologies.

There have been a number of papers in the literature about the possible association between prior start-up experience and the propensity to become an entrepreneur (Gimeno et al., 1997; Robinson and Sexton, 1994; Baron and Ensley, 2006). In line with these studies, we also find a strongly positive relationship between prior start-up experience and selection into entrepreneurship. We further investigated the importance of prior start-up experience for necessity entrepreneurs' propensity to innovate while considering the selection bias for entry into entrepreneurship. Surprisingly, we found that prior start-up experience of necessity entrepreneurs does not significantly relate to their likelihood to conduct product innovations. One may argue that necessity entrepreneurs' previous entrepreneurship experience was possibly in the form of necessity-based and even imitative entrepreneurship because their current condition (i.e., being a necessity entrepreneur) probably results from prior disadvantaged labor market and income conditions (Block and Sandner, 2009; Baptista et al., 2014). This may imply that their prior entrepreneurship experience does not contribute much to creative thinking, possibly explaining the non-significant result.

Finally, necessity entrepreneurs' perception of having entrepreneurial skills and knowledge also shows a significant positive relation with product innovation in addition to its positive relation with entrepreneurial entry. Here the explanation could be that entrepreneurial skills may facilitate necessity entrepreneurs' propensity to innovate rather than to imitate. A higher perceived level of entrepreneurial skills can stimulate heterodox and creative thinking of entrepreneurs as it can partly reflect necessity entrepreneurs' ability and skills to possibly provide a different and "new combination of means of production" (Schumpeter, 1934, p. 74; Parker, 2009; Koellinger and Minniti, 2009). We know that necessity entrepreneurs, by definition, are pushed to start their business and that they are often less ready to start a new venture and have lower entrepreneurial ability than non-necessity entrepreneurs (Hinz, and Jungbauer-Ganz, 1999). Thus, when necessity entrepreneurs possess entrepreneurial skills, they are able to better prepare for entrepreneurship and for launching a successful venture. Necessity entrepreneurs, when they have required entrepreneurship-specific skills and knowledge, can be more prosperous in attracting financial means often needed to form an innovative venture.

3.6 Implications and future research suggestions

Several policy implications can be derived from our study. First, our results would suggest that governments aiming to increase the quality of the overall pool of entrepreneurs could facilitate networking with innovative entrepreneurs, e.g., as role models or mentors. Secondly, higher levels of formal education reduce the likelihood for someone to become a necessity entrepreneur, probably because higher education provides access to attractive job

opportunities in paid employment. However, in case those who have become necessity entrepreneurs are higher educated, they are more likely to innovate than less educated necessity entrepreneurs. Hence, our findings imply that providing formal education opportunities for individuals not only results in lower rates of necessity entrepreneurs but, depending on the number of higher educated individuals entering necessity entrepreneurship, it may also increase the share of innovative entrepreneurs among the group of necessity entrepreneurs. Furthermore, our results show that entrepreneurship-specific human capital in the form of (self-perceived) entrepreneurial skills and knowledge may facilitate innovation among necessity entrepreneurs. Although imitative entrepreneurs could certainly benefit economies, e.g., through spilling over knowledge and creating competition (Schmitz, 1989), excessive entry of imitative entrepreneurs can discourage the entry of innovative entrepreneurs since it may reduce entrepreneurial profit (Schumpeter, 1934; Wong et al., 2005). With this in mind, governments may decide to stimulate the development of entrepreneurial skills through tailored educational programs as entrepreneurs with such skills may be more likely to introduce new products or services to the market.

There are a number of possible avenues for future studies that we would like to highlight. First, scholars could seek to use more objective measures for innovation (e.g., sales of new products compared with total sales) as well as for human capital factors (e.g., years of work and industry-specific experience). Second, instead of a cross-sectional dataset, a longitudinal study could help to determine whether there is a causal relationship between being a necessity entrepreneur and performance of the venture or between human capital factors and necessity entrepreneurs' propensity to innovate. Third and finally, as an extension of the present study, future studies could also look into the role of other individual factors, e.g., risk taking attitude, over-optimism or the composition of the entrepreneur's social network for necessity entrepreneurs' propensity to innovate.

Chapter 4

Competition, Perceived Competition and Innovative Start-ups

Based on Darnihamedani, Hessels, van Stel and Burke (2015b)

Abstract

Prior studies suggest that product market competition can influence entrepreneurs' tendency to innovate. While the relation between competition and innovation in the context of entrepreneurs may differ from that in the context of large established firms, no empirical study has yet addressed this relationship among small young firms. In this chapter, we consider both actual and perceived competition to provide a better understanding regarding the relationship between competition and entrepreneurs' propensity to innovate. We construct a relative measure of perceived competition at the level of the individual entrepreneur that is corrected for the level of actual competition in the specific product market the entrepreneur operates in. Using this measure, and employing multilevel regression models, we find that a high level of product market competition in the form of low profitability is positively related to the entrepreneurs' likelihood to innovate. In addition, in product markets where incumbent firms are, on average, larger, entrepreneurs seem to have a higher tendency to engage in innovation. Yet, if entrepreneurs perceive competition to be more intense than might be expected on the basis of various industry measures of competition, they are discouraged from innovation possibly because they underestimate the returns on innovation. The results show that it is important to distinguish between actual and perceived competition, as they differently influence entrepreneurs' propensity to innovate.

4.1 Introduction

Product market competition is often considered beneficial for the economy and social welfare, for instance because consumers benefit from increased supply (Hunt, 2000; Aghion and Griffith, 2008; Wennekers and Thurik, 1999). As Porter (2008) argues, competition shifts the value added of products to customers, for instance by forcing companies to provide products with lower prices. Competition possibly benefits the economy via another mechanism as well, viz. through its relation with innovative entrepreneurship, an important determinant of economic growth (Schumpeter, 1934; Wong et al., 2005). However, the relationship between competition and entrepreneurs' tendency to innovate is far from straightforward, and the nature of this relationship remains debated.

On the one hand, intense competition could discourage market players including entrepreneurs to invest in innovation (Dixit and Stiglitz, 1977; Aghion and Howitt, 1996). Intense competition means that markets are approaching equilibrium, profit margins are shrinking and "red oceans" (Kim and Mauborgne, 2005) are forming. Low "entrepreneurial profit" in these markets may discourage entrepreneurs to be innovative, whereas markets in which competition is more limited would induce entrepreneurs to innovate and to take, at least temporarily, advantage of a quasi-monopoly position (Schumpeter, 1934). Moreover, with strong competition, knowledge spills over more easily to competitors, making it harder for innovators to appropriate the returns to their innovations. This may lower the incentive to innovate (Marshall, 1890; Romer, 1986). In contrast, in markets with low competition, including new markets ("blue oceans", Kim and Mauborgne, 2005), innovators can easily reap the fruits of their innovative efforts, possibly causing a higher number of innovative start-ups.

On the other hand, in markets with intense competition, innovation may actually be needed to allow entrepreneurs to make profits and to temporarily beat or avoid price competitions (Arrow, 1962; Porter, 1980; 1985). In addition and according to the competence-based tradition, entrepreneurs learn from competition and they are enforced to renew their competencies (Hamel and Prahalad, 1990; Teece and Pisano, 1994). Thus competition can push entrepreneurs to creatively re-design their competencies which can, subsequently, stimulate innovation. Furthermore, incentives for innovation may emerge when many players are active in the market, since their presence may provide opportunities for selling innovations to incumbents and for inter-firm technological cooperation (Gans and Stern, 2003; Norback and Persson, 2012). In sum, the literature is inconclusive regarding the relationship of competition with entrepreneurs' propensity to innovate.

When studying the relation between competition and innovation, it is important to distinguish between firms of different sizes. Competition can influence small entrepreneurial firms in ways different from large established firms due to their different levels of access to resources, absorptive capacity, flexibility and growth opportunities. For example, while

in times of intense competition, large corporations can consider cost leadership and process innovation as possible responses to competition pressure, entrepreneurs are less likely to focus on such strategies because they do not benefit from economies of scale (Porter, 1985). Entrepreneurs may rather try to differentiate their products from their rivals' in the market and focus on product innovation e.g. adding new features to their product.

As far as the empirical literature is concerned, many studies do not distinguish between firm size (e.g., Aghion et al., 2005; Gilbert, 2006; Simonsohn, 2010) or focus on established large corporations (e.g., Schumpeter, 1942; Hamel and Prahalad, 1990; Ahuja et al., 2008). In contrast, the present chapter focuses on the relation between competition and innovation for small, young firms. Empirical literature on the determinants of innovative entrepreneurship for small and young firms has focused either on the firm level (e.g., Avermaete et al., 2003; Forsman, 2011) or on the country/regional level (e.g., Koellinger, 2008; Audretsch et al., 2006; Anokhin and Schultze, 2009). However, the industry level has received little attention in this literature (Baumol, 2010). This may be related to the fact that the literature on determinants of innovative entrepreneurship seldomly considers competition as a determinant. As both competition and innovation levels vary widely across industries, we argue that the industry (product market) level should be taken into account when studying the relation between competition and innovation.

In the present chapter, we investigate the relation between competition and innovation using a multilevel dataset comprising around 7,400 entrepreneurs in 51 product markets in 19 European countries. Besides combining variables at the individual level and at the industry (product market) level in our empirical models, a second contribution of this chapter to the literature concerns the distinction between actual and perceived competition. We believe that intense actual competition provides a context (e.g., a market for ideas, learning from competition) in which entrepreneurs are stimulated to innovate (Gans and Stern, 2003; Teece and Pisano, 1994). However, not only the actual level of competition in a product market but also the individual entrepreneur's *perception* of competition will influence innovative behavior. For instance, if entrepreneurs perceive competition to be more intense than it actually is, this can discourage entrepreneurs from engaging in innovation as they may underestimate the returns on their ideas (Schumpeter, 1934).

Perceived competition may strongly vary between entrepreneurs, even when they are in the same product market (i.e., even when the level of actual competition is the same), and even when the entrepreneurs have similar characteristics. In this chapter, we construct a relative measure of perceived competition in deviation from the level of perceived competition that might have been expected on the basis of various industry measures of ('actual') competition and individual characteristics of the entrepreneur. We then use this relative measure of perceived competition next to our indicators of actual competition to explain the level of innovation of individual entrepreneurs. Our study reveals how actual and per-

ceived competition can differently influence innovative entrepreneurship in the product market.

The rest of the chapter is structured as follows: first, the literature is reviewed to understand how competition may impact innovation and in particular what has been found and argued regarding the relationship of competition with entrepreneurs' propensity to innovate. Next, we explain what data sources, variables and method for analyzing the data are used. Subsequently, the results are demonstrated and main findings are explained. Lastly, we discuss the main conclusions, implications and limitations of the chapter.

4.2 Literature review

4.2.1 Competition and innovation

Microeconomic theory distinguishes between perfect competition, imperfect competition, oligopoly and monopoly. Arguing that there is no system of resource allocation which is more efficient than perfect competition, this theory suggests that competition causes commercial firms to develop new products, services and technologies (Nickell, 1996). However, at least since when Schumpeter (1942, p. 106) argued that "the large scale establishment or unit of control … has come to be the most powerful engine of progress" and "perfect competition looks inferior, and has no title to being set up as a model of ideal efficiency" economists and management scholars have been uncertain regarding what role competition and market structure may play in the innovation process (Teece, 1992; Gilbert, 2006). Two opposing views provide a strong theoretical background to explain the relationship between product market competition and innovation.

The first view, in line with Schumpeter (1942), points to the importance of expected returns on innovation and to the role of competition to erode such returns. Romer (1990) and Grossman and Helpman (1991) would argue that firms tend to engage in innovation since they pursue profitable opportunities arising from monopoly power. Thus, this argument entails that monopoly power decreases market uncertainty enabling the firm to more easily appropriate returns from innovation. This argument is in line with a broader notion in the innovation literature that firms have a higher propensity to invest in developing a new innovative product when they expect profitability to be high for the new product (Feldstein, 2002; Blume-Kohout and Sood, 2013). In addition, in a market with lower levels of competition, players may be more able to invest in innovation. Their ability and tendency to finance innovation is mainly due to their supernormal profits coming from their (quasi-) monopolistic power and their likely behavior to seek persistent dominance in the market compared to a firm without such power. Moreover, internal financing of innovation is desirable because it makes it easier to keep the secrecy of innovation projects and internal financing is normally cheaper than external financing due to asymmetric information (Tang, 2006; Henrekson and Sanandaji, 2011).

The first theoretical view that lower levels of competition relate to a higher propensity of firms to innovate is often challenged by other scholars (Gilbert, 2006; Aghion et al., 2005). According to these scholars, competition provides conditions in the product market that stimulate firms to innovate. Evolutionary economists, for example, suggest that competition can, through a selection process, enforce inefficient firms with a lower propensity to innovate to leave the market (Baldwin and Rafiquzzaman, 1995; Klepper and Malerba, 2010). Thus, innovation, particularly in markets with intense competition, is needed to survive and to make above average profit (Cefis and Marsili, 2005). As Porter (1990, p. 118) states "active pressure from rivals stimulates innovation as much from fear of falling behind as the inducement of getting ahead". In addition to this push effect, competition can provide opportunities (e.g., a market for ideas) that help firms, particularly entrants, to innovate. Hence, firms learn from competition and from incumbent firms and, subsequently, try to improve their products. Furthermore, competition, as a disequilibrating force, can provide firms to gain market share in a process of creative destruction (Schumpeter, 1934). Thus, competition can be considered as a democratizing force in the market that provides equal opportunities for market players to gain above-average profits through innovation (Capron Insead and Chatain, 2008). This is in line with Weinberg (1992) argument that a monopolist has the incentive to suppress other firms' efforts to innovate.

On the empirical front, the evidence and findings regarding the relationship of competition with innovation are also ambiguous. As Ahuja et al. (2008) and Cohen (2010) summarize, prior empirical studies proved inconclusive as these have found (and argued for) positive, negative or even insignificant relationships between competition and innovation. Although methodological problems such as endogeneity issues, poor controls and non-random samples are partly responsible for such mixed results, we believe that there are three main reasons for these inconclusive, and sometimes controversial, findings. First, the effect of competition on innovation may be different for different groups of firms (e.g., Aghion et al., 2005; Schmutzler, 2010). For instance, while small young firms may need to introduce new products to the market when faced with the pressure of competition, large firms can focus on efficiency (process innovation) due to economies of scale and hence can focus on providing existing products with lower costs (Porter, 1985; Klepper, 1996). Thus, the pressure of competition can drive small entrepreneurial firms into a different direction than large established corporations. The differing effect of competition on different groups of firms can be a source of dissimilar findings regarding the relationship between competition and innovation as studies may have used samples with different types of firms/industries.

Second, the approach through which competition is defined and measured can also influence the relationship (Tang, 2006). While some papers used the price-cost margin (PCM) to measure competition (e.g., Aghion et al., 2005, Nickell, 1996), other papers have

adopted the concentration ratio, Lerner Index, Boone Indicator or perception of competition (e.g., Moore et al., 2007; MacDonald, 1994). We suspect that each measure captures a rather unique aspect of competition (or market structure) and no measure is comprehensive. For example, while PCM captures the profitability of firms in a market, it does not measure the market share or the number of rivals in the market. The nature of competition may differ in markets with a low PCM and a few (large) rivals compared to markets with a low PCM and many (small) rivals.

Lastly, generalizing findings regarding innovative efforts (e.g., R&D activities) and innovative output (e.g., products) to the relationship between competition and innovation in empirical studies seems to have created some confusion (Ahuja et al., 2008). The influence of competition on innovative output can differ from that on innovative efforts. Competition, in line with Schumpeter (1934), could discourage many firms to *invest* resources in innovation or to deliberately undertake innovative activities (Gilbert, 2006). However, competition could still positively influence innovative *output* due to, e.g., R&D productivity pressure, the existence of a market for exchanging ideas, and the pressure to renew competencies (Norback and Persson, 2012; Gans and Stern, 2003; Teece and Pisano, 1994).

Against this background we concentrate on the relationship between competition and innovation specifically in the context of small young firms. Focusing on the innovative output (i.e., whether entrepreneurs provide new products to the market) and adopting several measures of competition, we try to avoid the first and the third issues and to investigate the second issue.

In the following sub-sections of the literature review, we discuss more specifically how several facets of competition may relate to entrepreneurs' propensity to innovate.

4.2.2 PCM and entrepreneurs' propensity to innovate

Price Cost Margin (PCM) indicates (average) profitability in the product market. PCM can show to what extent the market is competitive as a low PCM characterizes a market with high competition (close to perfect competition) and a high PCM implies a less competitive market (Aghion et al., 2005; Nickell, 1996). Low profitability can stimulate three main effects in the product market. First, entrepreneurs without promising ideas may exit the market (Shane and Venkataraman, 2000; Nickell et al., 1997; Spulber, 2009a) due to the process of creative destruction. Thus, in a market with low profitability the main way to survive is to innovate (Cefis and Marsili, 2005) and hence competition can push entrepreneurs to be more innovative.

Second, according to the competence-based tradition (Hamel and Prahalad, 1990; Teece and Pisano, 1994) competition stimulates learning among firms in order to enhance their core competencies. The idea is that firms learn from competing with each other and

they are forced to renew their competencies leading to proactive or reactive innovation. The competence-based theory argues that, in spite of entrepreneurs' limited access to resources, low levels of profitability in the product market can stimulate them to creatively design their competencies in order to bring new products to the market.

Third, competition in the form of low profitability can be viewed as a major disequilibrating force in the market (Schumpeter, 1934; Teece, 1992) as competition, by challenging the position of larger firms, can decrease entry barriers. Such disequilibrated markets provide the opportunity for innovative entrepreneurs to enter and to gain market share through introducing new products. Furthermore, innovative entrepreneurs enter "blue oceans" if they successfully introduce their products to a market with low PCM. Entrepreneurs benefit from a (ephemeral and quasi-) monopolistic position when they introduce a novel product (Schumpeter, 1934; Ahuja et al., 2008). In other words and as Aghion et al. (2005) argue, lower levels of PCM may add to the incremental profits from innovating and subsequently increase innovation efforts aimed at "escaping competition". As a result, when facing low profit margins, entrepreneurs may have a higher propensity to innovate in order to survive with adequate earnings.

Hence, we put forward the following hypothesis:

Hypothesis 1: A low level of PCM in a certain product market is positively related to the likelihood for entrepreneurs in that product market to be innovative.

4.2.3 Average firm size and entrepreneurs' propensity to innovate

The average size of firms indicates to which extent firms that are active in the product market are large-scaled. Firm size has been found to have a negative relationship with firms' propensity to innovate (Acs and Audretsch, 1987; Klepper, 1996). However, whether entrepreneurs are more innovative in the presence of large firms rather than in the presence of small incumbents is still an open question. On the one hand, the entry of innovative entrepreneurs in markets with large firms may be retaliated by large firms' hostile reactions (e.g., predatory pricing) as these firms can afford such strategic moves (Porter, 1980). Moreover and as argued by Capron Insead and Chatain (2008), large established firms can act on new entering entrepreneurs by degrading entrepreneurs' resource positions (e.g. by blocking access to essential resources). Hence, large established firms can maintain their competitive advantage through reducing the quality and/or effectiveness of entrants' resources. This can subsequently lower the ability for entrepreneurs to be innovative as innovation or a "new combination of means of production" (Schumpeter, 1934, p. 72) requires access to strategic resources.

On the other hand, the prevalence of large firms in the market could actually also have a positive impact on entrepreneurs' propensity to innovate. Large established companies can afford to invest more in R&D activities than small firms (Schumpeter, 1942; Pavitt,

1998). Part of the generated knowledge by large firms is usually not exploited by them due to, for example, their strategic focus or their inflexibility to pursue an unusual idea. Generated knowledge by large firms' R&D investments can spill over to small entrepreneurial firms through, for example, commercial linkages, or employment mobility (Braunerhjelm et al., 2010; Audretsch et al., 2006). For instance, the employee whose idea is not taken over by the company's decision makers, may decide to try and commercially exploit his (her) idea by leaving the company and starting his (her) own firm. Hence the possibility to use part of generated knowledge which has not been exploited by large corporations and the potential for knowledge spillovers make it more likely for entrepreneurs to innovate when operating in markets with larger firms.

In addition, imitation is a bigger threat when small firms are ubiquitous in the market (Porter, 1980; Shane and Venkataraman, 2000; Moore et al., 2007). Thus, innovative entrepreneurs, particularly in case of targeting niche markets, are less likely to face a threat of imitation if they enter into a market composed of larger firms. This can subsequently encourage innovative entrepreneurship in such markets because entrepreneurs can gain higher returns on their innovative ideas compared to markets composed of smaller firms. This argument is in line with Porter's (1980) that firms are more sensitive to each other's strategic moves if they are about the same size. In sum, we hypothesize that in modern economies, markets composed of large firms provide a more suitable environment for innovative entrepreneurship than markets composed of small firms. Hence, we suggest the following hypothesis:

Hypothesis 2: The average size of firms in a certain product market is positively related to the likelihood for entrepreneurs in that product market to be innovative.

4.2.4 The number of businesses and entrepreneurs' propensity to innovate

The presence of many firms in the market may indicate that barriers to enter the market are low. This may imply that the entry of innovative entrepreneurs or the existence of above average profit in the market can easily attract imitators (Shane and Venkataraman, 2000; Moore et al., 2007). This threat of imitation can subsequently decrease the incentives for innovation due to low expected returns on innovation (Schumpeter, 1934; Gilbert, 2006).

However, the presence of many firms in the market can also demonstrate that any opportunity for innovation is taken by firms (Cohen and Klepper, 1992). Dosi (1988) and Katila and Shane (2005) argue that entrepreneurs are more innovative when there is a high diversity in approaches to innovation. Approaches to innovation are more likely to be variant when there are more incumbents in the product market because each firm with routines specific to its history and particular innovation mode, is likely to provide a distinct alternative approach. Entrepreneurs, due to the lack of routines for innovation, are disadvantaged in markets where innovation is routinized. On the contrary, they tend to be innovative in

markets that welcome various alternative approaches to innovation (Moorman and Miller, 1998). When there are many active firms in the product market, a "market for ideas" may be created for entrepreneurs (Gans and Stern, 2003). Hence, entrepreneurs have the option to engage in this market to learn from incumbents (e.g., through technology alliances) or to license out their patents. The ability to sell the idea for a fair price can encourage entrepreneurs to innovate as they have an attractive exit option if they decide to focus on another opportunity or activity. Furthermore, the presence of many incumbents provides ample opportunities for entrepreneurs to collaborate with other market players to develop a new product. Given that entrepreneurs often lack complementary assets and financial resources required for innovation (Teece, 1992; Blanchflower and Oswald, 1998), this possibility can particularly help them to engage in innovation (Teece, 1986; Norback and Persson, 2012).

In addition and in line with Katila and Shane (2005), new firms are more likely to innovate and to perform better in crowded markets (i.e., markets with many incumbents) compared to less crowded markets because these markets entail more flexibility to introduce innovation. That is, in markets with more firms, competition for resources is higher than in markets with not so many firms (Hannan and Freeman, 1984). Thus, those firms that are able to derive high value from a given amount of resources in such markets, or in other words, firms that are creative with resources, are likely to survive. Hence, competition in the form of the presence of many incumbents in the product market stimulates entrepreneurs to be more innovative through rivalry on resources in the market.

In sum, we argue there is a positive relationship between the number of firms in the product market and entrepreneurs' propensity to innovate. Thus, we suggest the following hypothesis:

Hypothesis 3: The number of firms in a certain product market is positively related to the likelihood for entrepreneurs in that product market to be innovative.

4.2.5 Perception of competition and entrepreneurs' propensity to innovate

Even within the same product market, entrepreneurs may have very different perceptions about the level of competition prevailing in their product market. Entrepreneurs' perception of competition can deviate from the actual level of competition due to various reasons such as their newness to the market and lack of sufficient information about incumbent firms as well as their over-confidence (Moore et al., 2007; Moore and Cain, 2007; Parker, 2009). Sociological theories of the market (Porac et al., 1989; White, 1981) similarly suggest that new firms may consider only a fragment of competition and they may adjust their actions based on the perception provided by the members of the subset (Ahuja et al., 2008). These theories argue that competition has an asymmetric perceptual influence on entrepreneurs so that they may perceive competition intensity to some extent different from the real competition pressure. This is because entrepreneurs, as new entrants, are

often located not at the center of the network of firms but at its periphery. Hence, the deviation of perceived competition from actual competition can partly explain why some entrepreneurs commit to innovation more than others in the same product market (Tang, 2006).

Psychologists and behavioral economists would suggest that perception can greatly influence behavior and performance of individuals. They propose that people perceive to have a better performance than others when they deal with controllable tasks and environments compared to uncontrollable tasks and environments (Harris, 1996; Moore and Cain, 2007). Moore and Cain (2007) find, in an experiment, that when people perceive the task to be difficult, they are willing to accept that they perform worse than average. In line with this finding, we argue that when entrepreneurs perceive competition to be intense, they are more likely to admit that they may not be as skillful or knowledgeable as incumbents. This view may subsequently discourage them to invest in innovation because they would perceive themselves to be (far) behind their competitors.

When entrepreneurs perceive competition to be higher than it actually is this can discourage entrepreneurs from innovation as this can further decrease the expected returns on innovation due to possible perceived threats of imitation. In line with this argument, Tang (2006), for a sample of Canadian companies found that the perception of easy substitution of products is negatively correlated with innovative activities, possibly due to lower returns' expectations.

Also, a positive deviation of perceived competition from actual competition can partly reflect that either the entrepreneur's idea is not so promising or the entrepreneur does not have enough confidence to further develop the idea. This is because if the idea would be novel and promising, the entrepreneur would be more likely to avoid or ignore competition e.g. because the idea could have the potential to provide a (quasi-) monopolistic position for the entrepreneur (Schumpeter, 1934; Moore et al., 2007). Additionally and in line with talent allocation models, entrepreneurially talented individuals may perceive competition to be less intense than actual competition because they tend to be selfish and (over)confident (Weitzel et al., 2010). These individuals are more likely to innovate as compared to less talented people (Koellinger, 2008; Davidsson and Honig, 2003). Lastly, perceiving competition to be more intense than it actually is, seems to have a negative relationship with prudence and a risk-taking attitude which is often required for engagement in innovation (Tang, 2006).

In sum, the difference between perceived and actual competition can partly explain why some entrepreneurs undertake more innovation activities compared to others in the same product market for a given level of competition for the reasons explained above. We suspect that a positive deviation can lower the likelihood of innovative entrepreneurship. Hence, we propose the following hypothesis:

Hypothesis 4: When entrepreneurs perceive competition in their product market to be higher than its actual intensity, this is negatively related to the likelihood for entrepreneurs to be innovative.

4.3 Data and variables

4.3.1 Data sources and sample

To investigate the relationship between competition and the likelihood of innovative entrepreneurship, we use Global Entrepreneurship Monitor (GEM) data as well as data from the Organization for Economic Cooperation and Development (OECD) iLibrary. GEM, as the world largest entrepreneurship study, annually assesses entrepreneurial activities, aspirations and attitudes across many different countries (Reynolds et al., 2005) and allows us to have information on whether early-stage entrepreneurs (i.e., nascent entrepreneurs and entrepreneurs who have started their businesses in the last 42 months) are innovative or not. Several measures reflecting competition at the industry level are taken from the OECD iLibrary. More specifically, data at the industry level (SIC two digits), on total sales, operating expenses, number of firms and total number of employees are collected from Structural Analysis (STAN) and Structural Analysis and Structural and Demographic Business Statistics (SDBS) Databases of OECD iLibrary dataset for 19 upper-middle and high-income countries. Since the GEM contains information regarding the industry in which entrepreneurs operate, we were able to link the individual level GEM and the industry level OECD datasets. The aggregate database gives us a sample of 7,420 early-stage entrepreneurs (i.e. nascent entrepreneurs and young business owners) of 19 European countries from 51 sectors (using the first two digits of SIC codes) between 2003 and 2010.

4.3.2 Variables

Our dummy dependent variable is entrepreneurs' propensity to innovate. This variable is measured in the GEM by asking if the entrepreneur offers a new product or service to customers. When *all* or *some* customers, according to the entrepreneur, perceive the product or service as new to the market, the variable takes the value 1 and otherwise 0.

To measure competition as our main independent variables, we use indicators for the Price Cost Margin (PCM) of a sector, average firm size in a sector, the number of firms in a sector, and individual entrepreneurs' perception of competition.

In order to measure Price Cost Margin (PCM), we follow Nickell (1996) and Aghion et al. (2005) to define the indicator:

$$PCM = \frac{Operating\ Profit - Financial\ Costs}{Total\ Sales}$$

The intuition behind PCM is that low amounts of PCM refer to high competition as low profit margins can be indicative of "red oceans" (Kim and Mauborgne, 2005). Hence, there is a negative association between PCM and the intensity of competition. In order to keep consistency with our other competition measures we multiply PCM by -1 so that higher levels of the new variable, which could be called unprofitability, reflect more intense competition.

The (logarithm of) average size of companies can also capture competition as the prevalence of small and medium size firms can refer to a different type of competition compared to the prevalence of large firms in the market. The prevalence of large firms can indicate that there may be not much competitive pressure on small young firms due to their low share of the market, although in such markets the entry barriers could be considerable. The average size of firms is calculated through dividing the total number of employees by the total number of businesses in each industry. We also have a measure for number of businesses in an industry. The number of businesses can also point to competition as the existence of many rivals in a market can indicate that the market may be competitive. All three objective measures of competition have been included in the estimation models with a one year lag.

Lastly, perception of competition by entrepreneurs is captured through a question in the GEM data set asking entrepreneurs whether many businesses offer the same product (coded as 1) or only a few or no other business offers the same product (coded as 0). We calculated the deviation of the perception of competition from actual competition by using the residuals of a regression in which the perception of competition is explained from industry-level measures of ('actual') competition (with one year lag) and individual level variables, e.g., level of education, and prior entrepreneurship experience. The relative level of perceived competition by an individual entrepreneur is thus measured in deviation from the level that might have been expected on the basis of the industry (product market) the entrepreneur operates in, and the entrepreneur's individual characteristics.

We control for several individual variables including entrepreneurial networks (i.e., whether entrepreneurs know someone personally who started a new business in the last two years), start-up motivations (i.e., necessity versus opportunity based motivations), formal education (i.e., whether entrepreneurs have university education), prior entrepreneurship experience (as a dummy), perceived entrepreneurial skills, age and gender. We also comprise industry (in 4 categories: extractive, transforming, business services and consumer-oriented), year and country dummies to control for industry, time and country differences respectively. All control variables are taken from GEM.

4.4 Method

We analyze the data in five steps. First, we explain the entrepreneur's propensity to innovate in a model that includes our three indicators of industry level ('actual') competition and control variables. In a second model, we include perceived competition and control variables. Third, we include both actual and perceived competition in the same model. However, we want to correct for the fact that an entrepreneur's perceived competition depends on the industry he or she operates in, and on his or her individual characteristics. Therefore, we estimate an auxiliary model explaining perceived competition from the industry level competition measures and the individual level indicators (step 4). Lastly, we present a model to explain innovation which includes the residuals of perceived competition from step 4 and the actual competition measures (Table 4). This table forms the basis for us to assess the relationship between competition and the likelihood of entrepreneurs to innovate.

Observations for entrepreneurs are grouped by industries in several countries. A multilevel logistic regression approach is adopted for steps 1, 2, 3 and 5 because we deal with a hierarchical data structure. In fact using simple logistic regression would lead to "false positives" (Hofmann et al., 2000) due to underestimation of the standard errors. Including the random intercept allows the intercepts to vary randomly across industries. However, we do include 'fixed' industry dummies at the level of the four broad industries mentioned at the end of the 'variables' subsection. For step 4 (the auxiliary model), we use simple logistic regression to explain perceived competition.

4.5 Results

4.5.1 Descriptive statistics

Table 1 demonstrates some descriptive statistics for the variables used. As the PCM measure reflects, the average profitability is 14.4% across industries. The average size of firms across industries is 10.4 employees and the number of incumbent firms per industry is 172 firms. Furthermore, 71.7% of entrepreneurs perceive competition to be high in the product market.

Table 1- Descriptive statistics and correlation matrix of the model variables

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1. Product innovation	0.406	0.491										
Competition measures												
2. PCM	0.144	0.122	-0.069									
3. Average size	10.395	24.709	0.054	-0.161								
4. Number of businesses	172.213	143.532	-0.034	0.387	-0.469							
5. Perception of competition	0.717	0.865	-0.170	0.004	-0.068	0.069						
Individual variables												
6. High level of education	0.473	0.485	0.075	-0.049	0.069	0.023	-0.004					
7. Prior entrepreneurship experience	0.068	0.313	0.020	0.007	0.001	-0.018	0.023	-0.004				
8. Entrepreneurial networks	0.700	0.479	0.068	-0.043	0.004	-0.015	-0.034	0.045	0.035			
9. Entrepreneurial skills	0.870	0.347	0.019	-0.015	-0.049	-0.003	-0.047	0.037	0.047	0.105		
10. Age	39.056	11.898	-0.043	-0.009	0.045	-0.039	0.024	0.069	0.020	-0.099	0.031	
11. Male	0.696	0.492	-0.013	-0.028	-0.004	-0.002	-0.025	-0.036	0.047	0.088	0.094	-0.022

Since we observe no high correlations between our competition measures (e.g., between log number of businesses and PCM), multicollinearity is not likely to be a source of concern in this study. Somewhat surprisingly, the correlations between perceived competition on the one hand and our industry measures of ('actual') competition on the other hand, is rather low. Still, as perceived competition is theoretically related to actual competition and individual characteristics, we will use the residual-based measure as described earlier, so that our measure of perceived competition is completely independent from the level of actual competition and from an entrepreneur's individual characteristics.

4.5.2 Main results

Model 1 of Table 2 shows the results for when we include our measures for actual competition (without perceived competition). It can be seen that only the reverse of PCM positively relates to entrepreneurs' propensity to innovate, while the other measures are not significant. Model 2 of Table 2 presents the results for perceived competition (without actual competition). It can be seen that when entrepreneurs perceive that there are many businesses in the market offering the same product they are less likely to be innovative. In model 3 of Table 2 the actual measures of competition and perceived competition are both included in the regression. The results reveal that reverse PCM is still significantly positive as in model 1, although the coefficient is clearly reduced in magnitude. In addition the other two measures for actual competition remain insignificant as in model 1. Finally, perceived competition is still significantly negative as in model 2 and this result has become even stronger when the measures for actual competition are included in the regression.

Table 3 presents the auxiliary model where we explain perceived competition from actual competition and control variables. The results clearly suggest that entrepreneurs' perception of competition is influenced by the actual competition in the market. Somewhat surprisingly, we find that entrepreneurs tend to perceive the competition to be more intense when the market has higher levels of profitability. This can perhaps be explained by the fact that entrepreneurs may be more aware as well as more wary of the presence of other firms when profit margins are high, as high profit margins tend to attract new firms (including imitators) to the market (Moore et al. 2007, Burke and Van Stel, 2014). The average size of firms has no significant relationship with perception of competition. When many firms are active in the market, entrepreneurs perceive competition to be more intense. Regarding the control variables, we find that when entrepreneurs have higher levels of education and consider themselves to have entrepreneurial skills, they perceive competition to be less intense. Lastly, age seems to have an inverted U-shaped relationship with the perception of competition.

Table 4 presents the results which include the residuals of perceived competition from step 4 in addition to the actual (industry-level) competition measures. These results are used to test our hypotheses. It can be seen that the relationship between reverse PCM and entrepreneurs' propensity to innovate is significant positive. Hence, when average profit margins in the product market are low (or negative), entrepreneurs are more likely to innovate. This confirms our first hypothesis. When (logarithm of) average firm size is used as a proxy for competition, we find a significant positive association with innovative entrepreneurship. This means that when incumbent firms in the market are on average larger, entrepreneurs are more likely to be innovative. This finding is in line with our second hypothesis.

We find, however, no significant relationship between the number of businesses and entrepreneurs' propensity to innovate. Thus, our third hypothesis is not supported. Lastly, the positive deviation of perceived competition from actual competition has a significant negative relationship with entrepreneurs' propensity to innovate. Hence, when entrepreneurs perceive competition to be more intense than it actually is, they are less likely to innovate. This finding confirms our fourth hypothesis.

Regarding the individual level control variables, education, recent entrepreneurship experience and entrepreneurial networks have a significant positive relationship with entrepreneurs' likelihood to be innovative. Age shows an inverted U shape relationship and gender is not significant for entrepreneur's likelihood to innovate.

4.5.3 Robustness checks

Although a multi-level model is suitable for our analysis due to the hierarchical structure of the data, we run a simple logit model clustering on industries to see if the multi-level regression results are robust. The results of the logit regressions are similar to the results of multi-level regressions regarding the influence of competition. The results show that PCM and the deviation of perceived competition from actual competition have significant negative relationships and average firm size has a weakly significant positive relationship with entrepreneurs' propensity to innovate.

Table 2 – Results of the multilevel logistic regression analysis (steps 1-3)

Dependent variable: entrepreneurs with product innovation			
	(1)	(2)	(3)
Main predictors			
Unprofitability (reverse PCM)	0.954*** (0.320)		0.680** (0.334)
Log average size	0.004 (0.004)		0.000 (0.048)
Log number of businesses	0.016 (0.011)		0.012 (0.011)
Perception of competition		-0.761*** (0.045)	-0.950*** (0.050)
Control variables (individual level)			
High level of education	0.201*** (0.053)	0.207*** (0.053)	0.169*** (0.055)
Prior entrepreneurship experience	0.206** (0.098)	0.232** (0.099)	0.245** (0.100)
Entrepreneurial networks	0.210*** (0.056)	0.206*** (0.057)	0.212*** (0.058)
Perceived entrepreneurial skills	0.146* (0.076)	0.077 (0.076)	0.109 (0.080)
Age	-0.020*** (0.007)	0.035*** (0.005)	-0.022*** (0.007)
Age (squared)	0.0002* (0.0001)	-0.0006** (0.0001)	0.0002** (0.0001)
Male	-0.039 (0.056)	-0.052 (0.055)	-0.064 (0.058)
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Broad industry dummies (four categories)	Yes	Yes	Yes
Number of entrepreneurs (observations)	7,420	7,420	7,420
Number of countries	19	19	19
Random part estimates			
Number of industries	51	51	51
Deviance (-2*log likelihood)	9,586.15	9,093.24	8930.29
Wald Chi square	244.33	NA	598.60

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%

Table 3 – Results of the regression analysis (step 4)

Dependent variable: perception of competition	
Main predictors	
Unprofitability (reverse PCM)	-0.779** (0.306)
Log average size	-0.074 (0.051)
Log number of businesses	0.079*** (0.029)
Control variables (individual level)	
High level of education	-0.188*** (0.053)
Prior entrepreneurship experience	0.077 (0.101)
Entrepreneurial networks	-0.017 (0.057)
Perceived entrepreneurial skills	-0.259*** (0.078)
Age	0.025** (0.012)
Age (squared)	-0.0002* (0.0001)
Male	-0.040 (0.054)
Country dummies	Yes
Year dummies	Yes
Broad industry dummies (four categories)	Yes
Number of entrepreneurs (observations)	7,420
Number of countries	19
Number of industries	51
Pseudo R-square	0.029

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%

Table 4 – Results of the regression analysis (step 5)

Dependent variable: innovative entrepreneurs	
Main predictors	
Unprofitability (reverse PCM)	1.726*** (0.374)
Log average size	0.134* (0.073)
Log number of businesses	0.026 (0.052)
Residuals of perception of competition	-0.595*** (0.026)
Control variables (individual level)	
High level of education	0.209*** (0.058)
Prior entrepreneurship experience	0.217** (0.102)
Entrepreneurial networks	0.226*** (0.061)
Perceived entrepreneurial skills	0.144* (0.083)
Age	-0.052*** (0.013)
Age (squared)	0.0005*** (0.0002)
Male	-0.041 (0.060)
Country dummies	Yes
Year dummies	Yes
Broad industry dummies (four categories)	Yes
Number of entrepreneurs (observations)	7,420
Number of countries	19
Random part estimates	
Number of industries	51
Deviance (-2*log likelihood)	8961.642
Wald Chi square	787.54

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%

4.6 Discussion

Findings of this chapter support the conclusion that competition influences entrepreneurs' propensity to innovate. Our result regarding the role of PCM is in line with the view that in markets with intense competition, where firms face low levels of profitability consistent with the presence of "red oceans", innovation may be needed by entrepreneurs to avoid competition and to enter into a "blue ocean". This finding is in line with the argument of natural selection. According to Geroski (1995), entry can be fairly easy but survival is difficult particularly in competitive markets. Additionally, low profit pressure increases mortality rates of small young firms (Utterback and Suarez, 1993; Shane and Venkataraman, 2000). In such markets, entrepreneurs have basically two options: first, they can exit the market as competition leaves little room to increase or even to keep profit margins with the same sorts of products as before. Second and in order to survive, entrepreneurs need to differentiate themselves, often through innovative features, from incumbents (Porter, 1980). Audretsch (1995), by studying various manufacturing sectors in the US, shows that when surviving is more difficult, those small young firms that are able to survive have higher growth rates and they are more likely to innovate as compared to when surviving is not as equally difficult. This is in line with the conclusion of Cefis and Marsili (2005) that innovation helps new entrants to survive even during turbulent periods.

We further find indications that entrepreneurs are more likely to be innovative in the presence of large incumbents in the product market. Large firms have several characteristics that make the environment more suitable for innovative entrepreneurship by small and young firms. First, large firms tend to invest more in R&D activities while they may not fully exploit the generated knowledge due to, for example, lack of interest or because knowledge may spill over unintendedly such as through contacts in the market with other firms (Schumpeter, 1942; Audretsch et al., 2006). This provides a window opportunity for entrepreneurs to enter and to engage in innovation by exploiting part of the knowledge generated by large firms. Second, large firms are less likely than small young firms to imitate novel ideas of entrepreneurs. This is because large established firms tend to have formal (and fixed) strategic plans for the future and are not very flexible to just take advantage of any profitable opportunity in the market. Third, sometimes bright ambitious employees of large corporations leave their jobs and form an innovative spin-out to mostly pursue an opportunity that is not captured by the large corporate firm (Klepper, 2001). Innovative spin-outs can enter the product market with a high propensity to provide new products or services to customers or to, at least, concentrate on niche markets which their parent companies ignore (Klepper, 1996; Falck, 2008). Hence, the presence of large firms can lead to knowledge generation and spill-over to entrepreneurs, facilitating innovative entrepreneurship in the market.

Moreover, we found that perceiving competition to be more intense than its actual level can negatively influence entrepreneurs' propensity to innovate. This finding shows that entrepreneurs adjust their innovative behavior based on how they perceive competition in the market. This argument is in line with the Schumpeterian effect of competition that when entrepreneurs expect high returns on their innovative activity (i.e., entrepreneurial profit), they tend to engage in innovation. In addition, when perceived competition positively deviates from reality, entrepreneurs may feel more pressure towards financial conservation (rather than product innovation), thereby allowing less slack for experimentation (Lumpkin and Dess, 2001). Thus, when entrepreneurs consider the environment to be hostile, they may be more likely to engage in cost-cutting business activities such as process innovation or imitation. Overall, the result regarding the role of perceived competition can explain why some entrepreneurs with similar individual characteristics active in the same market, are innovative while their counterparts decide not to engage in innovation.

Lastly, we found (Table 3) that entrepreneurs perceive competition to be more intense in markets with more incumbents and with larger firms. The results also show that when levels of profitability are higher in the product market, entrepreneurs perceive competition to be higher than in markets with less profitability. One explanation for such a perception could be that when a market is profitable, many entrepreneurs decide to enter because of the attractiveness of the market (Burke and Van Stel, 2014). This can lead to the excessive entry of many entrepreneurs into the market (Moore et al., 2007; Shane and Venkataraman, 2000). While entrepreneurs can see that other entrepreneurs are entering the market they may perceive intensive competition to seize the profit margin.

4.7 Implications

Chapter four is among the first empirical studies that contribute to the competition-innovation debate with a focus on small young firms. It provides information on whether and how the market structure can influence the quality of new entrants in the product market as new entrants can greatly influence the evolution of a market/industry (Klepper, 1996; Shane and Venkataraman, 2000). In particular, our study shows that competition can influence entrepreneurs' tendency to innovate. We find a positive relationship between competition and the probability of innovative start-up when the PCM measure is used. Yet, we find that entrepreneurs have a higher propensity to innovate in the presence of large firms and when they perceive competition to be less intense than it actually is. The different results found for our measures of competition show that these measures should not be seen as substitutes, but rather as different aspects of competition with different influences on the likelihood of innovative entrepreneurship in the product market.

Our study provides several policy implications. First, promoting competition can stimulate innovative entrepreneurship in the product market. Low profitability can not only

increase customers' captured value due to possible lower prices of products (Porter, 2008), it can also enhance the quality and diversity of products in the market. Hence, policy-makers, through for example anti-trust policies, can preclude the formation of high market profitability by one or very few firms in the market. Second, although some previous studies suggest that markets composed of numerous small firms provide a suitable environment for innovation (Gans and Stern, 2003), our study finds that the presence of small firms in the market can lower the likelihood of innovative entrepreneurship possibly due to the threat of imitation. This finding suggests that policy-makers should think more carefully about the consequences of facilitating the entry of entrepreneurs through, for example, lower start-up costs or the provision of subsidies for starting a business. Third, our study suggests that when entrepreneurs estimate competition to be higher than it actually is, they are less likely to engage in innovation possibly because of lower expected returns on innovation. Governments (e.g., ministries of economic affairs or departments of commerce) can help to provide a clearer picture of the market structure and competition intensity in the industry for entrepreneurs by providing online insights and reports of the industry or by holding informative workshops for new start-ups.

4.8 Limitations and future research suggestions

This study has two limitations. First, the cross-sectional nature of our study makes it difficult to establish causal relationships. Second, the measure of innovation captured by the GEM is a self-reported measure, which may have introduced some measurement bias.

Future research can study the importance of other key measures of industry structure for innovative entrepreneurship. Additional measures of competition (e.g., the Boone indicator) and market concentration (e.g., the Herfindahl Index) can broaden our understanding of how industry structure can influence entrepreneurs' propensity to innovate (Boone, 2008). In addition, future studies can focus on the relationship between competition and process innovation as, in this chapter, we focused only on product innovation. Competition can press firms to reduce their costs in order to keep at least part of their profit. This can subsequently stimulate firms (including entrepreneurs) to cut costs through process innovation.

Chapter 5

Start-up Costs, Taxes and Innovative Entrepreneurship

Based on Darnihamedani, Hessels, Block and Simonyan (2015)

Abstract

Prior research suggests that start-up costs and taxes negatively influence entry into entrepreneurship. Yet, no distinction is made regarding the type of entrepreneurship, particularly innovative versus non-innovative entrepreneurship. Start-up costs, being one-off costs, may reduce the entry of entrepreneurs whose ideas are not very promising, thus increasing the proportion of innovative entrepreneurs. Taxes, being recurring costs, may reduce the "prize" of innovation and the profit from entrepreneurship, discouraging individuals with innovative business ideas from becoming entrepreneurs. Analyzing a dataset of 632,116 individuals, including 43,223 entrepreneurs from 53 countries, we can confirm our main predictions. This chapter contributes to the discussion on how governmental regulation costs and taxes influence innovative entrepreneurship and technological development.

5.1 Introduction

Firms' (and individuals') allocation decisions are responsive to changes in the expected rewards of their efforts (Feldstein, 2002; Blume-Kohout and Sood, 2013). The costs imposed by government regulations influence the relative rewards of different business activities (Atkinson and Stiglitz, 1980; Pizer, 2002). Hence, such costs could also affect what types of entrepreneurs enter the market, e.g., whether entrepreneurs are innovative or not.

Entrepreneurs have to deal with one-off start-up costs, such as notary charges, when setting up their businesses, as well as recurring costs in the form of income and corporate taxes. A number of prior studies have linked start-up costs and taxes to the level of entrepreneurial activity within and across economies (Djankov et al., 2002; Lundstrom and Stevenson, 2002; Gentry and Hubbard, 2000; Braunerhjelm and Eklund, 2014). For example, for a sample of European firms, Klapper et al. (2006) show that high start-up costs hamper the creation of new firms, particularly in sectors that should naturally have high entry rates. Regarding the role of taxes, Cullen and Gordon (2007) find that high tax rates have a negative effect on entrepreneurial entry; their explanation is that high taxes reduce an individual's willingness to take entrepreneurial risks.

In any given country, start-up costs and taxes may not only influence entrepreneurial entry but also the likelihood of innovative entrepreneurship because these costs can change the relative rewards of innovation (Schumpeter, 1934; Baumol, 1990; 2010). Innovative entrepreneurs play an important role in the economy by enhancing competition and providing consumers with new, high quality products or services (Schumpeter, 1934; Da Rin et al., 2011; Baumol, 2010). Thus, from a policy perspective, it is important to understand how governments, through setting the "rules of the game," may stimulate innovative or non-innovative entrepreneurship (Baumol, 1990). Little is known about how start-up costs and taxes influence the type of entrepreneurship. We suggest that innovative entrepreneurship is affected by both start-up costs and taxes. On the one hand, low start-up costs may lead to the entry of high quality entrepreneurs because lower costs are associated with more dynamic markets and lower levels of corruption (Djankov et al., 2002, De Soto, 1989). On the other hand, low start-up costs (low entry costs) encourage the entry of lower quality entrepreneurs, and hence the pool of entrepreneurs is of higher quality when start-up costs are higher (De Meza and Webb, 1987; Kaplan et al., 2011). This argument is in line with recent studies, such as Monteiro and Assuncao (2012), Branstetter et al. (2013), and Rostam-Afschar (2013), which find that low start-up regulations lead to the entry of low-ability entrepreneurs who are mainly active in low-tech industries (e.g., retailing business). In the same vein, we argue that, as one-off costs, start-up costs impose a selection effect and *increase* the share and likelihood of innovative entrepreneurship in a country. The argument is that, although high start-up costs generally discourage entrepreneurial entry (Klapper et al., 2006), such costs might have a less pronounced negative effect on the

entry of innovative entrepreneurs. This is because innovative entrepreneurs expect a high return on their new ventures (Schumpeter, 1934) and therefore may be more willing, compared to non-innovative entrepreneurs, to pay high one-off costs to obtain the legal status to start a firm (Branstetter et al., 2013).

We further argue that taxes, which represent recurring costs that reduce the gains from innovation and entrepreneurial profit, have a deterrent effect and discourage, in particular, risk-taking entrepreneurs with innovative ideas. Innovative entrepreneurs are motivated by the expectation of high returns on their innovative activities in the form of "entrepreneurial profit" (Schumpeter, 1934; Hobsbawm, 1969, p. 40; Baumol et al., 2007). Taxes reduce the expected return on innovation and, thus, we argue that they discourage innovative entrepreneurship. High taxes partially remove the "prize" of introducing a new product to the market, while entrepreneurs remain responsible and liable when their ideas fail (Gentry and Hubbard, 2000). In addition, high tax rates can reduce entrepreneurs' investment in innovation (Schumpeter, 1934; Henrekson, 2007) due to lower retained earnings (Henrekson and Sanandaji, 2011). For example, for a sample of Swedish individuals, Hansson (2012) found that the severity of the tax system has an adverse influence on the entry of highly educated entrepreneurs.

To investigate how start-up costs and taxes relate to innovative entrepreneurship, we use the Global Entrepreneurship Monitor (GEM) dataset comprising 632,116 individuals, including 43,223 entrepreneurs from 53 countries for the years 2004 to 2011. Our regressions show that the level of start-up costs has a significant positive relationship with innovative entrepreneurship, whereas the level of corporate and personal income tax rates shows a negative relationship. In this way, our study reveals how the type of costs (i.e., one-off entry costs versus recurring taxes) imposed by government regulations can influence the extent of innovative entrepreneurship in a country.

The rest of the chapter is structured as follows: First, we use prior literature to discuss how start-up costs and taxes relate to innovative entrepreneurship. Next, we describe our data sources, variables and methods. Subsequently, we present our main results, together with a number of robustness checks. In the final section, we present the main conclusions, implications and limitations of the study.

5.2 Start-up costs and innovative entrepreneurship

Start-up regulations are procedures and requirements imposed by governments for starting a business. Start-up regulations are established to ensure that new companies meet minimum requirements to provide goods or services to the market (SRI International, 1999). Several prior studies suggest that minimal start-up regulations encourage entrepreneurship (Baumol et al., 2007; Djankov et al., 2002; Klapper et al., 2006). Djankov et al. (2002) further show that countries in which start-up regulations are most burdensome have high

levels of corruption but not better quality public or private goods compared to other countries. However, their suggestion that lowering start-up costs leads to the entry of higher quality entrepreneurs has been challenged by several recent studies (Rostam-Afschar, 2013; Kaplan et al., 2011; Branstetter et al., 2013). For example, for a sample of German individuals, Rostam-Afschar (2013) finds that reducing entry regulations leads to a higher number of untrained workers becoming entrepreneurs. This is mainly because high entry barriers primarily deter such untrained workers from becoming entrepreneurs. Trained workers, with a higher level of human capital, have sufficient means to become entrepreneurs, even if the entry barriers are considerably high (Becker, 1993; Davidsson and Honig, 2003).

We similarly argue that when start-up costs are high, individuals with ideas that are less promising or novel are less inclined than individuals with more promising or novel ideas to become entrepreneurs. This is due to three reasons. First, individuals with promising novel business ideas may be willing to bear high start-up costs because they expect high returns from their ventures and one-off entry costs are not directly linked to the rewards of innovation (Schumpeter, 1934); on the other hand, individuals with less promising and less novel ideas do not expect such high returns, and, therefore, they are not willing to incur such costs. Second, individuals with innovative ideas have good opportunities to attract external financing (e.g., venture capital or business angels' funds) (Desai et al., 2003). Because innovative entrepreneurs usually have better access to capital, they may be more able to incur high start-up costs compared to non-innovative entrepreneurs. Third, able entrepreneurs can signal their higher ability to banks by paying high start-up costs. Hence, innovative ideas may have higher chances to be funded (De Meza and Webb, 1987; 1999). Otherwise, banks do not know the quality of entrepreneurs' projects due to asymmetric information and the high number of entrepreneurs and may assume because entry is inexpensive, that there are many low-ability entrepreneurs. Our arguments are in line with those of Branstetter et al. (2013), who find for a sample of Portuguese firms that marginal entrepreneurs tend to enter as a consequence of low entry costs. Such entrepreneurs have lower abilities compared to infra-marginal entrepreneurs. Branstetter et al. also find that marginal entrepreneurs usually establish their businesses in low-tech industries (e.g., agriculture, retail sector) where innovation is less likely, rather than in high- or medium-tech industries.

To summarize, we argue that high one-off start-up costs increase the share and likelihood of innovative entrepreneurship in a country.

5.3 Taxes and innovative entrepreneurship

Through taxes, governments are able to provide public goods (i.e., goods with benefits that cannot be entirely appropriated by market players and yet are needed by society), such as a

police force, a legal system, an education system and public infrastructure (La Porta et al., 1999). In addition, taxes can be used to re-distribute income in a society to support low-income citizens (e.g., the unemployed) (Feldstein and Wrobel, 1998; Kaplow and Shavell, 1994). Governments face an important dilemma when making decisions about tax rates. On the one hand, they need to collect sufficient taxes to provide high-quality public goods and services for their citizens. On the other hand, they want to avoid the danger of deterring economic growth by onerous taxation (Lee and Gordon, 2005).

The tax system affects entrepreneurial decisions and can sometimes punish successful ventures more than unsuccessful ones (Gentry and Hubbard, 2000). Although prior studies suggest that entrepreneurs have more opportunities to evade paying taxes than the paid-employed (Kamleitner et al., 2012), they mentally perceive taxes as payments "out of their pocket". Unlike the paid-employed who are rather passive in receiving information about the amount of taxes they pay, business owners think of taxes as a loss by looking at their gross income as the outcome of their work. People cognitively separate various sources of costs and incomes and constitute several accounts for such sources (Thaler, 1999). Since taxes are mainly seen to form part of the mental income account, payment of taxes is painful and perceived as reducing income. Hence, next to trying to evade paying taxes, taxation may influence other strategic decisions of entrepreneurs such as growth decisions.

We argue that taxes, being recurring costs, can have a deterrent effect with regard to innovative entrepreneurship. There are a number of reasons why this deterrent effect may occur. First, high taxes reduce the "prize" of innovation because taxes usually increase with entrepreneurial profit, sometimes even in a progressive manner. In fact, high taxes re-distribute wealth from successful innovative entrepreneurs to other citizens in society with low or no income (e.g., the unemployed) (Baumol et al., 2007; Gentry and Hubbard, 2000; Holtz-Eakin et al., 1993). The entry of innovative entrepreneurs, as explained, largely depends on their expected returns on innovation. Because taxes will repeatedly take away part of the rewards from innovation, high levels of taxes are expected to discourage individuals with innovative ideas from starting a venture.

Second, high tax rates can have an adverse impact on entrepreneurs' ability to invest in innovation. Prior research has found that one of the main sources of investment capital for entrepreneurs, especially during the early stages of the venture, are retained earnings (Henrekson and Sanandaji, 2011). This is mainly due to the high agency costs of other sources of investment capital. High taxes take away part of the start-up's income that otherwise could be re-invested in innovation. In addition, high taxes may be associated with extensive "safety net programs," such as generous unemployment benefits and universal health insurance (Baumol et al., 2007). A tax-financed welfare system may reduce household savings and may limit entrepreneurial investments and capital accumulation (Kotlikoff, 1995; Fölster, 2002; Baumol et al., 2007), which are important determinants of a country's

innovative entrepreneurship (Schumpeter, 1934; Baumol, 2010; Blanchflower and Oswald, 1998). In addition, such "safety net programs" usually point to a culture that does not appreciate and reward (hard) working individuals (Baumol et al., 2007). This could further lead to a lower tendency among entrepreneurs to innovate because innovation requires much effort to arrange a "new combination of means of production" (Schumpeter, 1934, p. 74).

There are two main taxes on entrepreneurs depending on the type of business. In many countries (e.g., the Netherlands and the US), profits are taxed under the corporate tax system when the business is incorporated (e.g., limited liability), while taxes are imposed on individual earnings only when the business is unincorporated (e.g., sole proprietorship) (Bruce and Mohsin, 2006). We contend that both types of taxes have deterrent effects on innovative entrepreneurship due to the above-mentioned reasons.

In sum, we expect a high corporate tax rate, as well as a high personal income tax rate, to reduce the share of and likelihood of innovative entrepreneurship in a country.

5.4 Data and variables

5.4.1 Data sources

We use both individual and country level data in our study. Our individual level data are from entrepreneurs who have participated in the Adult Population Survey (APS) of the Global Entrepreneurship Monitor (GEM). The data covers 53 countries for 2004 to 2011. GEM is the largest cross-country study of entrepreneurial activity, aspirations and attitudes (Reynolds et al., 2005). GEM collects data on individuals about different aspects of their entrepreneurial activity, such as the innovativeness of their ventures, as well as their personal start-up motivations, entrepreneurial ambitions and human capital characteristics, which make the GEM data suitable to use in our research.

At the country level, we use the World Bank Doing Business (WBDB) database and the World Competitiveness Yearbook (WCY) for information on start-up costs and taxes. The WBDB database contains several measures of business regulations and their enforcement for 155 countries from 2004 to the present. These measures demonstrate the regulatory expenses and procedures of undertaking business and have been used in prior research to analyze regulatory influences on the productivity and growth of entrepreneurs (e.g., Levie and Autio, 2011; Dreher and Gassebner, 2013; Braunerhjelm and Eklund, 2014). We use the World Competitiveness Yearbook (WCY) for information about corporate and personal income tax rates, as well as for some control variables (e.g., GDP growth, GDP per capita). WCY includes annual data for 18 years for more than fifty countries that participate in the executive survey conducted by the IMD World Competitiveness Center. Several previous studies have used WCY measures to study the impact of country level factors on entrepreneurship (e.g., Hessels et al., 2008; Van Stel et al., 2007).

5.4.2 Sample

The total GEM sample for 2004-2011 comprises 689,399 18-64 years old individuals including (early-stage and established) entrepreneurs, employees, unemployed individuals, students and retirees. Of these, 57,796 persons are early-stage entrepreneurs (8.4%), i.e., individuals who are setting up their businesses, as well as entrepreneurs who have started their own business in the last 42 months. For the purpose of this study, we focus on whether such early-stage entrepreneurs (which we will label "entrepreneurs") are innovative or not (see also the variables description below).

Table 1 shows the number of individuals and entrepreneurs per country and distinguishes between innovative and non-innovative entrepreneurs.

Table 1 – Sample of individuals and entrepreneurs by country

Country	Total sample of individuals	Share of entrepreneurs in total sample of individuals	Share of innovative entrepreneurs in total sample of entrepreneurs
Argentina	7,732	13.63%	22.79%
Australia	7,330	9.65%	11.74%
Austria	2,253	7.68%	10.40%
Belgium	12,203	4.77%	14.67%
Brazil	12,041	15.42%	4.94%
Canada	1,202	9.82%	14.41%
Chile	16,817	15.49%	41.78%
China	10,385	19.37%	13.82%
Colombia	18,489	18.21%	23.21%
Croatia	7,213	9.47%	10.40%
Czech republic	1,829	6.56%	10.00%
Denmark	19,317	5.39%	24.24%
Finland	8,820	8.56%	12.45%
France	10,877	3.33%	9.18%
Germany	23,199	7.61%	10.72%
Greece	9,947	8.87%	15.93%
Hong Kong	2,661	8.72%	8.19%
Hungary	11,364	7.60%	5.27%
Iceland	8,997	14.93%	15.79%
India	3,562	13.62%	17.01%
Indonesia	1,432	22.97%	26.14%
Ireland	7,951	9.96%	14.77%
Israel	6,854	7.57%	20.27%
Italy	10,744	4.45%	16.74%
Japan	7,939	5.08%	11.41%
Jordan	3,053	17.95%	33.94%
Kazakhstan	1,315	13.31%	2.86%
Korea	3,751	12.02%	10.20%
Latvia	8,875	8.77%	11.70%
Malaysia	4,349	8.09%	8.16%

Mexico	8,811	8.52%	13.21%
Netherlands	16,158	6.14%	19.22%
New Zealand	1,920	19.38%	13.10%
Norway	9,652	8.20%	11.30%
Peru	8,958	34.29%	28.75%
Philippines	1,715	24.43%	7.88%
Poland	2,053	8.43%	11.48%
Portugal	3,175	8.98%	11.23%
Romania	6,708	3.44%	8.65%
Russia	7,135	2.55%	16.71%
Singapore	7,327	8.75%	15.76%
Slovenia	12,830	6.72%	16.59%
South Africa	8,981	8.90%	23.28%
Spain	163,679	5.96%	17.40%
Sweden	34,579	3.10%	10.15%
Switzerland	9,292	6.60%	14.93%
Taiwan	1,766	8.83%	45.51%
Thailand	5,881	16.44%	14.24%
Turkey	6,111	8.18%	39.08%
United Kingdom	95,337	6.98%	11.60%
United Arab Emirates	4,612	10.36%	13.56%
United States	17,648	9.38%	36.40%
Venezuela	2,570	21.09%	9.41%
Total	**689,399**		

5.4.3 Variables

Our dependent variable is *innovative entrepreneur*. This variable is measured at the individual level, based on a question in the GEM survey asking entrepreneurs whether they provide a new product or service to the market. The variable is a dummy variable that takes the value 1 when the product or service offered is perceived by the entrepreneur to be *new to customers* and takes the value 0 otherwise.

Our main independent variables are *start-up costs* and *taxes*, which are measured at the country level. Start-up costs reflect the expenses required by law to register a new venture in a country. The second category, taxes, refers to the (logarithm of) corporate and personal income tax rates in a country. Table 2 provides a more detailed overview and description of our independent variables.

Table 2–Description and data sources of the main country level variables

Variable	Description	Source
Start-up costs	The average costs of obtaining legal status to operate a firm which is measured as a percentage of per capita income. It contains all recognizable official expenses such as fees, costs of forms and procedures, photocopies, fiscal stamps, legal and notary charges.	WBDB

Corporate tax rate on profit	Maximum corporate tax rate, calculated on profit before tax	WCY
Personal income tax rate	Maximum personal income tax rate in percent of the individual's income	WCY

In addition, we add to the regression model a number of individual and country level control variables that are common determinants of innovative entrepreneurship, according to prior research (Acs and Audretsch, 1987; Koellinger, 2008; Anokhin and Schultze, 2009). At the individual level, the following variables are included: formal education (a dummy variable that indicates whether entrepreneurs have a university education or not), entrepreneurial networks (a dummy variable indicating whether the entrepreneur knows someone personally who started a new business in the last two years or not), perception of entrepreneurial skills (a dummy variable indicating whether the entrepreneur perceives him- or herself to have relevant skills, knowledge and experience for setting up a business), recent prior entrepreneurship experience (a dummy variable that indicates whether someone quit as an entrepreneur in the past 12 months or not) and established business ownership (a dummy variable that equals one if the respondent owns a business older than 42 months), gender (a dummy variable that equals one for males), as well as age and age squared are included. In addition, "year" and "industry" are added as dummy variables to the regression model. The following industries are included in this research: business services (financial intermediation, real estate, renting and business activities); consumer oriented services (hotels and restaurants, other services); extractive industries (agriculture, fishing, mining and quarrying) and transforming (manufacturing, electricity gas and water, construction, trade and repairs, transports, storage and communication). At the country level, we include GDP growth and the (logarithm of) GDP per capita, which are both taken from the WCY database. After removing missing observations for all our variables, we retain a sample of 632,116 individuals of whom 43,223 are entrepreneurs.

5.5 Method

Given the binary nature of the dependent variable *innovative entrepreneur*, we use various probit regressions. We cluster the individual-level data by countries to avoid underestimation of standard errors and overconfident inferences (Huber and Stanig, 2011). Furthermore, we employ a Heckman probit model because there might be a selection bias when we assess the influence of start-up costs and taxes on the likelihood for entrepreneurs to be innovative. This is mainly because start-up costs and taxes could affect the entry of individuals into entrepreneurship (Djankov et al., 2002; Cullen and Gordon, 2007, Gentry and Hubbard, 2000), in addition to their effect on innovative entrepreneurship. Hence trying to

estimate the influence of start-up costs and taxes on an entrepreneur's likelihood to innovate may lead to biased estimators when such potential selection bias is not taken into account. Heckman correction (probit) models are used to address this methodological issue. Additionally, we have tested for the presence of a selection bias through likelihood ratio tests: The likelihood ratio test of rho (which compares the log likelihoods of the selection plus outcome models with the log likelihood of the probit model with sample selection) displays that a Heckman model is indeed required (Table 4).

The Heckman model has one selection and one outcome equation. The selection equation (the first stage) estimates entry into entrepreneurship, including all the above-mentioned individual and country level predictors. In addition, we add the employment status of individuals (dummy variables indicating whether someone is employed, unemployed, a student or a retiree) to the selection equation. The outcome equation (i.e., the second stage) estimates whether an entrepreneur innovates or not.

The Heckman probit model is similar to other Heckman correction models (Heckman, 1976; 1979; Puhani, 2000) regarding how it corrects for selection bias, except that the outcome dependent variable is a dummy variable and not a metric variable. Hence, we have:

$$Prob(E = 1|Z) = \varphi(Z\gamma) \quad (1)$$

and

$$E = Z\gamma + u_1 \quad (2)$$

where E designates entry into entrepreneurship (E=1 if the person is an entrepreneur and 0 otherwise), Z is the vector of predicting variables (e.g., start-up costs, corporate and income tax rates (log), GDP per capita (log), education level of the individual, entrepreneurial networks), γ is a vector of unknown parameters, φ is the cumulative distribution function of the standard normal distribution and u_1 is the error term. The first stage of the Heckman model yields results that can be used to predict the likelihood of being an entrepreneur for each individual.

The second stage (the outcome model) has the following form:

$$I^* = \varphi(X\beta + u_2) \quad (3)$$

where I^* represents entrepreneur's likelihood to innovate, X is the vector of predicting variables (e.g., start-up costs, tax rates, education level), β is a vector of unknown parameters and u_2 is the error term.

The model assumes that error terms u_1 and u_2, have normal distributions and are homoscedastic. The error terms are correlated with $corr(u_1, u_2) = \rho$. When standard probit techniques are applied to equation (3), it yields biased results, while the Heckman probit model provides consistent, asymptotically efficient estimates for all parameters in such models (Van de Ven and Van Praag, 1981).

Moreover, as with simple probit models, we cluster standard errors by countries. In the next section, we present the regression results. The main control variables correspond to Braunerhjelm and Eklund (2014) and are added stepwise to avoid multicollinearity concerns.

5.6 Results

5.6.1 Descriptive statistics

Before we describe our main results, we present descriptive statistics and correlations for the variables used in our study (Table 3). A total of 18.4% of the entrepreneurs are innovative and introduce new products or services to the market. Forty nine percent (49.0%) of the entrepreneurs have a university education, 3.4% have recent prior entrepreneurship experience and 37.0% have another entrepreneur in their networks. Regarding country-level indicators, on average, it takes 8.6% of a person's average income (measured as GDP per capita) to register a company. In addition, corporate and personal income tax rates are, on average, 27.0% and 31.5%, respectively.

The correlation matrix shows that the correlations between individual-level variables are low. Regarding macro-level variables, we find high correlations between log GDP per capita and start-up costs (correlation is -0.65), as well as between corporate and personal income tax rates (correlation is 0.48). In light of these high correlations, we adopt a stepwise approach in our regression analysis.

Table 3- Descriptive statistics and correlation matrix of the individual and country level variables

	Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Individual level variables															
1. Product innovation	0.18	0.39													
2. High level of education	0.49	0.50	0.05												
3. Entrepreneurial networks	0.37	0.48	0.01	-0.01											
4. Perceived entrepreneurial skills	0.49	0.50	0.01	-0.06	0.18										
5. Prior entrepreneurship experience	0.03	0.18	0.02	-0.02	0.07	0.06									
6. Established business ownership	0.08	0.28	0.02	0.02	0.04	0.04	0.03								
7. Age	43.23	26.63	0.00	0.05	-0.07	-0.02	-0.01	0.02							
8. Male	0.49	0.50	0.00	0.00	0.10	0.11	0.03	0.04	-0.02						
Country level variables															
9. Start-up costs	8.60	11.00	0.08	-0.05	0.03	-0.01	0.05	0.01	-0.05	-0.02					
10. Corporate tax rate (log)	3.29	0.68	-0.05	-0.03	-0.03	-0.01	-0.03	0.02	0.02	-0.04	0.04				
11. Personal income tax rate (log)	3.44	0.57	-0.07	0.02	-0.05	0.03	-0.08	0.01	0.04	0.02	-0.47	0.48			
12. Air transport (log)	17.13	1.45	-0.07	0.04	-0.08	-0.02	-0.03	0.02	0.06	-0.01	-0.29	0.20	0.38		
13. GDP per capita (log)	10.05	3.58	-0.07	0.14	-0.04	0.04	-0.10	0.02	0.08	0.06	-0.65	-0.07	0.49	0.29	
14. GDP growth	2.64	0.83	0.06	-0.05	0.03	-0.04	0.06	-0.01	-0.04	-0.03	0.32	0.11	-0.26	-0.12	-0.50

5.6.2 Main findings

Table 4 presents the Heckman probit regression results. Concerning start-up costs imposed by the government, we find a significant positive relationship between the required start-up costs and entrepreneurs' likelihood to innovate (Model I in Table 4). Hence, *ceteris paribus*, early-stage entrepreneurs are more likely to innovate when start-up costs are high in a country. We find a marginal effect of 0.1%-point. That is, evaluated at the sample means, a 10%-points increase in start-up costs from the mean leads to an increase in the predicted probability of innovative entrepreneurship of 1%-point — an increase of 9.8% in the likelihood for entrepreneurs in a country to be innovative.

Concerning the role of corporate and personal income tax rates, our results (Model II and Model III in Table 4) show an overall significant negative relationship between both types of taxes and entrepreneurs' likelihood to innovate. We find a marginal effect of -1%-point for the variable corporate tax rate (log). That is, evaluated at the sample mean, a 10%-point decrease in a country's corporate tax rates from the mean leads to an increase in the predicted probability of innovative entrepreneurship of 0.6%-points — an increase of approximately 6% in the probability that entrepreneurs innovate. Moreover, we find a significant marginal effect of -1.7%-points for the variable personal income tax rate (log).

Table 4 – Results of the Heckman probit regression analysis of start-up costs and taxes on entrepreneurs' propensity to innovate

	Product innovation (model I)		Selection model	**Product innovation (model II)**		Selection model	**Product innovation Model (III)**		Selection model
Predicted probabilities	0.11			0.10			0.10		
	Marginal effect	t-statistics	t-statistics	Marginal effect	t-statistics	t-statistics	Marginal effect	t-statistics	t-statistics
Country level variables									
Start-up costs	0.001	2.26**	-0.60						
Corporate tax rate (log)				-0.010	-5.37***	-0.73			
Income tax rate (log)							-0.017	-2.01**	-1.23
GDP per capita (log)	-0.002	-0.20	-4.80***	-0.014	-1.53	-4.11***	-0.007	-0.82	-3.95***
GDP growth rate	0.003	1.66*	0.86	0.002	1.17	0.92	0.002	1.47	0.85
Individual level control variables									
High level of education	0.019	4.42***	0.48	0.017	3.99***	0.43	0.018	4.22***	0.33
Entrepreneurial networks	0.013	1.85*	13.50***	0.014	2.09**	13.32***	0.013	1.94*	13.30***
Perceived entrepreneurial skills	0.052	3.10***	23.01***	0.054	3.46***	22.67***	0.054	3.36***	22.43***
Gender (male=1)	0.004	0.47	4.36***	0.004	0.49	4.14***	0.005	0.50	4.01***
Age	-0.001	-0.65	2.35**	-0.001	-0.49	2.34**	-0.001	-0.53	2.39**
Age-square	0.00001	0.47	-3.52***	0.000003	0.31	-3.48***	0.000006	0.33	-3.56***
Established business ownership	0.022	1.21	-6.80***	0.021	1.19	-6.79***	0.023	1.23	-6.79***
Prior entrepreneurship experience	0.022	2.96***	11.63***	0.021	2.96***	11.72***	0.021	2.89***	11.98***
Industry dummies		Yes			Yes			Yes	
Employment status dummies			Yes			Yes			Yes

Year dummies		Yes	Yes		Yes	Yes		Yes	Yes
Constant		-3.56***	-0.24		-1.99**	-0.57		-2.51**	-0.59
Sample size		632,116	43,223		632,116	43,223		632,116	43,223
Number of countries		53			53			53	
Likelihood Ratio test (rho=0)(prob>chi2)		***			***			***	

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

5.6.3 Additional findings

Next to the main predictors, the impact of the control variables on an entrepreneurs' likelihood to innovate is also reported in Table 4. At the country level, GDP growth and log GDP per capita have insignificant associations with entrepreneurs' likelihood to innovate. At the individual level, a high level of formal education, knowing another entrepreneur, prior entrepreneurship experience and (perceived) entrepreneurial skills have significant positive associations with entrepreneurs' propensity to innovate. Among these variables, perception of entrepreneurial skills seems to have the strongest relationship with innovation (a marginal effect of 5.4%-points).

Regarding the selection model and at the country level, only log GDP per capita consistently shows a significant negative relationship with entry into entrepreneurship. Hence, countries with a higher GDP per capita have a lower likelihood of entrepreneurial entry. At the individual level, prior entrepreneurship experience, perception of entrepreneurial skills, having entrepreneurial networks and being male show a significant positive relationship with individuals' likelihood to become an entrepreneur. Being an established business owner and age, however, negatively relate to entry into entrepreneurship.

5.6.4 Robustness checks

Hierarchical regression

The likelihood ratio test results provided in Table 4 show that a Heckman model is necessary due to the existence of a selection bias. Yet, we also find that when we use simple probit regressions, taking only the sample of entrepreneurs without accounting for selection bias, results are similar to the Heckman regressions. However, these models with clustered standard errors are not specifically designed to analyze hierarchical data (Franzese, 2005; Rabe-Hesketh and Skrondal, 2012). As entrepreneurs are nested in countries, a multi-level regression designed to combine variables from different aggregation levels takes into account possible intra-class correlations, thus reducing the likelihood of type 1 and type 2 errors (Hofmann et al., 2000). Multi-level models estimate the variances of the random effects and use this information to give observations different weights. Thus, multi-level models not only correct the standard errors but also provide better estimations of coefficients. Hence, we also analyze our data employing multi-level logit regressions with random intercepts as a robustness check.

Unlike multi-level models, clustering standard errors does not need to have asymptotics in terms of the number of observations per cluster, (Huber and Stanig, 2011). In addition, it has been argued that clustering standard errors provides model-free standard errors, while multi-level models require a correct model for the structure of variance e.g., standard deviations are constant at each level (Gelman and Hill, 2007). Moreover, multi-level mod-

els assume that errors and regressors are uncorrelated at all levels requiring the model to contain all relevant variables. Thus, multi-level modeling imposes more assumptions on the model than using cluster-adjusted standard errors (Primo et al., 2007; Gelman and Hill, 2007), which is one of the main reasons why we use the multilevel regressions merely as a robustness check.

The multilevel logit regressions show similar results as the Heckman probit regressions (Table 5, columns I, II and III). Using these models, we also find that start-up costs have a significant positive relationship with the probability for entrepreneurs to be innovative and that corporate and income tax rates have a significant negative association with the likelihood of innovative entrepreneurship.

Instrumental variable approach

One limitation of a cross-sectional study of the relation between taxes and entrepreneurship is the possibility of confounding factors (e.g., social security, good quality infrastructure). We try to deal with this possible endogeneity issue by using air transport - measured by (log of) passengers carried including both domestic and international aircraft passengers registered in the country - as instrument for taxes. Air transport depends on several factors such as the location of a country (and airport), transportation infrastructure and the population of a country. Hence, using it as an instrument can help to address the possible endogeneity issue in the relationship of taxes with innovative entrepreneurship.

We argue that air transport is associated with tax rates because countries with a large population, a good location and a decent transportation infrastructure have more passengers and these countries need to have higher tax rates to finance decent public goods (e.g., transportation infrastructure) for citizens. The correlation between the instrument and (corporate and income) tax rates is high since F-statistics, when we regress air transport on tax rates, are above 10 indicating that the instrument is not weak. In addition, and in order to check the validity of the instrument, we use Hansen's J test which shows that the instrument is valid as it is uncorrelated with the error term of our regression model with innovative entrepreneur as the dependent variable. [6]

We use instrumental variable probit regression analysis clustering the data by countries. Results of the instrumental variable approach are provided in Table 5, columns IV and V. The results confirm our previous finding that tax rates have a significant negative relationship with the likelihood of innovative entrepreneurship in a country.

[6] Results of the validity and strength tests of the instrument are available from the corresponding author upon request.

Table 5 – robustness check results, multi-level and IV

Estimation method	(I) Multi-level	(II) Multi-level	(III) Multi-level	(IV) IV	(V) IV
Country level variables					
Start-up costs	0.015*** (0.003)				
Corporate tax rate (log)		-0.099*** (0.017)		-0.759** (0.340)	
Income tax rate (log)			-0.181** (0.085)		-0.481** (0.243)
GDP per capita (log)	0.178** (0.070)	-0.098 (0.068)	-0.027 (0.072)	-0.064 (0.045)	0.125 (0.112)
GDP growth rate	0.032*** (0.008)	0.026 (0.023)	0.027 (0.18)	0.021 (0.013)	0.020 (0.015)
Individual level control variables					
High level of education	0.114*** (0.028)	0.151*** (0.054)	0.145*** (0.052)	0.043 (0.047)	0.054 (0.038)
Entrepreneurial networks	0.076*** (0.028)	0.066* (0.035)	0.062* (0.035)	0.005 (0.027)	0.016 (0.022)
Perceived entrepreneurial skills	0.195*** (0.040)	0.274*** (0.069)	0.276*** (0.069)	0.139*** (0.051)	0.156*** (0.047)
Gender (male=1)	0.004 (0.027)	0.004 (0.043)	0.012 (0.044)	-0.32 (0.36)	0.009 (0.026)
Age	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)	0.002 (0.002)	-0.001 (0.001)
Age-square	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Established business ownership	0.268*** (0.051)	0.329*** (0.079)	0.325*** (0.071)	0.179*** (0.056)	0.184*** (0.045)
Prior entrepreneurship experience	0.068 (0.043)	0.088* (0.051)	0.089* (0.051)	0.000 (0.063)	0.036 (0.031)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Constant	-4.432*** (0.699)	-1.176 (0.802)	-1.596** (0.759)	1.909 (1.458)	-1.021 (0.632)
Sample size	45,111	45,111	45,111	45,111	45,111

*** denotes significance at 1%; ** denotes significance at 5%; * denotes significance at 10%.

5.7 Discussion

Our results support the conclusion that start-up costs and taxes have significant and profound effects on whether nascent entrepreneurs innovate or not. Several prior studies have found that heavy start-up regulations reduce entrepreneurial entry at least in the form of "formal entrepreneurship" (De Soto, 1989; Djankov et al., 2002; Klapper et al., 2006). Based on these studies, a negative relationship between start-up costs and innovative en-

trepreneurship can be expected due to two main arguments: First, and in line with public choice theory (Stigler, 1971), it could be claimed that entry costs keep out competitors and increase incumbent benefits. While this may be socially inefficient (Djankov et al., 2002), we argue the contrary — that such costs can actually increase the likelihood of entrepreneurs to be innovative because their expected returns on innovation are less likely to be competed away (Schumpeter, 1934; Gilbert, 2006). Low start-up costs, which make entry relatively easy, can stimulate an excessive entry of non-innovative entrepreneurs (Porter, 1980; Shane and Venkataraman, 2000; Branstetter et al., 2013). When facing high start-up costs, entrepreneurs may be willing to enter only if their ideas are promising and the expected returns on their ideas are high.

A second argument for expecting a negative relationship with innovation is that high entry regulations associate with corruption and bribery, which can subsequently upset innovative entrepreneurial efforts (Djankov et al., 2002; De Soto, 1989; Baumol et al., 2007). This association, however, has recently been challenged after the influential studies of De Soto (1989; 2000) and Djankov et al. (2002), as many countries (including those with higher levels of corruption) have significantly lowered the barriers to new business creation (Van Stel et al., 2007; Monteiro and Assuncao, 2012). For instance, Russia has lowered its start-up costs from 13% in 2002 to 5% in 2006 and to 2% in 2012. Given that our database is mostly composed of upper middle- and high-income countries in the years from 2004 to 2011 (Table 1), the above-mentioned link between entry regulations and corruption seems loose and unsupported. Furthermore, recent empirical studies on start-up regulations and entrepreneurship (e.g., Monteiro and Assuncao, 2012; Branstetter et al., 2013) have cast doubts upon the negative associations, suggested by Djankov et al. (2002), between the time and costs required for starting a business and the quality of entrepreneurs in emerging and advanced economies. According to these studies, marginal entrepreneurs decide to register their firms when start-up costs are low (De Meza and Webb, 1999). These marginal entrepreneurs are less able entrepreneurs and less likely to have a promising innovative idea compared to infra-marginal entrepreneurs (Tokman, 1992).

In this study, we find that in more tax-friendly countries, entrepreneurs show a higher propensity to engage in innovation. As we explained earlier, higher rates of corporate and personal income taxes can adversely affect the prize of innovation for entrepreneurs. This argument fits a more general notion in the innovation literature that firms' propensity to engage in innovation is responsive to changes in the expected profitability of their potential products (Gilbert, 2006; Blume-Kohout and Sood, 2013). While onerous taxation can lower the amount of the innovation prize, entrepreneurs tend to credit themselves for their successes (Cullen and Gordon, 2005; Parker, 2009). Hence, entrepreneurs with a tendency to innovate are likely to severely resent governments' efforts to take away part of their earnings (Baumol et al., 2007). In line with our findings, some other studies suggest that a

high rate of tax payments on entrepreneurs (e.g., through a progressive tax system) can decrease their willingness to take risks (Gentry and Hubbard, 2000; Cullen and Gordon, 2007).

Moreover, tax payment can be considered as a decrease in one's own financial resources and subsequently as a limitation of one's financial freedom. Considering taxes to be a limitation of financial freedom is especially likely in response to perceiving tax payments as "out of pocket" losses (Kamleitner et al., 2012). As a consequence, entrepreneurs are more likely to perceive and frame taxes as threats to their financial freedom than other taxpayers (Kirchler, 1998). Brehm (1966) would suggest that people react to a perceived loss of freedom by efforts to re-establish the lost control. One way to do so, next to considering possible ways to evade tax, could be to consider setting up a business in countries where they perceive to have more financial freedom and have to pay less taxes particularly if entrepreneurs are still in the early stages of setting up a business. This effect is more pronounced for such early-stage entrepreneurs because, as Kirchler (1996) argues, entrepreneurs who ran their own businesses for only a short time are most sensitive to tax pressures.

Lastly, a high tax rate can lower the possibilities for investments in innovation due to lower levels of retained earnings and lower levels of savings (Henrekson and Sanandaji, 2011). In addition, high tax rates reduce the expected (risk-adjusted, after tax) returns on innovative ventures and subsequently decrease venture capital investments in innovative start-ups (Da Rin et al., 2011). Heavy taxation can also have an adverse influence on the inflow of foreign direct investment (Djankov et al., 2010; Desai et al., 2004). Foreign investors normally bring their knowledge, experience and technologies along with their money to the countries they invest in (De Clercq et al., 2008; Baumol et al., 2007). In addition, foreign direct investment may provide the required funding for innovative entrepreneurs, e.g., by buying part of the new venture (Wright et al., 2005).

5.8 Implications

To date, little scholarly attention has been devoted to the influence of the costs imposed by regulations on innovative entrepreneurship. This suggests that regulations are not considered a source of costs that can take away the "prize" of entrepreneurial innovation. Although studies investigated the influence of institutions and regulations on the level and the type of entrepreneurs (Cullen and Gordon, 2007; Branstetter et al., 2013), it was not clear, particularly at the micro-level, how these regulations influence the relative rewards for innovation. Our goal in this article has been to investigate the effect of some of the most important, yet debated, costs imposed by regulations on entrepreneurs' propensity to innovate. Our focus on starting entrepreneurs is relevant because the type and quality of new actors that enter the market is likely to have implications for a country's overall entrepre-

neurial or business quality. Our argument is premised on the notion that entrepreneurs innovate mainly to gain above-average profit margins in line with Schumpeter's proposition (1934). In this context, the government can stimulate entrepreneurial innovation by using appropriate business regulations to structure the relative rewards for innovation (Baumol, 1990).

Several policy implications can be derived from our findings. First, the extent to which start-up regulation costs are linked to the expected profit of innovation can influence entrepreneurs' propensity to innovate. As mentioned, innovative entrepreneurs can contribute to economic development through offering new products to the market and through challenging established large corporations in the marketplace (Schumpeter, 1934; Klepper, 1996). The government can stimulate innovative entrepreneurship by tying costs *less directly* to the rewards of innovation. For example, and in line with the suggestion of Baumol et al. (2007), taxes on properties and goods are preferred to taxes on income and profit if the goal is to promote innovative business activities and growth.

Second, and regarding start-up costs, our results suggest that in spite of a possible negative relationship with the supply of entrepreneurial ventures (Klapper et al., 2006), such costs actually have a significant positive relation with the likelihood of entrepreneurs to be innovative. Hence, this finding suggests that policy-makers should think more carefully about the consequences of having lower start-up costs. Lowering these costs, on the one hand, can increase the rate of entrepreneurship, leading to less unemployment and a more dynamic business environment (Branstetter et al., 2013; Klapper et al., 2006). On the other hand, lowering start-up costs may decrease the likelihood that entrepreneurs will innovate, possibly due to the (excessive) entry of imitative entrepreneurs and lower expected returns on innovation.

Third, if innovative entrepreneurship is indeed an important source of economic growth (Schumpeter, 1934; Da Rin et al., 2011), then our finding that entrepreneurs have a low propensity to innovate in countries with severe tax systems could partly explain why taxes may have a negative influence on economic growth as suggested in prior studies (Lee and Gordon, 2005). While previous studies have pointed to other detrimental effects of high corporate and income tax rates for the economy (Grossman, 1993), policy-makers should also be aware of the adverse consequences of high tax rates for firms' and entrepreneurs' propensity to innovate.

5.9 Limitations and further research

This study has a number of limitations that should be taken into account. First, using cross-sectional data makes it difficult to establish causal relationships. Although the instrumental variable approach helps to reduce the threat of omitted variable bias, a panel dataset of entrepreneurs and a major change in tax rates or start-up costs across time constitute the

ideal setting to investigate how these macro-level predictors influence entrepreneurs' decisions to engage in innovation. A second limitation concerns our use of a self-reported measure of innovation. Using an objective measure of innovation (e.g., new product sales as a percentage of total sales) would be preferred, although access to such data in a cross-country setting comprising enough observations for each country would be very difficult, if not impossible.

We would like to highlight two main avenues for future studies. First, it would be interesting to investigate the impact of other regulations, such as labor regulations on entrepreneurs' propensity to innovate. High costs imposed by labor regulations, for example, may increase the costs of innovation because innovation is often accompanied with labor adjustments (Da Rin et al., 2011), while such costs may discourage the entry of entrepreneurs with not so promising ideas. Second, we only look at one type of innovation (product innovation) in this study. Further research could investigate the relationship between taxes and other types of innovation. While our findings suggest that taxes reduce the likelihood of product innovation among entrepreneurs, taxes possibly have a similar, different or no effect on other types of innovation. High tax rates, for example, may stimulate entrepreneurs to buy new machinery and declare it as a cost to avoid paying large amounts of taxes, and hence, this could increase the likelihood of process innovation.

Summary

In the past decades, entrepreneurship, as a growing field of research, was trying to find universal rules that govern the entrepreneurial behavior of all individuals. But there are movements in the field to understand the variability and heterogeneity among individuals who (may) opt for entrepreneurship since they are not identical members of a class. This thesis contributes to such movements with dividing entrepreneurs based on start-up motivations, the quality of their idea (i.e., innovative or imitative) and their prior labor market statuses. We argue that such categorizations are important to understand the future strategic decisions and performance of the venture.

This thesis begins with an introduction that motivates studying involvement of individuals in entrepreneurship and particularly their engagement in innovative entrepreneurship. First, it provides a comprehensive view on the determinants of innovative entrepreneurship at various levels. Second, this dissertation offers new insights on how investments in human capital may influence entrepreneurial decisions of individuals with specific yet important start-up conditions (i.e. necessity-based motivation, unemployment). Third, admitting countries "are not king size individuals" and "eco-logic differs from individual psycho-logic", this research explains how certain relevant contextual factors such as competition intensity, taxation and start-up costs may influence individuals' propensity to one type of activity (i.e., innovation) instead of another (i.e., imitation). The next four chapters investigate the determinants of nascent entrepreneurship and innovative entrepreneurship in a country. First, the entrepreneurial entry of individuals with different labor market statuses and the role of important human capital investment factors (i.e., formal education and prior entrepreneurship experience) are investigated. Second, the start-up as well as contextual conditions that determine whether someone is involved in one type of entrepreneurial activity instead of another (i.e., innovation versus imitation) is studied in this thesis.

The findings of this thesis suggest that higher levels of investments in human capital encourage the unemployed to opt for entrepreneurship. Such investments show a positive relation with necessity entrepreneurs' propensity to innovate as well. Moreover, it is found that competition, when defined as average profitability of the sector, positively relates to entrepreneurs' propensity to innovate. Lastly, this thesis finds that one-off regulatory costs (i.e., start-up costs) are positively related whereas recurring regulatory costs (i.e., taxes) are negatively related to entrepreneurs' propensity to innovate.

Samenvatting (Summary in Dutch)

Gedurende de afgelopen decennia heeft het onderzoeksveld van de ondernemerswereld zich gericht op het vinden van universele regels die bepalend zijn voor het ondernemend gedrag van het individu. Er zijn echter in dat veld eveneens bewegingen richting het begrijpen van de variëteit en heterogeniteit onder de individuen die (mogelijk) kiezen voor ondernemerschap, omdat zij geen identieke leden van een enkele groep zijn. Deze scriptie draagt aan deze bewegingen door ondernemers op te delen op basis van motivaties voor hun initiatieven, de kwaliteit van hun ideeën (innovatie versus imitatie) en hun professionele achtergronden. We stellen dat zulke opdelingen van belang zijn voor het begrijpen van de toekomstige strategische beslissingen en de prestaties van de onderneming.

Deze scriptie begint met een introductie, met de motieven voor het bestuderen van de betrokkenheid van individuen in ondernemerschap en met name in innovatief ondernemerschap. Allereerst wordt een uitgebreid overzicht gegeven van de bepalende factoren voor innovatief ondernemerschap op verschillende niveaus. Vervolgens biedt deze thesis nieuwe inzichten in hoe investeringen in Human Capital de beslissingen in ondernemerschap van individuen met specifieke startup-overwegingen (bijvoorbeeld motivatie gebaseerd op noodzaak, werkloosheid) beïnvloeden. Als derde, accepterend dat landen geen individuen zijn en dat ecologie afwijkt van de individuele psychologie, legt dit onderzoek uit hoe bepaalde relevante contextuele factoren zoals intensiteit van concurrentie, belastingsstelsels en opstartkosten van invloed zijn op de individuele neiging naar bepaalde soorten start-up activiteiten (innovatief ofwel imiterend). De volgende vier hoofdstukken onderzoeken de bepalende factoren voor startend ondernemerschap en innovatief ondernemerschap in een land. Eerst worden de start-ups van individuen met verschillende professionele achtergronden en de rol van belangrijke investeringen in Human Capital (opleiding, eerdere ondernemingservaring) onderzocht. Daarna worden zowel de start-up als de contextuele factoren die bepalend zijn voor of een individu betrokken is bij het ene (innovatief) of het andere (imiterend) type ondernemerschap besturdeerd.

De bevindingen in deze studie suggereren dat grotere investeringen in Human Capital werklozen motiveren om te kiezen voor het ondernemerschap. Er is eveneens een positieve relatie tussen zulke investeringen en de neiging van ondernemers om te vernieuwen. Bovendien blijkt dat de concurrentiepositie, gedefinieerd als de gemiddelde winstgevendheid van de sector, positief gerelateerd is aan de neiging van ondernemers om te vernieuwen. Ten slotte is in deze studie een positieve relatie gevonden tussen de neiging

van ondernemers om te vernieuwen en eenmalige kosten (zoals start-up kosten) en een negatieve relatie tussen diezelfde neiging en terugkerende kosten (zoals belastingen).

References

Acemoglu, D., Akcigit, U., & Celik, M. A. (2014). Young, restless and creative: Openness to disruption and creative innovations. NBER Working Paper No. 19894. Cambridge MA: National Bureau of Economic Research.

Acs, Z. (2006). How is entrepreneurship good for economic growth? *Innovations: Technology, Governance, Globalization*, *1*(1), 97-107.

Acs, Z., Arenius, P., Hay, M., & Minniti, M. (2005). *Global Entrepreneurship Monitor 2004: executive report*. Babson College and London Business School, Babson Park/London.

Acs, Z., & Audretsch, D. (1987). Innovation, market structure and firm size. *The Review of Economics and Statistics*, *69*(4), 567-574.

Acs, Z. J., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: Measurement issues and policy implications. *Research Policy*, *43*(3), 476-494.

Acs, Z., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, *32*(1), 15-30.

Acs, Z., Desai, S., & Hessels, J. (2008). Entrepreneurship, economic development and institutions. *Small Business Economics*, *31*(3), 219-234.

Adner, R., & Levinthal, D. (2001). Demand heterogeneity and technology evolution : Implications for product and process innovation. *Management Science*, *47*(5), 611-628.

Agarwal, R., Audretsch, D., & Sarkar, M. B. (2007). The process of creative construction: Knowledge spillovers, entrepreneurship, and economic growth. *Strategic Entrepreneurship Journal, 1*(3-4), 263-286.

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economics*, *120*(2), 701-728.

Aghion, P., & Griffith, R. (2008). *Competition and Growth: Reconciling Theory and Evidence*. Cambridge, MA: MIT Press.

Aghion, P., & Howitt, P. (1996). *Endogenous Growth Theory*. Cambridge, MA: MIT Press.

Ahuja, G., Lampert, C. M., & Tandon, V. (2008). Moving beyond Schumpeter: Management research on the determinants of technological innovation. *The Academy of Management Annals*, *2*(1), 1-98.

Aldridge, J. H. (1997). An occupational personality profile of the male entrepreneur as assessed by the 16PF fifth edition. Unpublished doctoral dissertation, University of Georgia.

Aldrich, H., & Martinez, M. A. (2010). Entrepreneurship as social construction: A multi-level evolutionary approach. In Acs, Z., Audretsch, D. (Eds.), *Handbook of Entrepreneurship Research* (pp. 387-427). New York, New York: Springer.

Aldrich, H., & Martinez, M. A. (2015). Why aren't entrepreneurs more creative? Conditions affecting creativity and innovation in entrepreneurial activity. In Shalley, C., Hitt, M., Zhou, J. (Eds.), *The Oxford Handbook of Creativity, Innovation and Entrepreneurship* (pp. 445-456). New York, US: Oxford University Press.

Anokhin, S., & Schulze, W. S. (2009). Entrepreneurship, innovation, and corruption. *Journal of Business Venturing*, *24*(5), 465-476.

Arenius, P., & Minniti, M. (2005). Perceptual variables and nascent entrepreneurship. *Small Business Economics*, *24*(3), 233-247.

Arrow, K. J. (1962). Economic welfare and the allocation of resources for inventions. In Nelson, R. (Ed.), *The Rate and Direction of Technological Change* (pp. 609-629). Princeton, US: Princeton University Press.

Atkinson A. B. & Stiglitz, J. E. (1980). *Lectures on Public Economics*. New York, US: McGraw-Hill.

Audretsch, D. B. (1995). Innovation, growth and survival. *International Journal of Industrial Organization*, *13*, 441-457.

Audretsch, D. B., & Keilbach, M. (2004). Entrepreneurship and regional growth: An evolutionary interpretation. *Journal of Evolutionary Economics*, *14*(5), 605-616.

Audretsch, D. B., Keilbach, M., & Lehmann, E. (2006). *Entrepreneurship and Economic Growth*. New York, US: Oxford University Press.

Audretsch, D. B. & Thurik, R. (2001). What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. *Industrial and Corporate Change*, *10*(1), 267-315.

Autio, E., Pathak, S., & Wennberg, K. (2013). Consequences of cultural practices for entrepreneurial behaviors. *Journal of International Business Studies*, *44*(4), 334-362.

Avermaete, T., Viaene, J., Morgan, E. J., & Crawford, N. (2003). Determinants of innovation in small food firms. *European Journal of Innovation Management*, *6*(1), 8-17.

Baptista, R., Karaöz, M., & Mendonça, J. (2014). The impact of human capital on the early success of necessity versus opportunity-based entrepreneurs. *Small Business Economics*, *42*, 831-847.

Baptista, R., Lima, F., & Preto, M. T. (2012). How former business owners fare in the labor market? Job assignments and earnings. *European Economic Review*, *56*(2), 263-276.

Baron, R. A., Ensley, M. D. (2006). Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs. *Management Science*, *52*(9), 1331-1344.

Bates, T. (1995). Self-employment entry across industry groups. *Journal of Business Venturing*, *10*(2), 143-156.

Baum, J. R. & Locke, E. A. (2004). The relationship of entrepreneurial traits, skill and motivation to subsequent venture growth. *Journal of Applied Psychology*, *89*(4), 587-598.

Baumgartner, H. J., & Caliendo, M. (2008). Turning unemployment into self-employment: Effectiveness of two start-up programmes. *Oxford Bulletin of Economics and Statistics*, *70*(3), 347-373.

Baumol, W. J. (1990). Entrepreneurship: productive, unproductive, and destructive. *Journal of Political Economy*, *98*(5), 893-921.

Baumol, W. J. (2010). *The Microtheory of Innovative Entrepreneurship*. New Jersey, US: Princeton University Press.

Baumol, W. J., Litan, R. E. & Schramm, C. J. (2007). *Good Capitalism, Bad Capitalism and the Economics of Growth and Prosperity*. New Haven, US: Yale University Press.

Becker, G. S. (1993). *Human Capital (3rd edition)*. Chicago, US: University of Chicago Press.

Berglann, H., Moen, E. R., Roed, K., & Skogstroem, J. F. (2011). Enterpreneurship: Origins and returns. *Labour Economics*, *18*(2), 180-193.

Bergmann, H., & Sternberg, R. (2007). The changing face of entrepreneurship in Germany. *Small Business Economics*, *28*(2-3), 205-221.

Bhide, A. (2000). *The Origin and Evolution of New Businesses*. Oxford, UK: The Oxford University Press.

Binder, M., & Coad, A. (2013). Life satisfaction and self-employment: A matching approach. *Small Business Economics*, *40*(4), 1009-1033.

Blanchflower, D. G. (2004). Self-employment: More may not be better. *Swedish Economic Policy Review*, *11*, 15-73.

Blanchflower, D. G., & Oswald, A. J. (1998). What makes an entrepreneur? *Journal of Labor Economics*, *16*(1), 26-60.

Blau, D. M., & Robins, P. K. (1990). Job search outcomes for the employed and unemployed. *Journal of Political Economy*, *98*(3), 637-655.

Block, J. H., Kohn, K., Miller, D. & Ullrich, K. (2015). Necessity entrepreneurship and competitive strategy. *Small Business Economics*, *44*, 37-57.

Block, J. H., & Sandner, P. (2009). Necessity and opportunity entrepreneurs and their duration in self-employment: Evidence from German micro data. *Journal of Industry, Competition and Trade*, *9*(2), 117-137.

Block, J. H., & Wagner, M. (2007). Opportunity recognition and exploitation by necessity and opportunity entrepreneurs: Empirical evidence from earnings equations. *Academy of Management Proceedings*.

Block, J. H., & Wagner, M. (2010). Necessity and opportunity entrepreneurs in Germany: Characteristics and earnings differentials. *Schmalenbach Business Review*, *62*(2), 154-174.

Blume-Kohout, M. E., & Sood, N. (2013). Market size and innovation: Effects of medicare part D on pharmaceutical research and development. *Journal of Public Economics*, *97*, 327-336.

Boone, J. (2008). A new way to measure competition. *The Economic Journal*, *118*(531), 1245-1261.

Bosma, N., Hessels, J., Schutjens, V., Van Praag, M., & Verheul, I. (2012). Entrepreneurship and role models. *Journal of Economic Psychology*, *33*(2), 410-424.

Bosma, N., Van Praag, M., Thurik, R., & De Wit, G. (2004). The value of human and social capital investments for the business performance of startups. *Small Business Economics*, *23*(3), 227-236.

Branstetter, L., Lima, F., Taylor, L. J., & Venâncio, A. (2013). Do entry regulations deter entrepreneurship and job creation? Evidence from recent reforms in Portugal. *The Economic Journal*, *124*(577), 805-832.

Braunerhjelm, P., Acs, Z. J., Audretsch, D. B., & Carlsson, B. (2010). The missing link: Knowledge diffusion and entrepreneurship in endogenous growth. *Small Business Economics*, *34*(2), 105-125.

Braunerhjelm, P., & Eklund, J. E. (2014). Taxes, tax administrative burdens and new firm formation. *Kyklos*, *67*(1), 1-11.

Brehm, J. W. (1966). *A Theory of Psychological Reactance*. New York, US: Academic Press.

Bruce, D., & Mohsin, M. (2006). Tax policy and entrepreneurship: New time series evidence. *Small Business Economics*, *26*(5), 409-425.

Burke, A. E., FitzRoy, F. R., & Nolan, M. A. (2000). When less is more: Distinguishing between entrepreneurial choice and performance. *Oxford Bulletin of Economics and Statistics*, *62*(5), 565-586.

Burke, A. E., FitzRoy, F. R., & Nolan, M. A. (2002). Self-employment wealth and job creation: The roles of gender, non-pecuniary motivation and entrepreneurial ability. *Small Business Economics*, *19*, 255-270.

Burke, A. E., & To, T. (2001). Can reduced entry barriers worsen market performance? A model of employee entry. *International Journal of Industrial Organization, 19*(5), 695-704.

Burke, A., & Van Stel, A. (2014). Entry and exit in disequilibrium. *Journal of Business Venturing*, *29*(1), 174-192.

Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2009). Risk attitudes of nascent entrepreneurs-new evidence from an experimentally validated survey. *Small Business Economics*, *32*(2), 153-167.

Caliendo, M., & Kritikos, A. S. (2010). Start-ups by the unemployed: Characteristics, survival and direct employment effects. *Small Business Economics*, *35*(1), 71-92.

Capron Insead, L., & Chatain, O. (2008). Competitors' resource-oriented strategies: Acting on competitors' resources through interventions in factor markets and political markets. *Academy of Management Review*, *33*(1), 97-121.

Carrasco, R. (1999). Transitions to and from self-employment in Spain: An empirical analysis. *Oxford Bulletin of Economics and Statistics*, *62*(3), 315-341.

Cassar, G. (2006). Entrepreneur opportunity costs and intended venture growth. *Journal of Business Venturing*, *21*(5), 610-632.

Cassar, G. (2014). Industry and startup experience on entrepreneur forecast performance in new firms. *Journal of Business Venturing, 29*(1), 137-151.

Casson, M. (2003). *The Entrepreneur: An Economic Theory*. Cheltenham, the UK: Edward Edgar.

Cefis, E., & Marsili, O. (2006). Survivor: The role of innovation in firms' survival. *Research Policy*, *35*(5), 626-641.

Clark, A. E., & Oswald, A. J. (1994). Unhappiness and unemployment. *The Economic Journal*, *104*(424), 648-659.

Clark, A. E, Georgellis, Y., & Sanfey, P. (2001). Scarring: The Psychological Impact of Past Unemployment. *Economica*, *68*(270), 221-241.

Clark, A. E., Frijters, P., & Shields, M. (2008). Relative income, happiness and utility: An explanation for the Easterlin Paradox and other puzzles. *Journal of Economic Literature*, *46*(1), 95-144.

Coad, A. (2014). Death is not success: Reflections on business exit. *International Small Business Journal*, *32*(7), 721-732.

Cohen, W. M. (2010). Fifty years of empirical studies of innovative activity and performance. In Hall, B. H., Rosenberg, N. (Eds.), *Handbook of the Economics of Innovation, Volume 1* (1st ed., pp. 129-213). Amsterdam, the Netherlands: Elsevier B.V.

Cohen, W. M. & Klepper, S. (1992). The tradeoff between firm size and diversity in the pursuit of technological progress. *Small Business Economics*, *4*(1), 1-14.

Cohen, W., & Levinthal, D. (1989). Innovation and learning: The two faces of R&D. *The Economic Journal, 99*(3), 569-596.

Cornelius, B., Landstrom, H., & Persson, O. (2006). Entrepreneurship studies: The dynamic research front of a developing social science. *Entrepreneurship Theory and Practice*, *30*(3), 375-397.

Cullen, J. B., & Gordon, R. H. (2007). Taxes and entrepreneurial risk-taking: Theory and evidence for the U.S. *Journal of Public Economics*, *91*(7-8), 1479-1505.

Dakhli, M., & De Clercq, D. (2004). Human capital, social capital, and innovation: A multi-country study. *Entrepreneurship & Regional Development*, *16*(2), 107-128.

Da Rin, M., Di Giacomo, M., & Sembenelli, A. (2011). Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe. *Journal of Public Economics*, *95*(9-10), 1048-1066.

Darnihamedani, P., & Hessels, J. (2016). Human capital as a driver of innovation among necessity-based entrepreneurs. *International Review of Entrepreneurship*, *14*(1), 1-24.

Darnihamedani, P., Hessels, J., Block, J., & Simonyan, A. (2015). Start-up costs, taxes and innovative entrepreneurship. Manuscript in preparation.

Darnihamedani, P., Hessels, J., Van Stel, A., & Burke, A. (2015). Which types of the unemployed select into nascent entrepreneurship? Manuscript in preparation.

Darnihamedani, P., Hessels, J., Van Stel, A., & Burke, A. (2015). Competition, perceived competition and innovative start-ups. Manuscript in preparation.

Davidsson, P. (2006). Nascent entrepreneurship: Empirical studies and developments. *Foundations and Trends in Entrepreneurship*, *2*(1), 1-76.

Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, *18*(3), 301-331.

De Clercq, D., Hessels, J., & Van Stel, A. J. (2008). Knowledge spillovers and new ventures' export orientation. *Small Business Economics*, *31*(3), 283-303.

Deli, F. (2011). Opportunity and necessity entrepreneurship: Local unemployment and the small firm effect. *Journal of Management Policy and Practice*, *12*(4), 38-57.

Delmar, F., & Davidsson, P. (2000). Where do they come from? Prevalence and characteristics of nascent entrepreneurs. *Entrepreneurship and Regional Development*, *12*(1), 1-23.

De Meza, D., & Webb, D. C. (1987). Too much investment: A problem of assymetric information. *The Quarterly Journal of Economics*, *102*(2), 281-292.

De Meza, D., & Webb, D. C. (1999). Wealth, enterprise and credit policy. *The Economic Journal*, *109*(455), 153-163.

Desai, M., Foley, C. F., & Hines, J. R. (2004). Foreign direct investment in a world of multiple taxes. *Journal of Public Economics*, *88*(12), 2727-2744.

Desai, M., Gompers, P., & Lerner, J. (2003). Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe. NBER *Working Paper* No. 10165.

De Soto, H. (1989). *The Other Path: The Invisible Revolution in the Third World*. New York, New York: Harper and Row.

De Soto, H. (2000). *The Mystery of Capital*. New York, New York: Basic Books.

Dixit, A., & Stiglitz, J. (1977). Monopolistic competition and optimum product diversity. *American Economic Review*, *67*(3), 297-308.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The regulation of entry. *Quarterly Journal of Economics*, *117*(1), 1-37.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The Effect of Corporate Taxes on Investment and Entrepreneurship. *American Economic Journal: Macroeconomics*, *2*, 31-64.

Dobrev, S. D., & Barnett, W. (2005). Organizational roles and the transition to entrepreneurship. *Academy of Management Journal*, *48*, 433-449.

Doiron, J. D. (1995). Lay-offs as signals: The Canadian evidence. *The Canadian Journal of Economics, 28*, 899-913.

Dosi, G. (1988). Sources, procedures, and microeconomic effects of innovation. *Journal of Economic Literature*, *26*(3), 1120-1171.

Dreher, A., & Gassebner, M. (2013). Greasing the wheels? The impact of regulations and corruption on firm entry. *Public Choice*, *155*(3), 413-432.

Drucker, P. F. (1985). *Innovation and Entrepreneurship*. London, the UK: William Heinemann Ltd.

Easterlin, R. A. (ed.) (2002). *Happiness in Economics*. Cheltenham, the UK: Edward Elgar.

Eckhardt, J., & Shane, S. (2010). An update to individual-opportunity nexus. In: Acs, Z. & Audretsch, D. (Ed). *Handbook of Entrepreneurship Research* (pp. 47-77). New York, New York: Springer Science+Business Media.

Evans, D., & Jovanovic, B. (1989). An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy*, *97*(4), 808-827.

Evans, D., & Leighton, L. (1989). The determinants of changes in U.S. self-employment, 1968-1987. *Small Business Economics, 1*, 111-119.

Evans, D., & Leighton, L. (1990). Small business formation by unemployed and employed workers. *Small Business Economics*, *2*, 319-330.

Evanschitzky, H., Baumgarth, C., Hubbard, R., & Armstrong, J.S. (2007). Replication research's disturbing trend. *Journal of Business Research*, *60*(4), 411-415.

Falck, O. (2008). Routinization of innovation in German manufacturing: The David-Goliath symbiosis revisited. *Industrial and Corporate Change*, *18*(3), 497-506.

Feldstein, M. (2002). The transformation of public economics research: 1970-2000. J*ournal of Public Economics*, *86*, 319-326.

Feldstein, M., & Wrobel, M. V. (1998). Can state taxes redistribute income? *Journal of Public Economics*, *68*(3), 369-396.

Fölster, S. (2002). Do lower taxes stimulate self-employment? *Small Business Economics, 19*(2), 135-145.

Foreman-Peck, J. S. (1985). Seedcorn or Chaff? New Firm Formation and the Performance of the Interwar Economy. *Economic History Review*, *38*(3), 402-422.

Forsman, H. (2011). Innovation capacity and innovation development in small enterprises. A comparison between the manufacturing and service sectors. *Research Policy*, *40*(5), 739-750.

Frankish, J. S., Roberts, R. G., Coad, A., & Storey, D. J. (2014). Is entrepreneurship a route out of deprivation? *Regional Studies, 48*(6), 1090-1107.

Franzese, R. J. (2005). Empirical strategies for various manifestations of multilevel data. *Political Analysis*, *13*(4), 430-446.

Frederiksen, A., Ibsen, R., Rosholm, M., & Westergaard-Nielsen, N. (2013). Labour market signalling and unemployment duration: An empirical analysis using employer-employee data. *Economics Letters*, *118*, 84-86.

Gans, J. S., & Stern, S. (2003). The product market and the market for ‘‘Ideas’’: Commercialization strategies for technology entrepreneurs. *Research Policy*, *32*(2), 333-350.

Gartner, W. (1985). A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review*, *10*(4), 696-706.

Gartner, W. B. (1988). Who is an entrepreneur? is the wrong question. *American Journal of Small Business*, *12*(4), 11-32.

Gelman, A., Hill, J. (2007). *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York, New York: Cambridge University Press.

Gentry, W., & Hubbard, G. (2000). Tax policy and entrepreneurial entry. *The American Economic Review*, *90*(2), 283-287.

Geroski, P. A. (1995). What do we know about entry? *International Journal of Industrial Organization*, *13*, 421-440.

Ghio, N., Guerini, M., Lehmann, E. E., & Rossi-Lamastra, C. (2015). The emergence of the knowledge spillover theory of entrepreneurship. *Small Business Economics*, *44*(1), 1-18.

Gibbons, R., & Katz, L. F. (1991). Layoffs and lemons. *Journal of Labor Economics*, *9*, 351-380.

Gilbert, R. (2006). Looking for Mr. Schumpeter: Where are we in the competition-innovation debate? *NBER Working Paper Series*, *6*, 159-215.

Goldsmith, A. H., Veum, J. R., & Darity, W. (1996). The psychological impact of unemployment and joblessness. *Journal of Socio-Economics*, *25*(3), 333-358.

Greene, F., Mole, K., & Storey, D. (2004). Does more mean worse? Three decades of enterprise policy in the Tees Valley. *Urban Studies*, *41*(7), 1207-1228.

Grilo, I., & Thurik, A. R. (2008). Determinants of entrepreneurial engagement levels in Europe and the US. *Industrial and Corporate Change*, *17*(6), 1113-1145.

Grossman, G. (1993). *Innovation and Growth in the Global Economy*. Boston, US: MIT press.

Grossman, G. M., & Helpman, E. (1991). Quality ladders in the theory of growth. *Review of Economic Studies*, *58*(1), 43-61.

Gimeno, J., Folta, T., Cooper, A., & Woo, C. (1997). Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly, 42*, 750-783.

Gruber, M., MacMillan, I. C., & Thompson, J. D. (2012). From minds to markets: How human capital endowments shape market opportunity identification of technology start-ups. *Journal of Management*, *38*(5), 1421-1449.

Hamel, G., & Prahalad, C. K. (1990). The core competence of the corporation. *Harvard Business Review*, *33*, 79-91.

Hannan, M., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, *49*, 149-164.

Harris, P. (1996). Sufficient grounds for optimism? The relationship between perceived controllability and optimistic bias. *Journal of Social and Clinical Psychology*, *15*(1), 9-52.

Hayek, F. A. (1945). The use of knowledge in society. *American Economic Review*, *35*, 519-530.

Hebert, R. F., & Link, A. N. (1989). In search of the meaning of entrepreneurship. *Small Business Economics*, *1*(1), 39-49.

Heckman, J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. *Annals of Economic and Social Measurement*, *5*(4), 475-492.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica, 47*(1), 153-161.

Helliwell, J., & Putnam, R. D. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society of London, Series B. Biological Sciences, 359*(1449), 1435-1446.

Henrekson, M. & Sanandaji, T. (2011). Entrepreneurship and the theory of taxation, *Small Business Economics*, *37*, 167-185.

Hessels, J., Gelderen, M., & Thurik, R. (2008). Entrepreneurial aspirations, motivations, and their drivers. *Small Business Economics*, *31*(3), 323-339.

Hessels, J., & Van Stel, A. (2011). Entrepreneurship, export orientation and economic growth. *Small Business Economics*, *37*, 255-268.

Hinz, T., & Jungbauer-Ganz, M. (1999). Starting a business after unemployment: Characteristics and chances of success (empirical evidence from a regional German labour market). *Entrepreneurship & Regional Development*, *11*, 317-333.

Hobsbawm, E. J. (1969). *Industry and Empire from 1750 to the Present Day*. Harmondsworth, US: Penguin.

Hofmann, D. A., Griffin, M. A., & Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In Klein, K. J., Kozlowski, S. W. J. (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions*. (pp. 467-511). San Francisco, CA: Jossey-Bass.

Hofstede, G. (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*. Thousand Oaks, US: Sage.

Honig, B. (1996). Education and self-employment in Jamaica. *Comparitive Education Review*, *40*(2), 177-193.

Honig, B., & Samuelsson, M. (2014). Data replication and extension: A study of business planning and venture-level performance. *Journal of Business Venturing Insights*, *1-2*, 18-25.

Hoskisson, R. E., Covin, J., Volberda, H. W., & Johnson, R. A. (2011). Revitalizing entrepreneurship: The search for new research opportunities. *Journal of Management Studies*, *48*(6), 1141-1168.

Hubbard, R., Vetter, D. E., & Little, E. L. (1998). Replication in strategic management: Scientific testing for validity, generalizability and usefulness. *Strategic Management Journal*, *19*(3), 243-254.

Huber, J. D., & Stanig, P. (2011). Church-state separation and redistribution. *Journal of Public Economics*, *95*(7-8), 828-836.

Hunt, S. D. (2000). A general theory of competition: Too eclectic or not eclectic enough? Too incremental or not incremental enough? Too neoclassical or not neoclassical enough? *Journal of Macromarketing*, *20*(77), 77-81.

Johnson, W. (2009). So what or so everything? Bringing behavior genetics to entrepreneurship research. *Journal of Business Venturing*, *24*, 23-26.

Kamleitner, B., Korunka, C., & Kirchner, E. (2012). Tax compliance of small business owners: A review. *International Journal of Entrepreneurial Behavior and Research*, *18*(3), 330-351.

Kaplan, D. S., Piedra, E., & Seira, E. (2011). Entry regulation and business start-ups: Evidence from Mexico. *Journal of Public Economics*, *95*(11-12), 1501-1515.

Kaplow, L., & Shavell, S. (1994). Why the legal system is less efficient than the income tax in redistributing income. *Journal of Legal Studies*, *23*, 667-683.

Katila, R., & Shane, S. (2005). When does lack of resources make new firms innovative? *Academy of Management Review*, *48*(5), 814-829.

Kher, R., Streeter, D. H., & Just, D. R. (2012). The "Good Job" trap: Opportunity cost as a deterrent to immediate venture creation. *International Review of Entrepreneurship*, *10*(4), 127-152.

Kihlstrom, R., & Laffont, J. (1979). A general equilibrium entrepreneurial theory of firm formation based on risk aversion. *Journal of Political Economy*, *87*, 719-748.

Kim, C., & Mauborgne, R. (2005). *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant*. Massachusetts, US: Harvard Business School Publishing.

Kirchler, E. (1998). Differential representations of taxes: Analysis of free associations and judgements of five employment groups. *Journal of Socio-Economics*, *27*(1), 117-131.

Kirzner, I. M. (1973). *Competition and Entrepreneurship*. Chicago, US: The University of Chicago Press.

Klapper, L., Laeven, L., & Rajan, R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, *82*(3), 591-629.

Klepper, S. (1996). Entry, exit, growth, and innovation over the product life cycle. *The American Economic Review*, *86*(3), 562-583.

Klepper, S. (2001). Employee startups in High-Tech industries. *Industrial and Corporate Change*, *10*, 639-674.

Klepper, S., Malerba, F. (2010). Demand, innovation and industrial dynamics: An introduction. *Industrial and Corporate Change*, *19*, 1515-1520.

Kloosterman, R. C. (2010). Matching opportunities with resources: A framework for analysing (migrant) entrepreneurship from a mixed embeddedness perspective. *Entrepreneurship & Regional Development*, *22*(1), 25-45.

Klyver, K., Hindle, H., & Meyer, D. (2008). Influence of social network structure on entrepreneurship participation - A study of 20 national cultures. *International Entrepreneurship and Management Journal*, *4*, 331-347.

Knabe, A., & Rätzel, S. (2011). Scarring or scaring? The psychological impact of past unemployment and future unemployment risk. *Economica*, *78*(310), 283-293.

Knight, F. H. (1921). *Risk, Uncertainty and Profit*. Boston, US: Houghton Mifflin.

Knight, J. & Gunatilaka, R. (2012). Income, aspiration and the hedonic treadmill in a poor society. *Journal of Economic Behavior and Organization, 82*(1), 67-81.

Koellinger, P. (2008). Why are some entrepreneurs more innovative than others? *Small Business Economics*, *31*, 21-37.

Koellinger, P., Mell, J., Pohl, I., Roessler, C., & Treffers, T. (2015). Self-employed but looking: A labor market experiment. *Economica*, *82*, 137-161.

Koellinger, P., & Minniti, M. (2009). Unemployment benefits crowd out nascent entrepreneurial activity. *Economics Letters*, *103*(2), 96-98.

Koellinger, P., Minniti, M., & Schade, C. (2007). "I think I can, I think I can": Overconfidence and entrepreneurial behavior. *Journal of Economic Psychology*, *28*(4), 502-527.

Lai, J. C. L., & Wong, W. S. (1998). Optimism and coping with unemployment among Hong Kong Chinese women. *Journal of Research in Personality, 32,* 454-479.

Landström, H., Harirchi, G., & Astrom, F. (2012). Entrepreneurship: Exploring the knowledge base. *Research Policy*, *41*(7), 1154-1181.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *Journal of Law, Economics, and Organization*, *XV*, 222-279.

Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics*, *23*(4), 649-680.

Lee, Y., & Gordon, R. H. (2005). Tax structure and economic growth. *Journal of Public Economics*, *89*(5-6), 1027-1043.

Levie, J., & Autio, E. (2011). Regulatory burden, rule of Law, and entry of strategic entrepreneurs: An international panel study. *Journal of Management Studies*, *48*(6), 1392-1419.

Lucas, R. E. (1978). On the size distribution of business firms. *The Bell Journal of Economics*, *9*(2), 508-523.

Lumpkin, G. T., & Dess, G. G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. *Journal of Business Venturing*, *16*, 429-451.

Lundstrom, A., & Stevenson, L. (2002). *Entrepreneurship Policy for the Future*. Stockholm, Sweden: Swedish Foundation for Small Business Research.

Luttmer, E. (2005). Neighbours as negatives: Relative earnings and well-being. *Quarterly Journal of Economics*, *120*(3), 963-1002.

MacDonald, J. M. (1994). Does import competition force efficient production? *The Review of Economics and Statistics*, *76*(4), 721-727.

Markman, D. D., & Baron, R. A. (2003), Person-entrepreneurship fit: Why some people are more successful as entrepreneurs than others. *Human Resource Management Review*, *13*(2), 281-301.

Marshall, A. (1890). *Principles of Economics*. London, UK: Macmillan.

Martin, B., McNally, J. J., & Kay, M. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing*, *28*(2), 211-224.

Marvel, M. R., Davis, J. L., & Sproul, C. R. (2016). Human Capital and entrepreneurship research: A critical review and future directions. *Entrepreneurship Theory and Practice*, *40*(3), 599-626.

Marvel, M. R., & Lumpkin, G. T. (2007). Technology entrepreneurs' human capital and its effects on innovation radicalness. *Entrepreneurship Theory and Practice*, *31*(6), 807-828.

McClelland, D. C. (1961). *The Achieving Society*. Princeton, US: Van Nostrand.

McMullen, J. S., Bagby, D. R., & Palich, L. E. (2008). Economic freedom and the motivation to engage in entrepreneurial action. *Entrepreneurship Theory and Practice*, *32*(5), 875-896.

Millán, A., Millán, J. M., Román, C., & Van Stel, A. (2013). How does employment protection legislation influence hiring and firing decisions by the smallest firms? *Economics Letters*, *121*(3), 444-448.

Minniti, M., & Nardone, C. (2007). Being in someone else's shoes: The role of gender in nascent entrepreneurship. *Small Business Economics*, *28*, 223-238.

Mitchell, R. K., & Randolph-Seng, B. (2014). *Handbook of Entrepreneurial Cognition*. Cheltenham, UK: Edward Elgar.

Monteiro, J. C. M., & Assunção, J. J. (2012). Coming out of the shadows? Estimating the impact of bureaucracy simplification and tax cut on formality in Brazilian microenterprises. *Journal of Development Economics*, *99*(1), 105-115.

Moore, D. A., & Cain, D. M. (2007). Overconfidence and underconfidence: When and why people underestimate (and overestimate) the competition. *Organizational Behavior and Human Decision Processes*, *103*(2), 197-213.

Moore, D. A., Oesch, J. M., & Zietsma, C. (2007). What competition? Myopic self-focus market-entry decisions. *Organization Science*, *18*(3), 440-454.

Moorman, C., & Miner, A. (1998). Organizational improvisation and organizational memory. *Academy of Management Review*, *23*, 698-723.

Naudé, W. (2010). Entrepreneurship, developing countries, and development economics: New approaches and insights. *Small Business Economics*, *34*(1), 1-12.

Nickell, S. J. (1996). Competition and corporate performance. *Journal of Political Economy*, *104*(4), 724-746.

Nickell, S. J., Nikolitsas, D., & Dryden, N. (1997). What makes firms perform well? *European Economic Review*, *41*(3), 783-796.

Nicolaou, N., & Shane, S. (2013). Biology, neuroscience and entrepreneurship. *Journal of Management Inquiry*, *18*, 98-100.

Norbäck, P. J., & Persson, L. (2012). Entrepreneurial innovations, competition and competition policy. *European Economic Review*, *56*(3), 488-506.

North, D. C., (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge, UK: Cambridge University Press.

Parker, S. C. (2009). *The Economics of Entrepreneurship*. Cambridge, the UK: Cambridge University Press.

Parker, S. C. (2013). Do serial entrepreneurs run successively better-performing businesses? *Journal of Business Venturing*, *28*(5), 652-666.

Paul, K. I., & Moser, K. (2009). Unemployment impairs mental health: Meta-analyses. *Journal of Vocational Behavior*, *74*, 264-282.

Pavitt, K. (1998). Technologies, products and organization in the innovating firm: What Adam Smith tells us and Joseph Schumpeter doesn't. *Industrial and Corporate Change*, *7*(3), 433-452.

Peña, I. (2002). Intellectual capital and business start-up success. *Journal of Intellectual Capital*, *3*(2), 180-198.

Peña, I. (2004). Business incubation centers and new firm growth in the Basque country. *Small Business Economics*, *22*, 223-236.

Pfeiffer, F., & Reize, F. (2000). Business start-ups by the unemployed — an econometric analysis based on firm data. *Labour Economics*, *7*(5), 629-663.

Pizer, W. A. (2002). Combining price and quantity controls to mitigate global climate change. *Journal of Public Economics*, *85*(3), 409-434.

Polanyi, M. (1967). *The Tacit Dimension*. London, UK: Routledge and Kegan.

Porac, J. F., Thomas, H., & Baden-Fuller, C. (1989). Competitive groups as cognitive communities: The case of Scottish knitwear manufacturer. *Journal of Management Studies*, *26*, 397-416.

Porter, M. E. (1980). *Competitive Strategy*. New York, New York: Free Press.

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York, New York: Free Press.

Porter, M. E. (1990). *The Competitive Advantage of Nations*. New York, New York: Free Press.

Porter, M. E. (2008). *On Competition*. Boston, US: Harvard Business School Publishing.

Poschke, M. (2013). Who becomes an entrepreneur? Labor market prospects and occupational choice. *Journal of Economic Dynamics and Control*, *37*, 693-710.

Powdthavee, N. (2008). Putting a price tag on friends, relatives, and neighbours: Using surveys of life satisfaction to value social relationships. *Journal of Socio-Economics, 37*(4), 1459-1480.

Primo, D. M., Jacobsmeier, M. I., & Milyo, J. (2007). Estimating the impact of state policies and institutions with mixed-level data. *State Politics and Policy Quarterly*, *7*, 446-59.

Puhani, P. A. (2000). The Heckman correction for sample selection and its critique. *Journal of Economic Surveys*, *14*(1), 53-68.

Pyysiäinen, J., Anderson, A., McElwee, G., & Vesala, K. (2006). Developing the entrepreneurial skills of farmers: Some myths explored. *International Journal of Entrepreneurial Behaviour & Research*, *12*(1), 21-39.

Rabe-Hesketh, S., & Skrondal, A. (2012). *Multilevel and Longitudinal Modeling Using Stata*. College Station, US: Stata Press.

Reynolds, P. (2009). New firm creation in the United States: A PSED I overview. In *Foundations and trends in entrepreneurship*. Hanover, US: Now Publishers.

Reynolds, P. D., Bygrave, W. D., Autio, E., Hay, M., Kauffman, M., & All, F. (2002). *Global Entrepreneurship Monitor 2002: Executive Report*. Babson College and London Business School, Babson Park/London.

Reynolds, P., Bosma, N., Autio, E., Hunt, S., De Bono, N., Servais, I., & Chin, N. (2005). Global Entrepreneurship Monitor: Data collection design and implementation 1998-2003. *Small Business Economics*, *24*(3), 205-231.

Reynolds, P., & Curtin, R. (2007). *Panel study of entrepreneurial dynamics program rational and description*. Working paper, University of Michigan, Ann Arbor.

Robinson, P. B. & Sexton, E. A. (1994). The effect of education and experience on self-employment success. *Journal of Business Venturing*, *9*(2), 141-156.

Román, C., Congregado, E., & Millán, J. M. (2013). Start-up incentives: Entrepreneurship policy or active labour market programme? *Journal of Business Venturing*, *28*(1), 151-175.

Romer, P. (1990). Endogeneous technological changes. *Journal of Political Economy*, *98*(5), 71-102.

Romero, I., & Martinez-Román, J. A. (2012). Self-employment and innovation. Exploring the determinants of innovative behavior in small businesses. *Research Policy*, *41*(1), 178-189.

Rostam-Afschar, D. (2013). Entry regulation and entrepreneurship: A natural experiment in German craftsmanship. *Empirical Economics*, *47*(3), 1-35.

Santarelli, E., & Vivarelli, M. (2007). Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change*, *16*(3), 455-488.

Sarasvathy, S. D. (2004). The questions we ask and the questions we care about: Reformulating some problems in entrepreneurship research. *Journal of Business Venturing*, *19*(5), 707-717.

Sarasvathy, S. D., Simon, H., & Lave, L. (1998). Perceiving and managing business risks: Differences between entrepreneurs and bankers. *Journal of Economic Behaviour and Organization, 33*(2), 207-225.

Sarasvathy, S. D., & Venkataraman, S. (2011). Entrepreneurship as method: Open questions for an entrepreneurial future. *Entrepreneurship Theory and Practice*, *35*(1), 113-135.

Shackle, G. S. (1979), *Imagination and the Nature of Choice*. Edinburgh, UK: Edinburgh University Press.

Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, *20*, 222-237.

Schjoedt, L., & Shaver, K. G. (2007). Deciding on an entrepreneurial career: A test of the pull and push hypotheses using the panel study of entrepreneurial dynamics data. *Entrepreneurship Theory and Practice*, *31*(5), 733-752.

Schmitz, J. A. (1989). Imitation, entrepreneurship, and long-run growth. *Journal of Political Economy, 97*, 721-739.

Schmutzler, A. (2010). Is competition good for innovation? A simple approach to an unresolved question. *Foundations and Trends in Microeconomics*, *5*(6), 355-428.

Schultz, T. (1959). Investment in man: An economist's view. *Social Service Review*, *33*(2), 69-75.

Schumpeter, J. A. (1934). *The Theory of Economic Development*. Cambridge, US: Harvard University Press.

Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York, New York: Harper & Row.

Shane, S. (2000). *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*. Northampton, US: Edward Elgar Publishing Limited.

Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, *11*(4), 448-469.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics*, *33*(2), 141-149.

Shane, S. (2012). Reflections of the 2010 AMR decade award: Delivering on the promise of entrepreneurship as a field of research. *Academy of Management Journal*, *37*, 10-20.

Shane, S., Locke, E. A., & Collins, C. J. (2003). Entrepreneurial motivation. *Human Resource Management Review*, *13*(2), 257-279.

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, *25*(1), 217-226.

Shapiro, C., & Stiglitz, J. E. (1984). Equilibrium unemployment as a worker discipline device. *The American Economic Review*, *74*(3), 433-444.

Shepherd, D. A. (2003). Learning from business failure: Propositions of grief recovery for the self-employed. *Academy of Management Review*, *28*(2), 318-328.

Simonsohn, U. (2010). eBay's crowded evenings: Competition neglect in market entry decisions. *Management Science*, *56*(7), 1060-1073.

Smilor, R.W. (1997). Entrepreneurship: Reflections on a subversive activity. *Journal of Business Venturing*, *12*(5), 341-346.

Spulber, D. F. (2009). Competition among entrepreneurs. *Industrial and Corporate Change*, *19*(1), 1-26.

Spulber, D. F. (2009). *The Theory of the Firm: Microeconomics with Endogenous Entrepreneurs, Firms, Markets, and Organizations*. Cambridge, MA: Cambridge University Press.

SRI International (1999). *International Practices and Experiences in Business Startup Procedures.* Arlington, VA.

Stam, E., & Van Stel, A. (2011). Types of entrepreneurship and economic growth. In Szirmai, A., Naude, W., Goedhuys, M. (Eds.). *Entrepreneurship, Innovation and Economic Development* (pp. 78-95). Oxford, UK: Oxford University Press.

Stigler, G. (1971). The theory of economic regulation. *The Bell Journal of Economic and Management Science*, *2*(1), 3-21.

Storey, D. J. (1991). The birth of new firms - does unemployment matter? A review of the evidence. *Small Business Economics*, *3*, 167-178.

Storey, D. J. (1994). *Understanding the Small Business Sector*. London, UK: Routledge.

Stutzer, A. (2004). The Role of income aspirations in individual happiness. *Journal of Economic Behavior and Organization, 54*(1), 89-109.

Tang, J. (2006). Competition and innovation behaviour. *Research Policy*, *35*(1), 68-82.

Teece, D. J. (1986). Profiting from technological innovation-implications for integration, collaboration, licensing and public-policy. *Research Policy*, *15*(6), 285-305.

Teece, D. J. (1992). Competition, cooperation, and innovation. *Journal of Economic Behavior & Organization*, *18*, 1-25.

Teece, D. J., & Pisano, G. (1994). The dynamic capabilities of firms: An introduction. *Industrial and Corporate Change*, *3*(3), 537-556.

Tervo, H., & Niittykangas, H. (1994). The impact of unemployment on new firm formation in Finland. *International Small Business Journal*, *13*(1), 38-53.

Thaler, R. H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, *12*(3), 183-206.

Theodossiou, I. (1998). The effects of low-pay and unemployment on psychological well-being: A logistic regression approach. *Journal of Health Economics*, *17*, 85-104.

Thurik, A. R., Carree, M. A., Van Stel, A., & Audretsch, D. B. (2008). Does self-employment reduce unemployment? *Journal of Business Venturing*, *23*(6), 673-686.

Tokman, V. E. (1992). *Beyond Regulation: The Informal Economy in Latin America*. Colorado, US : Lynne Rienner Publishers.

Ucbasaran, D., Westhead, P., & Wright, M. (2011). Why serial entrepreneurs don't learn from failure. *Harvard Business Review*, *89*(4), 26-36.

Ucbasaran, D., Westhead, P., Wright, M., & Flores, M. (2010). The nature of entrepreneurial experience, business failure and comparative optimism. *Journal of Business Venturing*, *25*, 541-555.

Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing*, *26*(3), 341-358.

Utterback, J. M. (1978). Management of technology. in Hax, A. (Ed.). *Studies in Operation Management* (pp. 137-160).Amsterdam, the Netherlands: North Holland Pub.

Utterback, J. M., & Suarez, F. (1993). Innovation, competition and industry structure. *Research Policy*, *22*, 1-21.

Van der Loos, M. J. H. M., Koellinger, P. D., Groenen, P., & Thurik, A. R. (2010). Genome-wide association studies and the genetics of entrepreneurship. *European Journal of Epidemiology*, *25*, 1-3.

Van der Sluis, J., Van Praag, M., & Vijverberg, W. (2005). Entrepreneurship selection and performance: A meta-analysis of the impact of education in developing economies. *The World Bank Economic Review*, *19*(2), 225-261.

Van der Zwan, P., Thurik, A. R., & Grilo, I. (2010). The entrepreneurial ladder and its determinants. *Applied Economics*, *43*(17), 2183-2191.

Van de Ven, W. P., & Van Praag, B. M. (1981). The demand for deductibles in private health insurance: A probit model with sample selection. *Journal of Econometrics*, *17*, 229-252.

Van Praag, M. (2005), *Successful Entrepreneurship*. Cheltenham, UK: Edward Elgar.

Van Stel, A., Carree, M. A., & Thurik, A. R. (2005). The Effect of entrepreneurial activity on national economic growth. *Small Business Economics*, *24*(3), 311-321.

Van Stel, A. J., & Storey, D. J. (2004). The link between firm births and job creation: Is there a Upas Tree effect? *Regional Studies*, *38*(8), 893-909.

Van Stel, A., Storey, D. J., & Thurik, A. R. (2007). The effect of business regulations on nascent and young business entrepreneurship. *Small Business Economics*, *28*, 171-186.

Venkataraman, S., (1997). The distinctive domain of entrepreneurship research. In: Katz, J. (Ed.). *Advances in Entrepreneurship, Firm Emergence and Growth, vol. 3* (pp. 119-138). Greenwich, CT: JAI Press.

Weinberg, J. A. (1992). Exclusionary practices and technological competition. *Journal of Industrial Economics*, *40*(2), 135-146.

Weitzel, U., Urbig, D., Desai, S., Sanders, M., & Acs, Z. (2010). The good, the bad, and the talented: Entrepreneurial talent and selfish behavior. *Journal of Economic Behavior & Organization*, *76*(1), 64-81.

Wennekers, S., & Thurik, A. R. (1999). Linking entrepreneurship and economic growth. *Small Business Economics*, *13*, 27-55.

Wennekers, S., Van Stel, A., Thurik, A. R., & Reynolds, P. (2005). Nascent entrepreneurship and the level of economic development. *Small Business Economics*, *24*(3), 293-309.

White, H. C. (1981). Where do markets come from? *American Journal of Sociology*, *87*(3), 517-547.

White, R., Thornhill, S., & Hampson, E. (2006). Entrepreneurs and evolutionary biology: The relationship between testosterone and new venture creation. *Organizational Behavior and Human Decision Processes*, *100*, 21-34.

Williams, N., & Williams, C. C. (2011). Beyond necessity versus opportunity entrepreneurship: Some lessons from English deprived urban neighbourhoods. *International Entrepreneurship and Management Journal*, *10*, 23-40.

Wolff, J., & Nivorozhkin, A. (2012). Start me up: The effectiveness of a self-employment programme for needy unemployed people in Germany. *Journal of Small Business and Entrepreneurship*, *25*(4), 499-518.

Wong, P. K., Ho, Y. P., & Autio, E. (2005). Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small Business Economics*, *24*(3), 335-350.

Wright, M., Pruthi, S., & Lockett, A. (2005). International venture capital research: From cross-country comparisons to crossing borders. *International Journal of Management Reviews*, *7*(3), 135-165.

Wu, B., & Knott, A. M. (2006). Entrepreneurial risk and market entry. *Management Science*, *52*(9), 1315-1330.

Yang, T., & Aldrich, H. E. (2012). Out of sight but not out of mind: Why failure to account for left truncation biases research on failure rates. *Journal of Business Venturing*, *27*(4), 477-492.

Zhao, F. (2005). Exploring the synergy between entrepreneurship and innovation. *International Journal of Entrepreneurial Behaviour & Research*, *11*(1), 25-41.

Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, *36*, 381-404.

Portfolio of the PhD candidate

Educational background

9/2009- 8/2010	**Research Master in Business Studies**, specialization in Strategic Management, Erasmus University Rotterdam, the Netherlands, GPA: 8.0 / 10 **Thesis:** *Corporate Venture Capital Investments and the Innovation Performance.* Supervisor: Prof. Dr. Justin Jansen
9/2008-8/2009	**Master of Science in International Business**, Strategy and Innovation Concentration, Maastricht University, The Netherlands, GPA: 7.3 / 10 **Thesis:** *The Effects of Firm Size on Creating Synergy through Mergers and Acquisitions.* Supervisor: Prof. Dr. John Hagedoorn
9/2003- 8/2007	**Bachelor of Science in Industrial Engineering**, Sharif University of Technology, Tehran, Iran, GPA: 16.6 / 20

(Selected) PhD Courses

- Advanced topics in entrepreneurship
- Applied econometrics
- Statistical methods

Selected Conference and Workshop Presentations

- Darnihamedani, P., Zhou, H. (2016). Labor market quality and entrepreneurial entry. *Babson College Entrepreneurship Research Conference*, Bodo, Norway.

- Darnihamedani, P., Block, J., Hessels, J., & Simonyan, A. (2015). Start-up costs, taxes and innovative entrepreneurship. *Babson College Entrepreneurship Research Conference*, Babson Park, USA.

- Darnihamedani, P., Hessels, J., & van Stel, A. (2013). Which types of the unemployed select into nascent entrepreneurship? *RENT Conference*, ISM University of Management and Economics, Vilnius, Lithuania.

- Darnihamedani, P., & Hessels, J. (2013). Necessity-based entrepreneurs and innovation: a peaceful reconciliation? *Global Entrepreneurship Monitor Research Conference*, Barcelona, Spain.

Papers

Published papers

- Darnihamedani, P., & Hessels, J. (2016). Human capital as a driver of innovation among necessity-based entrepreneurs. *International Review of Entrepreneurship, 14*(1), 1-25.

Working Papers

- Darnihamedani, P., Hessels, J., & van Stel, A. Which types of the unemployed select into nascent entrepreneurship?
- Darnihamedani, P., Block, J., Hessels, J., & Simonyan, A. Start-up costs, taxes and innovative entrepreneurship.
- Darnihamedani, P. Hessels, J., van Stel, A., & Burke, A. The relationship between competition, perceived competition and innovative entrepreneurship.
- Darnihamedani, P., Zhou, H., van Stel, A. How does the relation between macro-level education and entrepreneurship differ across stages of the entrepreneurial process? Lucas (1978) revisited.
- Darnihamedani, P. Jansen, J. J. P. Growth aspirations of established versus early-stage firms and the role of institutions.

About the Author

Pourya Darnihamedani (1985) completed a bachelor in industrial engineering at Sharif University of Technology, Tehran, Iran in 2007. He did a master in international business at Maastricht University and, subsequently, a research master in strategic management at Rotterdam School of Management, Erasmus University Rotterdam. Pourya worked as a business consultant for more than a year in Amsterdam before coming back to academia. In July 2012, he started his PhD journey at the department of Applied Economics, Erasmus School of Economics, Erasmus University Rotterdam under the supervision of Professor Roy Thurik and Doctor Jolanda Hessels.

His research focuses on determinants of entrepreneurship at various levels, antecedents of business growth and launching an innovative venture. Pourya presented his work in a number of prestigious entrepreneurship conferences such as Babson College Entrepreneurship Conference and RENT. He is an ad-hoc reviewer of several entrepreneurship journals and management conferences such as Small Business Economics and Academy of Management Meetings. During his PhD, he served as the treasurer of ERIM PhD Council for one year period. Pourya is continuing his career as an assistant professor of entrepreneurship and innovation management at NEOMA Business School, France.

The ERIM PhD Series

The ERIM PhD Series contains PhD dissertations in the field of Research in Management defended at Erasmus University Rotterdam and supervised by senior researchers affiliated to the Erasmus Research Institute of Management (ERIM). All dissertations in the ERIM PhD Series are available in full text through the ERIM Electronic Series Portal: http://repub.eur.nl/pub. ERIM is the joint research institute of the Rotterdam School of Management (RSM) and the Erasmus School of Economics at the Erasmus University Rotterdam (EUR).

DISSERTATIONS LAST FIVE YEARS

Abbink, E.J., *Crew Management in Passenger Rail Transport*, Promotors: Prof. L.G. Kroon & Prof. A.P.M. Wagelmans, EPS-2014-325-LIS, http://repub.eur.nl/pub/76927

Acar, O.A., *Crowdsourcing for Innovation: Unpacking Motivational, Knowledge and Relational Mechanisms of Innovative Behavior in Crowdsourcing Platforms*, Promotor: Prof. J.C.M. van den Ende, EPS-2014-321-LIS, http://repub.eur.nl/pub/76076

Akin Ates, M., *Purchasing and Supply Management at the Purchase Category Level: strategy, structure and performance*, Promotors: Prof. J.Y.F. Wynstra & Dr E.M. van Raaij, EPS-2014-300-LIS, http://repub.eur.nl/pub/50283

Akpinar, E., *Consumer Information Sharing*, Promotor: Prof. A. Smidts, EPS-2013-297-MKT, http://repub.eur.nl/pub/50140

Alexander, L., *People, Politics, and Innovation: A Process Perspective*, Promotors: Prof. H.G. Barkema & Prof. D.L. van Knippenberg, EPS-2014-331-S&E, http://repub.eur.nl/pub/77209

Almeida e Santos Nogueira, R.J. de, *Conditional Density Models Integrating Fuzzy and Probabilistic Representations of Uncertainty*, Promotors: Prof. U. Kaymak & Prof. J.M.C. Sousa, EPS-2014-310-LIS, http://repub.eur.nl/pub/51560

Bannouh, K., *Measuring and Forecasting Financial Market Volatility using High-frequency Data*, Promotor: Prof. D.J.C. van Dijk, EPS-2013-273-F&A, http://repub.eur.nl/pub/38240

Ben-Menahem, S.M., *Strategic Timing and Proactiveness of Organizations*, Promotors: Prof. H.W. Volberda & Prof. F.A.J. van den Bosch, EPS-2013-278-S&E, http://repub.eur.nl/pub/39128

Benning, T.M., *A Consumer Perspective on Flexibility in Health Care: Priority Access Pricing and Customized Care*, Promotor: Prof. B.G.C. Dellaert, EPS-2011-241-MKT, http://repub.eur.nl/pub/23670

Benschop, N, *Biases in Project Escalation: Names, frames & construal levels*, Promotors: Prof. K.I.M. Rhode, Prof. H.R. Commandeur, Prof. M.Keil & Dr A.L.P. Nuijten, EPS-2015-375-S&E, hdl.handle.net/1765/79408

Berg, W.E. van den, *Understanding Salesforce Behavior using Genetic Association Studies*, Promotor: Prof. W.J.M.I. Verbeke, EPS-2014-311-MKT, http://repub.eur.nl/pub/51440

Betancourt, N.E., *Typical Atypicality: Formal and Informal Institutional Conformity, Deviance, and Dynamics*, Promotor: Prof. B. Krug, EPS-2012-262-ORG, http://repub.eur.nl/pub/32345

Bliek, R. de, *Empirical Studies on the Economic Impact of Trust*, Promotor: Prof. J. Veenman & Prof. Ph.H.B.F. Franses, EPS-2015-324-ORG, http://repub.eur.nl/pub/78159

Blitz, D.C., *Benchmarking Benchmarks*, Promotors: Prof. A.G.Z. Kemna & Prof. W.F.C. Verschoor, EPS-2011-225-F&A, http://repub.eur.nl/pub/22624

Boons, M., *Working Together Alone in the Online Crowd: The Effects of Social Motivationsand Individual Knowledge Backgrounds on the Participation and Performance of Members of Online Crowdsourcing Platforms*, Promotors: Prof. H.G. Barkema & Dr D.A. Stam, EPS-2014-306-S&E, http://repub.eur.nl/pub/50711

Brazys, J., *Aggregated Marcoeconomic News and Price Discovery*, Promotor: Prof. W.F.C. Verschoor, EPS-2015-351-F&A, http://repub.eur.nl/pub/78243

Burger, M.J., *Structure and Cooptition in Urban Networks*, Promotors: Prof. G.A. van der Knaap & Prof. H.R. Commandeur, EPS-2011-243-ORG, http://repub.eur.nl/pub/26178

Byington, E., *Exploring Coworker Relationships: Antecedents and Dimensions of Interpersonal Fit Coworker Satisfaction, and Relational Models*, Promotor: Prof. D.L. van Knippenberg, EPS-2013-292-ORG, http://repub.eur.nl/pub/41508

Camacho, N.M., *Health and Marketing: Essays on Physician and Patient Decision-Making*, Promotor: Prof. S. Stremersch, EPS-2011-237-MKT, http://repub.eur.nl/pub/23604

Cancurtaran, P., *Essays on Accelerated Product Development*, Promotors: Prof. F. Langerak & Prof.G.H. van Bruggen, EPS-2014-317-MKT, http://repub.eur.nl/pub/76074

Caron, E.A.M., *Explanation of Exceptional Values in Multi-dimensional Business Databases*, Promotors: Prof. H.A.M. Daniels & Prof. G.W.J. Hendrikse, EPS-2013-296-LIS, http://repub.eur.nl/pub/50005

Carvalho, L. de, *Knowledge Locations in Cities: Emergence and Development Dynamics*, Promotor: Prof. L. Berg, EPS-2013-274-S&E, http://repub.eur.nl/pub/38449

Consiglio, I., *Others: Essays on Interpersonal and Consumer Behavior*, Promotor: Prof. S.M.J. van Osselaer, EPS-2016-366-MKT, http://repub.eur.nl/pub/79820

Cox, R.H.G.M., *To Own, To Finance, and To Insure - Residential Real Estate Revealed*, Promotor: Prof. D. Brounen, EPS-2013-290-F&A, http://repub.eur.nl/pub/40964

Deichmann, D., *Idea Management: Perspectives from Leadership, Learning, and Network Theory*, Promotor: Prof. J.C.M. van den Ende, EPS-2012-255-ORG, http://repub.eur.nl/pub/31174

Deng, W., *Social Capital and Diversification of Cooperatives*, Promotor: Prof. G.W.J. Hendrikse, EPS-2015-341-ORG, http://repub.eur.nl/pub/77449

Desmet, P.T.M., *In Money we Trust? Trust Repair and the Psychology of Financial Compensations*, Promotor: Prof. D. de Cremer, EPS-2011-232-ORG, http://repub.eur.nl/pub/23268

Dollevoet, T.A.B., *Delay Management and Dispatching in Railways*, Promotor: Prof. A.P.M. Wagelmans, EPS-2013-272-LIS, http://repub.eur.nl/pub/38241

Doorn, S. van, *Managing Entrepreneurial Orientation*, Promotors: Prof. J.J.P. Jansen, Prof. F.A.J. van den Bosch, & Prof. H.W. Volberda, EPS-2012-258-STR, http://repub.eur.nl/pub/32166

Douwens-Zonneveld, M.G., *Animal Spirits and Extreme Confidence: No Guts, No Glory?* Promotor: Prof. W.F.C. Verschoor, EPS-2012-257-F&A, http://repub.eur.nl/pub/31914

Duca, E., *The Impact of Investor Demand on Security Offerings*, Promotor: Prof. A. de Jong, EPS-2011-240-F&A, http://repub.eur.nl/pub/26041

Duyvesteyn, J.G. *Empirical Studies on Sovereign Fixed Income Markets,* Promotors: Prof. P.Verwijmeren & Prof. M.P.E. Martens, EPS-2015-361-F&A, hdl.handle.net/1765/79033

Duursema, H., *Strategic Leadership: Moving Beyond the Leader-Follower Dyad*, Promotor: Prof. R.J.M. van Tulder, EPS-2013-279-ORG, http://repub.eur.nl/pub/39129

Eck, N.J. van, *Methodological Advances in Bibliometric Mapping of Science*, Promotor: Prof. R. Dekker, EPS-2011-247-LIS, http://repub.eur.nl/pub/26509

Elemes, A, *Studies on Determinants and Consequences of Financial Reporting Quality,* Promotor: Prof. E.Peek, EPS-2015-354-F&A, http://hdl.handle.net/1765/79037

Ellen, S. ter, *Measurement, Dynamics, and Implications of Heterogeneous Beliefs in Financial Markets*, Promotor: Prof. W.F.C. Verschoor, EPS-2015-343-F&A, http://repub.eur.nl/pub/78191

Erlemann, C., *Gender and Leadership Aspiration: The Impact of the Organizational Environment*, Promotor: Prof. D.L. van Knippenberg, EPS-2016-376-ORG, http://repub.eur.nl/pub/79409

Eskenazi, P.I., *The Accountable Animal*, Promotor: Prof. F.G.H. Hartmann, EPS-2015-355-F&A, http://repub.eur.nl/pub/78300

Essen, M. van, *An Institution-Based View of Ownership*, Promotors: Prof. J. van Oosterhout & Prof. G.M.H. Mertens, EPS-2011-226-ORG, http://repub.eur.nl/pub/22643

Evangelidis, I., *Preference Construction under Prominence*, Promotor: Prof. S.M.J. van Osselaer, EPS-2015-340-MKT, http://repub.eur.nl/pub/78202

Faber, N., *Structuring Warehouse Management*, Promotors: Prof. MB.M. de Koster & Prof. Ale Smidts, EPS-2015-336-LIS, http://repub.eur.nl/pub/78603

Fernald, K., *The Waves of Biotechnological Innovation in Medicine: Interfirm Cooperation Effects and a Venture Capital Perspective,* Promotors: Prof. E.Claassen, Prof. H.P.G. Pennings & Prof. H.R. Commandeur, EPS-2015-371-S&E, http://hdl.handle.net/1765/79120

Fourne, S.P., *Managing Organizational Tensions: A Multi-Level Perspective on Exploration, Exploitation and Ambidexterity*, Promotors: Prof. J.J.P. Jansen & Prof. S.J. Magala, EPS-2014-318-S&E, http://repub.eur.nl/pub/76075

Gharehgozli, A.H., *Developing New Methods for Efficient Container Stacking Operations*, Promotor: Prof. M.B.M. de Koster, EPS-2012-269-LIS, http://repub.eur.nl/pub/37779

Gils, S. van, *Morality in Interactions: On the Display of Moral Behavior by Leaders and Employees*, Promotor: Prof. D.L. van Knippenberg, EPS-2012-270-ORG, http://repub.eur.nl/pub/38027

Ginkel-Bieshaar, M.N.G. van, *The Impact of Abstract versus Concrete Product Communications on Consumer Decision-making Processes*, Promotor: Prof. B.G.C. Dellaert, EPS-2012-256-MKT, http://repub.eur.nl/pub/31913

Gkougkousi, X., *Empirical Studies in Financial Accounting*, Promotors: Prof. G.M.H. Mertens & Prof. E. Peek, EPS-2012-264-F&A, http://repub.eur.nl/pub/37170

Glorie, K.M., *Clearing Barter Exchange Markets: Kidney Exchange and Beyond*, Promotors: Prof. A.P.M. Wagelmans & Prof. J.J. van de Klundert, EPS-2014-329-LIS, http://repub.eur.nl/pub/77183

Hekimoglu, M., *Spare Parts Management of Aging Capital Products,* Promotor: Prof. R. Dekker, EPS-2015-368-LIS, http://hdl.handle.net/1765/79092

Heij, C.V., *Innovating beyond Technology. Studies on how management innovation, co-creation and business model innovation contribute to firm's (innovation) performance*, Promotors: Prof. F.A.J. van den Bosch & Prof. H.W. Volberda, EPS-2012-370-STR, http://repub.eur.nl/pub/78651

Heyde Fernandes, D. von der, *The Functions and Dysfunctions of Reminders*, Promotor: Prof. S.M.J. van Osselaer, EPS-2013-295-MKT, http://repub.eur.nl/pub/41514

Heyden, M.L.M., *Essays on Upper Echelons & Strategic Renewal: A Multilevel Contingency Approach*, Promotors: Prof. F.A.J. van den Bosch & Prof. H.W. Volberda, EPS-2012-259-STR, http://repub.eur.nl/pub/32167

Hoever, I.J., *Diversity and Creativity*, Promotor: Prof. D.L. van Knippenberg, EPS-2012-267-ORG, http://repub.eur.nl/pub/37392

Hogenboom, A.C., *Sentiment Analysis of Text Guided by Semantics and Structure,* Promotors: Prof. U. Kaymak & Prof. F.M.G. de Jong, EPS-2015-369-LIS, http://hdl.handle.net/1765/79034

Hogenboom, F.P., *Automated Detection of Financial Events in News Text*, Promotors: Prof. U. Kaymak & Prof. F.M.G. de Jong, EPS-2014-326-LIS, http://repub.eur.nl/pub/77237

Hollen, R.M.A*., Exploratory Studies into Strategies to Enhance Innovation-Driven International Competitiveness in a Port Context: Toward Ambidextrous Ports,* Promotors: Prof. F.A.J. Van Den Bosch & Prof. H.W.Volberda, EPS-2015-372-S&E, hdl.handle.net/1765/78881

Hoogendoorn, B., *Social Entrepreneurship in the Modern Economy: Warm Glow, Cold Feet*, Promotors: Prof. H.P.G. Pennings & Prof. A.R. Thurik, EPS-2011-246-STR, http://repub.eur.nl/pub/26447

Hoogervorst, N., *On The Psychology of Displaying Ethical Leadership: A Behavioral Ethics Approach*, Promotors: Prof. D. de Cremer & Dr M. van Dijke, EPS-2011-244-ORG, http://repub.eur.nl/pub/26228

Hout, D.H. van, *Measuring Meaningful Differences: Sensory Testing Based Decision Making in an Industrial Context; Applications of Signal Detection Theory and Thurstonian Modelling*, Promotors: Prof. P.J.F. Groenen & Prof. G.B. Dijksterhuis, EPS-2014-304-MKT, http://repub.eur.nl/pub/50387

Houwelingen, G.G. van, *Something To Rely On*, Promotors: Prof. D. de Cremer & Prof. M.H. van Dijke, EPS-2014-335-ORG, http://repub.eur.nl/pub/77320

Hurk, E. van der, *Passengers, Information, and Disruptions*, Promotors: Prof. L.G. Kroon & Prof. P.H.M. Vervest, EPS-2015-345-LIS, http://repub.eur.nl/pub/78275

Hytonen, K.A., *Context Effects in Valuation, Judgment and Choice: A Neuroscientific Approach*, Promotor: Prof. A. Smidts, EPS-2011-252-MKT, http://repub.eur.nl/pub/30668

Iseger, P. den, *Fourier and Laplace Transform Inversion with Applications in Finance*, Promotor: Prof. R. Dekker, EPS-2014-322-LIS, http://repub.eur.nl/pub/76954

Jaarsveld, W.L. van, *Maintenance Centered Service Parts Inventory Control*, Promotor: Prof. R. Dekker, EPS-2013-288-LIS, http://repub.eur.nl/pub/39933

Jalil, M.N., *Customer Information Driven After Sales Service Management: Lessons from Spare Parts Logistics*, Promotor: Prof. L.G. Kroon, EPS-2011-222-LIS, http://repub.eur.nl/pub/22156

Kappe, E.R., *The Effectiveness of Pharmaceutical Marketing*, Promotor: Prof. S. Stremersch, EPS-2011-239-MKT, http://repub.eur.nl/pub/23610

Karreman, B., *Financial Services and Emerging Markets*, Promotors: Prof. G.A. van der Knaap & Prof. H.P.G. Pennings, EPS-2011-223-ORG, http://repub.eur.nl/pub/22280

Khanagha, S., *Dynamic Capabilities for Managing Emerging Technologies*, Promotor: Prof. H.W. Volberda, EPS-2014-339-S&E, http://repub.eur.nl/pub/77319

Kil, J., *Acquisitions Through a Behavioral and Real Options Lens*, Promotor: Prof. H.T.J. Smit, EPS-2013-298-F&A, http://repub.eur.nl/pub/50142

Klooster, E. van 't, *Travel to Learn: the Influence of Cultural Distance on Competence Development in Educational Travel*, Promotors: Prof. F.M. Go & Prof. P.J. van Baalen, EPS-2014-312-MKT, http://repub.eur.nl/pub/51462

Koendjbiharie, S.R., *The Information-Based View on Business Network Performance: Revealing the Performance of Interorganizational Networks*, Promotors: Prof. H.W.G.M. van Heck & Prof. P.H.M. Vervest, EPS-2014-315-LIS, http://repub.eur.nl/pub/51751

Koning, M., *The Financial Reporting Environment: The Role of the Media, Regulators and Auditors*, Promotors: Prof. G.M.H. Mertens & Prof. P.G.J. Roosenboom, EPS-2014-330-F&A, http://repub.eur.nl/pub/77154

Konter, D.J., *Crossing Borders with HRM: An Inquiry of the Influence of Contextual Differences in the Adoption and Effectiveness of HRM*, Promotors: Prof. J. Paauwe & Dr L.H. Hoeksema, EPS-2014-305-ORG, http://repub.eur.nl/pub/50388

Korkmaz, E., *Bridging Models and Business: Understanding Heterogeneity in Hidden Drivers of Customer Purchase Behavior*, Promotors: Prof. S.L. van de Velde & Prof. D. Fok, EPS-2014-316-LIS, http://repub.eur.nl/pub/76008

Kroezen, J.J., *The Renewal of Mature Industries: An Examination of the Revival of the Dutch Beer Brewing Industry*, Promotor: Prof. P.P.M.A.R. Heugens, EPS-2014-333-S&E, http://repub.eur.nl/pub/77042

Kysucky, V., *Access to Finance in a Cros-Country Context*, Promotor: Prof.dr. L. Norden, EPS-2015-350-F&A, http://repub.eur.nl/pub/78225

Lam, K.Y., *Reliability and Rankings*, Promotor: Prof. Ph.H.B.F. Franses, EPS-2011-230-MKT, http://repub.eur.nl/pub/22977

Lander, M.W., *Profits or Professionalism? On Designing Professional Service Firms*, Promotors: Prof. J. van Oosterhout & Prof. P.P.M.A.R. Heugens, EPS-2012-253-ORG, http://repub.eur.nl/pub/30682

Langhe, B. de, *Contingencies: Learning Numerical and Emotional Associations in an Uncertain World*, Promotors: Prof. B. Wierenga & Prof. S.M.J. van Osselaer, EPS-2011-236-MKT, http://repub.eur.nl/pub/23504

Lee, C.I.S.G, *Big Data in Management Research: Exploring New Avenues*, Promotors: Prof. S.J. Magala & Dr W.A. Felps, EPS-2016-365-ORG, http://repub.eur.nl/pub/79818

Legault-Tremblay, P.O., Corporate Governance During Market Transition: Heterogeneous responses to Institution Tensions in China, Promotor: Prof. B. Krug, EPS-2015-362-ORG, http://repub.eur.nl/pub/78649

Lenoir, A.S. *Are You Talking to Me? Addressing Consumers in a Globalised World,* Promotors: Prof. S. Puntoni & Prof. S.M.J. van Osselaer, EPS-2015-363-MKT, http://hdl.handle.net/1765/79036

Leunissen, J.M., *All Apologies: On the Willingness of Perpetrators to Apologize*, Promotors: Prof. D. de Cremer & Dr. M. van Dijke, EPS-2014-301-ORG, http://repub.eur.nl/pub/50318

Li, D., *Supply Chain Contracting for After-sales Service and Product Support*, Promotor: Prof. M.B.M. de Koster, EPS-2015-347-LIS, http://repub.eur.nl/pub/78526

Li, Z., *Irrationality: What, Why and How*, Promotor(s): Prof. H. Bleichrodt, Prof. P.P. Wakker, & Prof. K.I.M. Rohde, EPS-2014-338-MKT, http://repub.eur.nl/pub/77205

Liang, Q.X., *Governance, CEO Identity, and Quality Provision of Farmer Cooperatives*, Promotor: Prof. G.W.J. Hendrikse, EPS-2013-281-ORG, http://repub.eur.nl/pub/39253

Liket, K., *Why 'Doing Good' is not Good Enough: Essays on Social Impact Measurement*, Promotors: Prof. H.R. Commandeur & Dr K.E.H. Maas, EPS-2014-307-STR, http://repub.eur.nl/pub/51130

Loos, M.J.H.M. van der, *Molecular Genetics and Hormones: New Frontiers in Entrepreneurship Research*, Promotors: Prof. A.R. Thurik, Prof. P.J.F. Groenen, & Prof. A. Hofman, EPS-2013-287-S&E, http://repub.eur.nl/pub/40081

Lovric, M., *Behavioral Finance and Agent-Based Artificial Markets*, Promotors: Prof. J. Spronk & Prof. U. Kaymak, EPS-2011-229-F&A, http://repub.eur.nl/pub/22814

Lu, Y., *Data-Driven Decision Making in Auction Markets*, Promotors: Prof. H.W.G.M. van Heck & Prof. W. Ketter, EPS-2014-314-LIS, http://repub.eur.nl/pub/51543

Ma, Y., *The Use of Advanced Transportation Monitoring Data for Official Statistics,* Promotors: Prof. L.G. Kroon and Dr Jan van Dalen, EPS-2016-391-LIS, hdl.handle.net/1765/80174

Manders, B., *Implementation and Impact of ISO 9001*, Promotor: Prof. K. Blind, EPS-2014-337-LIS, http://repub.eur.nl/pub/77412

Markwat, T.D., *Extreme Dependence in Asset Markets Around the Globe*, Promotor: Prof. D.J.C. van Dijk, EPS-2011-227-F&A, http://repub.eur.nl/pub/22744

Mees, H., *Changing Fortunes: How China's Boom Caused the Financial Crisis*, Promotor: Prof. Ph.H.B.F. Franses, EPS-2012-266-MKT, http://repub.eur.nl/pub/34930

Mell, J.N., *Connecting Minds: On The Role of Metaknowledge in Knowledge Coordination*, Promotor: Prof. D.L. van Knippenberg, EPS-2015-359-ORG, http://hdl.handle.net/1765/78951

Meuer, J., *Configurations of Inter-firm Relations in Management Innovation: A Study in China's Biopharmaceutical Industry*, Promotor: Prof. B. Krug, EPS-2011-228-ORG, http://repub.eur.nl/pub/22745

Micheli, M.R., *Business Model Innovation: A Journey across Managers' Attention and Inter-Organizational Networks*, Promotor: Prof. J.J.P. Jansen, EPS-2015-344-S&E, http://repub.eur.nl/pub/78241

Mihalache, O.R., *Stimulating Firm Innovativeness: Probing the Interrelations between Managerial and Organizational Determinants*, Promotors: Prof. J.J.P. Jansen, Prof. F.A.J. van den Bosch, & Prof. H.W. Volberda, EPS-2012-260-S&E, http://repub.eur.nl/pub/32343

Milea, V., *News Analytics for Financial Decision Support*, Promotor: Prof. U. Kaymak, EPS-2013-275-LIS, http://repub.eur.nl/pub/38673

Naumovska, I., *Socially Situated Financial Markets: A Neo-Behavioral Perspective on Firms, Investors and Practices*, Promotors: Prof. P.P.M.A.R. Heugens & Prof. A. de Jong, EPS-2014-319-S&E, http://repub.eur.nl/pub/76084

Nielsen, L.K., *Rolling Stock Rescheduling in Passenger Railways: Applications in short term planning and in disruption management*, Promotor: Prof. L.G. Kroon, EPS-2011-224-LIS, http://repub.eur.nl/pub/22444

Nuijten, A.L.P., *Deaf Effect for Risk Warnings: A Causal Examination applied to Information Systems Projects*, Promotors: Prof. G.J. van der Pijl, Prof. H.R. Commandeur & Prof. M. Keil, EPS-2012-263-S&E, http://repub.eur.nl/pub/34928

Oord, J.A. van, *Essays on Momentum Strategies in Finance,* Promotor: Prof. H.K. van Dijk, EPS-2016-380-F&A, hdl.handle.net/1765/80036

Osadchiy, S.E., *The Dynamics of Formal Organization: Essays on bureaucracy and formal rules*, Promotor: Prof. P.P.M.A.R. Heugens, EPS-2011-231-ORG, http://repub.eur.nl/pub/23250

Ozdemir, M.N., *Project-level Governance, Monetary Incentives, and Performance in Strategic R&D Alliances*, Promotor: Prof. J.C.M. van den Ende, EPS-2011-235-LIS, http://repub.eur.nl/pub/23550

Peers, Y., *Econometric Advances in Diffusion Models*, Promotor: Prof. Ph.H.B.F. Franses, EPS-2011-251-MKT, http://repub.eur.nl/pub/30586

Peters, M., *Machine Learning Algorithms for Smart Electricity Markets*, Promotor: Prof. W. Ketter, EPS-2014-332-LIS, http://repub.eur.nl/pub/77413

Porck, J., *No Team is an Island: An Integrative View of Strategic Consensus between Groups*, Promotors: Prof. P.J.F. Groenen & Prof. D.L. van Knippenberg, EPS-2013-299-ORG, http://repub.eur.nl/pub/50141

Porras Prado, M., *The Long and Short Side of Real Estate, Real Estate Stocks, and Equity*, Promotor: Prof. M.J.C.M. Verbeek, EPS-2012-254-F&A, http://repub.eur.nl/pub/30848

Poruthiyil, P.V., *Steering Through: How organizations negotiate permanent uncertainty and unresolvable choices*, Promotors: Prof. P.P.M.A.R. Heugens & Prof. S.J. Magala, EPS-2011-245-ORG, http://repub.eur.nl/pub/26392

Pourakbar, M., *End-of-Life Inventory Decisions of Service Parts*, Promotor: Prof. R. Dekker, EPS-2011-249-LIS, http://repub.eur.nl/pub/30584

Pronker, E.S., *Innovation Paradox in Vaccine Target Selection*, Promotors: Prof. H.J.H.M. Claassen & Prof. H.R. Commandeur, EPS-2013-282-S&E, http://repub.eur.nl/pub/39654

Protzner, S. *Mind the gap between demand and supply: A behavioral perspective on demand forecasting,* Promotors: Prof. S.L. van de Velde & Dr L. Rook, EPS-2015-364-LIS, *http*://repub.eur.nl/pub/79355

Pruijssers, J.K., *An Organizational Perspective on Auditor Conduct*, Promotors: Prof. J. van Oosterhout & Prof. P.P.M.A.R. Heugens, EPS-2015-342-S&E, http://repub.eur.nl/pub/78192

Retel Helmrich, M.J., *Green Lot-Sizing*, Promotor: Prof. A.P.M. Wagelmans, EPS-2013-291-LIS, http://repub.eur.nl/pub/41330

Rietdijk, W.J.R. *The Use of Cognitive Factors for Explaining Entrepreneurship,* Promotors: Prof. A.R. Thurik & Prof. I.H.A. Franken, EPS-2015-356-S&E, http://repub.eur.nl/pub/79817

Rietveld, N., *Essays on the Intersection of Economics and Biology*, Promotors: Prof. A.R. Thurik, Prof. Ph.D. Koellinger, Prof. P.J.F. Groenen, & Prof. A. Hofman, EPS-2014-320-S&E, http://repub.eur.nl/pub/76907

Rijsenbilt, J.A., *CEO Narcissism: Measurement and Impact*, Promotors: Prof. A.G.Z. Kemna & Prof. H.R. Commandeur, EPS-2011-238-STR, http://repub.eur.nl/pub/23554

Rösch, D. *Market Efficiency and Liquidity,* Promotor: Prof. M.A. van Dijk, EPS-2015-353-F&A, http://hdl.handle.net/1765/79121

Roza-van Vuren, M.W., *The Relationship between Offshoring Strategies and Firm Performance: Impact of innovation, absorptive capacity and firm size*, Promotors: Prof. H.W. Volberda & Prof. F.A.J. van den Bosch, EPS-2011-214-STR, http://repub.eur.nl/pub/22155

Rubbaniy, G., *Investment Behaviour of Institutional Investors*, Promotor: Prof. W.F.C. Verschoor, EPS-2013-284-F&A, http://repub.eur.nl/pub/40068

Schoonees, P. *Methods for Modelling Response Styles*, Promotor: Prof.dr P.J.F. Groenen, EPS-2015-348-MKT, http://repub.eur.nl/pub/79327

Schouten, M.E., *The Ups and Downs of Hierarchy: the causes and consequences of hierarchy struggles and positional loss*, Promotors; Prof. D.L. van Knippenberg & Dr L.L. Greer, EPS-2016-386-ORG, http://repub.eur.nl/pub/80059

Shahzad, K., *Credit Rating Agencies, Financial Regulations and the Capital Markets*, Promotor: Prof. G.M.H. Mertens, EPS-2013-283-F&A, http://repub.eur.nl/pub/39655

Sousa, M.J.C. de, *Servant Leadership to the Test: New Perspectives and Insights*, Promotors: Prof. D.L. van Knippenberg & Dr D. van Dierendonck, EPS-2014-313-ORG, http://repub.eur.nl/pub/51537

Spliet, R., *Vehicle Routing with Uncertain Demand*, Promotor: Prof. R. Dekker, EPS-2013-293-LIS, http://repub.eur.nl/pub/41513

Staadt, J.L., *Leading Public Housing Organisation in a Problematic Situation: A Critical Soft Systems Methodology Approach*, Promotor: Prof. S.J. Magala, EPS-2014-308-ORG, http://repub.eur.nl/pub/50712

Stallen, M., *Social Context Effects on Decision-Making: A Neurobiological Approach*, Promotor: Prof. A. Smidts, EPS-2013-285-MKT, http://repub.eur.nl/pub/39931

Tarakci, M., *Behavioral Strategy: Strategic Consensus, Power and Networks*, Promotor: Prof. D.L. van Knippenberg & Prof. P.J.F. Groenen, EPS-2013-280-ORG, http://repub.eur.nl/pub/39130

Teixeira de Vasconcelos, M., *Agency Costs, Firm Value, and Corporate Investment*, Promotor: Prof. P.G.J. Roosenboom, EPS-2012-265-F&A, http://repub.eur.nl/pub/37265

Troster, C., *Nationality Heterogeneity and Interpersonal Relationships at Work*, Promotor: Prof. D.L. van Knippenberg, EPS-2011-233-ORG, http://repub.eur.nl/pub/23298

Tsekouras, D., *No Pain No Gain: The Beneficial Role of Consumer Effort in Decision-Making*, Promotor: Prof. B.G.C. Dellaert, EPS-2012-268-MKT, http://repub.eur.nl/pub/37542

Tuijl, E. van, *Upgrading across Organisational and Geographical Configurations*, Promotor: Prof. L. van den Berg, EPS-2015-349-S&E, http://repub.eur.nl/pub/78224

Tuncdogan, A., *Decision Making and Behavioral Strategy: The Role of Regulatory Focus in Corporate Innovation Processes*, Promotors: Prof. F.A.J. van den Bosch, Prof. H.W. Volberda, & Prof. T.J.M. Mom, EPS-2014-334-S&E, http://repub.eur.nl/pub/76978

Uijl, S. den, *The Emergence of De-facto Standards*, Promotor: Prof. K. Blind, EPS-2014-328-LIS, http://repub.eur.nl/pub/77382

Vagias, D., *Liquidity, Investors and International Capital Markets*, Promotor: Prof. M.A. van Dijk, EPS-2013-294-F&A, http://repub.eur.nl/pub/41511

Veelenturf, L.P., *Disruption Management in Passenger Railways: Models for Timetable, Rolling Stock and Crew Rescheduling*, Promotor: Prof. L.G. Kroon, EPS-2014-327-LIS, http://repub.eur.nl/pub/77155

Venus, M., *Demystifying Visionary Leadership: In search of the essence of effective vision communication*, Promotor: Prof. D.L. van Knippenberg, EPS-2013-289-ORG, http://repub.eur.nl/pub/40079

Vermeer, W., *Propagation in Networks:The impact of information processing at the actor level on system-wide propagation dynamics,* Promotor: Prof. P.H.M.Vervest, EPS-2015-373-LIS, http://repub.eur.nl/pub/79325

Versluis, I., *Prevention of the Portion Size Effect*, Promotors: Prof. Ph.H.B.F. Franses & Dr E.K. Papies, EPS-2016-382-MKT, http://repub.eur.nl/pub/79880

Visser, V.A., *Leader Affect and Leadership Effectiveness: How leader affective displays influence follower outcomes*, Promotor: Prof. D.L. van Knippenberg, EPS-2013-286-ORG, http://repub.eur.nl/pub/40076

Vlam, A.J., *Customer First? The Relationship between Advisors and Consumers of Financial Products*, Promotor: Prof. Ph.H.B.F. Franses, EPS-2011-250-MKT, http://repub.eur.nl/pub/30585

Vries, J. de, *Behavioral Operations in Logistics,* Promotors: Prof. M.B.M de Koster & Prof. D.A. Stam, EPS-2015-374-LIS, http://repub.eur.nl/pub/79705

Waltman, L., *Computational and Game-Theoretic Approaches for Modeling Bounded Rationality*, Promotors: Prof. R. Dekker & Prof. U. Kaymak, EPS-2011-248-LIS, http://repub.eur.nl/pub/26564

Wang, T., *Essays in Banking and Corporate Finance*, Promotors: Prof. L. Norden & Prof. P.G.J. Roosenboom, EPS-2015-352-F&A, http://repub.eur.nl/pub/78301

Wang, Y., *Information Content of Mutual Fund Portfolio Disclosure*, Promotor: Prof. M.J.C.M. Verbeek, EPS-2011-242-F&A, http://repub.eur.nl/pub/26066

Wang, Y., *Corporate Reputation Management: Reaching Out to Financial Stakeholders*, Promotor: Prof. C.B.M. van Riel, EPS-2013-271-ORG, http://repub.eur.nl/pub/38675

Weenen, T.C., *On the Origin and Development of the Medical Nutrition Industry*, Promotors: Prof. H.R. Commandeur & Prof. H.J.H.M. Claassen, EPS-2014-309-S&E, http://repub.eur.nl/pub/51134

Wolfswinkel, M., *Corporate Governance, Firm Risk and Shareholder Value*, Promotor: Prof. A. de Jong, EPS-2013-277-F&A, http://repub.eur.nl/pub/39127

Yang, S., *Information Aggregation Efficiency of Prediction Markets*, Promotor: Prof. H.W.G.M. van Heck, EPS-2014-323-LIS, http://repub.eur.nl/pub/77184

Zaerpour, N., *Efficient Management of Compact Storage Systems*, Promotor: Prof. M.B.M. de Koster, EPS-2013-276-LIS, http://repub.eur.nl/pub/38766

Zhang, D., *Essays in Executive Compensation*, Promotor: Prof. I. Dittmann, EPS-2012-261-F&A, http://repub.eur.nl/pub/32344

Zwan, P.W. van der, *The Entrepreneurial Process: An International Analysis of Entry and Exit*, Promotors: Prof. A.R. Thurik & Prof. P.J.F. Groenen, EPS-2011-234-ORG, http://repub.eur.nl/pub/23422

Erasmus Research Institute of Management - ERiM

INDIVIDUAL CHARACTERISTICS, CONTEXTUAL FACTORS AND ENTREPRENEURIAL BEHAVIOR

This thesis concerns research topics involving entrepreneurship, in general, and innovative entrepreneurship, in particular. In the first part, the relationship between individual characteristics and entrepreneurial activity is investigated. Specifically, the first two chapters investigate whether and to what extent individual-level factors (i.e., human capital investments) influence entrepreneurial entry and strategic decisions of entrepreneurs (e.g., to develop a new product). The second part focuses on the extent to which the context of entrepreneurs may influence the allocation of entrepreneurial activity (i.e., entrepreneurs' propensity to innovate).

The value of this thesis is at least threefold. First, it provides a comprehensive view on the determinants of innovative entrepreneurship at various levels. Second, this dissertation offers new insights into how investments in human capital may influence entrepreneurial decisions of individuals with specific yet important start-up conditions (i.e., necessity-based motivation, unemployment). Third, admitting countries "are not king size individuals" and "eco-logic differs from individual psycho-logic", this research explains how certain relevant contextual factors such as competition intensity, taxation and start-up costs may influence individuals' propensity to one type of activity (i.e., innovation) instead of another (i.e., imitation).

From a policy perspective, this thesis is beneficial to understand the determinants of (innovative) entrepreneurship in a country. This is primarily because governments can set the "rules of the game" (e.g., through competition policies) and influence the relative rewards of (one type of) entrepreneurial activity. Additionally, investors can make more informed decisions on what venture(s) to fund by understanding the determinants of sub-groups of entrepreneurs (e.g., innovative, opportunity-based) at the individual and market levels.

ERiM

The Erasmus Research Institute of Management (ERIM) is the Research School (Onderzoekschool) in the field of management of the Erasmus University Rotterdam. The founding participants of ERIM are the Rotterdam School of Management (RSM), and the Erasmus School of Economics (ESE). ERIM was founded in 1999 and is officially accredited by the Royal Netherlands Academy of Arts and Sciences (KNAW). The research undertaken by ERIM is focused on the management of the firm in its environment, its intra- and interfirm relations, and its business processes in their interdependent connections.

The objective of ERIM is to carry out first rate research in management, and to offer an advanced doctoral programme in Research in Management. Within ERIM, over three hundred senior researchers and PhD candidates are active in the different research programmes. From a variety of academic backgrounds and expertises, the ERIM community is united in striving for excellence and working at the forefront of creating new business knowledge.

ERIM PhD Series
Research in Management

Erasmus Research Institute of Management - ERiM
Rotterdam School of Management (RSM)
Erasmus School of Economics (ESE)
Erasmus University Rotterdam (EUR)
P.O. Box 1738, 3000 DR Rotterdam,
The Netherlands

Tel. +31 10 408 11 82
Fax +31 10 408 96 40
E-mail info@erim.eur.nl
Internet www.erim.eur.nl

Design & layout: B&T Ontwerp en advies (www.b-en-t.nl) Print: Haveka (www.haveka.nl)