Essays at the Intersection of Psychology, Biology, and Entrepreneurship
Essays at the Intersection of Psychology, Biology, and Entrepreneurship

Verslagen op het snijvlak van psychologie, biologie en ondernemerschap

Thesis

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

Prof. dr. R.C.M.E. Engels

and in accordance with the decision of the Doctorate Board.

The public defence shall be held on
Thursday 20 December 2018 at 13:30 hours

by

Indy Bernoster
born in Vlaardingen

Erasmus University Rotterdam
Doctoral Committee

Promotors: Prof. dr. A.R. Thurik
Prof. dr. I.H.A. Franken
Prof. dr. P.J.F. Groenen

Other members:
Prof. dr. K.I.M. Rohde
Prof. dr. J.W. van Strien
Prof. dr. O. Torrès

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://repub.eur.nl/

ERIM PhD Series in Research in Management, 463
ERIM reference number: EPS-2018-463-S&E
© 2018, Indy Bernoster

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

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means
electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system,
without permission in writing from the author.
Table of Contents

Table of Contents  v
Acknowledgements  

1. Introduction and Conclusion  
   1.1. Motivation  
      1.1.1 Entrepreneurial Intention  
      1.1.2 Entrepreneurial Choice  
      1.1.3 Entrepreneurial Orientation  
      1.1.4 Entrepreneurial Success  
   1.2. Research Topics: Part I and II  
   1.3. Model and Data  
   1.4. Thesis Outline: Aims and Results  
      1.4.1 Part I: The Intersection of Psychology and Entrepreneurship  
      1.4.2 Part II: The Intersection of Biology and Entrepreneurship  
   1.5. Conclusion: Contributions and the Future  
      1.5.1 Overall Contribution  
      1.5.2 Future Research  
   1.6. Individual Contributions and Publication Status per Chapter  

2. Overconfidence, Optimism, and Entrepreneurship  21
   2.1. Introduction  
   2.2. Theory and Hypotheses  
   2.3. Data and Methods  
      2.3.1 Samples  
      2.3.2 Variables and Measures  
      2.3.3 Analysis  
   2.4. Results  
   2.5. Discussion  

v
2.6. Conclusion

3. The Role of Affect in Entrepreneurial Orientation
3.1. Introduction
3.2. Literature Review
  3.2.1 Affect
  3.2.2 Entrepreneurial Orientation
  3.2.3 Affect and Entrepreneurship
  3.2.4 Additional Test
3.3. Method
  3.3.1 Panteia
  3.3.2 AMAROK
  3.3.3 Analysis
3.4. Results
3.5. Discussion
  3.5.1 Implications for Theory and Practice
  3.5.2 Limitations and Future Research Directions
3.6. Conclusion
3.7. Appendix A
  3.7.1 Woudestein
  3.7.2 Results
3.8. Appendix B

4. Positive Affect, the Entrepreneurial Process, and Entrepreneurial Success of Sole Proprietors
4.1. Introduction
4.2. Supporting Literature
  4.2.1 Positive Affect and Entrepreneurial Process
  4.2.2 Entrepreneurial Process and Entrepreneurial Success
  4.2.3 Positive Affect and Entrepreneurial Success: A Mediation Model
4.3. Data and Method
  4.3.1 Sample
  4.3.2 Variables and Measures
  4.3.3 Analysis
4.4. Results
  4.4.1 Main Results
  4.4.2 Robustness Checks
4.5. Discussion
  4.5.1 Implications for Theory and Practice
4.5.2 Limitations and Suggestions for Future Research

4.6. Conclusion

5. The Role of Behavioral and Electrophysiological Measures in Entrepreneurship

5.1. Introduction

5.2. Literature and Exploratory Purpose

5.3. Method

5.3.1 Sample 1

5.3.2 Sample 2

5.3.3 Sample 3

5.3.4 Analysis

5.4. Results

5.5. Conclusion

5.5.1 Discussion

5.5.2 Limitations

5.5.3 The Way Forward

5.5.4 Final Conclusion

6. Electrophysiological, Behavioral, and Self-Reported Measures of Impulsivity: Different Sides of the Same Coin?

6.1. Introduction

6.2. Data and Method

6.2.1 Sample 1

6.2.2 Sample 2

6.2.3 Analyses

6.3. Results

6.3.1 Psychometric Checks

6.3.2 Correlation Analyses

6.3.3 Regression Analyses

6.3.4 Bootstrapping

6.4. Discussion

7. Summary in English

8. Summary in Dutch

9. References

10. About the author

11. Portfolio

12. The ERIM PhD Series
1. Introduction and Conclusion

Indy Bernoster

The first chapter of the present thesis introduces and defines my research topics. The thesis consists of two parts, with separate, but overarching subjects. The first part adds to our knowledge at the intersection of psychology and entrepreneurship and the second part to our knowledge at the intersection of biology and entrepreneurship. This first chapter also provides summaries of the subsequent chapters – with particular research aims, findings, and contributions – and it concludes the thesis. Finally, it deals with the individual contribution to and publication status of each chapter.
Entrepreneurship is an important area of research (Gorgievski & Stephan, 2016). Entrepreneurs create employment, facilitate productivity growth, and engender high quality innovations (Van Praag & Versloot, 2007). Therefore, they also play a role for economic growth and in the recovery from economic recessions (Erken, Donselaar, & Thurik, 2016; Koellinger & Thurik, 2012). A profound understanding of entrepreneurs enables better policies to stimulate entrepreneurship in modern economies. Although scholars generally agree on the importance of (knowledge about) entrepreneurs, they do not do so with respect to the definition of ‘the entrepreneur’.

The definition of ‘the entrepreneur’ has been subject of debate for years and the answer on the question “what makes an entrepreneur?” depends on which literature one consults (Gartner, 1990). There is no consensus on one confined, clear concept of ‘the entrepreneur’. In fact, its conception is broad (Stevenson & Jarillo, 2007) resulting in many definitions that can complement or contradict one another. Hébert and Link (1989) have identified at least twelve distinct roles of ‘the entrepreneur’, while Shane and Venkataraman (2000) admit difficulty in setting up a conceptual framework for entrepreneurship because of its ambiguous definition. According to them, entrepreneurship studies the sources of opportunities, the process of discovery, evaluation, and exploitation of these opportunities, and the individuals who constitute this process. Eckhardt and Shane (2003) emphasize that this perspective means that entrepreneurship could attribute to both managers and business founders and that not all business founders are entrepreneurs per se. This emphasis does not only apply to the perspective of Shane and Venkataraman, but also to that of others. For instance, Schumpeter’s definition describes the role of an entrepreneur as innovating: creating and introducing new products and services (Schumpeter, 1934). Further, Kirzner (1997) argues that entrepreneurs anticipate and solve inefficiencies in a market, Knight (1921) defines entrepreneurs as the ones that are willing to bear uncertainty of an unknown distribution of future profits, and Gartner (1988) marks entrepreneurship as the creation of organizations and he distinguishes between a behavioral approach, i.e. studying activities necessary for organization creation, and a trait approach, i.e. studying personality traits of the entrepreneur.

These different but overlapping definitions indicate the relevance of the present thesis as this thesis investigates the definition of ‘the entrepreneur’ by analyzing their psychological and biological traits. Hence, Gartner’s trait approach is adopted. The reason for using the trait approach lays in recent developments in the field of entrepreneurship, being part of a much bigger research field: economics. Traditionally, economists employ the ‘homo economicus’ view, in which rational individuals are utility maximizing decision makers. However, partly thanks to Richard Thaler who won the Nobel prize for his contribution to the field of
behavioral economics (Thaler, 2014), the limitations of the traditional ‘homo economicus’ perspective have become clear and led to the development of the field ‘behavioral economics’ with ample room for emotional, psychological, and biological effects (Kahneman, 2011). This shift in focus of the economics discipline – from the view of rational individuals to the view of ‘softer’, irrational individuals – causes entrepreneurship research to also shift in this direction. Therefore, behavioral economics is used as a starting point and non-rational, emotional-based concepts from fields like psychology and biology are associated with entrepreneurship concepts.

When it comes to defining ‘the entrepreneur’, many aspects of entrepreneurship can serve as the main focus. For instance, the focus could be on entrepreneurial intention, choice, process, activities, orientation/strategy, health, well-being, success/performance, and so on. The present thesis focuses on, but is not confined to, four well-known entrepreneurial concepts: entrepreneurial intention (Liñán & Chen, 2009), entrepreneurial choice, entrepreneurial orientation (Covin & Slevin, 1989), and entrepreneurial success. By using these four entrepreneurial concepts as a guideline for the present thesis, the implicit focus is on micro-level entrepreneurship, i.e. which psychological/biological traits do individuals that score high on the entrepreneurial concepts have?

1.1.1 Entrepreneurial Intention

The first entrepreneurial concept investigated in the present thesis is entrepreneurial intention (Liñán & Chen, 2009). With entrepreneurial intention, the present thesis refers to the willingness to become an entrepreneur. Entrepreneurial intention is related to personality traits such as entrepreneurial self-efficacy (Chen, Greene, & Crick, 1998), optimism, and overconfidence (Giacomin, Janssen, & Shinnar, 2016). Besides this stream of literature, also profound psychological concepts such as four of the Big Five traits – i.e. conscientiousness, openness to experience, extraversion, and neuroticism (Brandstätter, 2011) – and the Behavioral Activation System (BAS; Geenen, Urbig, Muehlfeld, Van Witteloostuijn, & Gargalianou, 2016) are associated with entrepreneurial intention. Recent literature takes entrepreneurship research to a next level by focusing on psychiatric disorders like Attention-Deficit/Hyperactivity Disorder (ADHD; Verheul, Block, Burmeister-Lamp, Thurik, Tiemeier, & Turturea, 2015) which is found to be related to entrepreneurial intention, although mediated by risk taking propensity.

Although Krueger and Carsrud (1993) first mention intention as the single best predictor of behavior, it recently received some critique and was proposed to be inappropriate because of doubts about whether intention indeed leads to actual behavior (Krueger, 2017). Nevertheless, Ajzen (1991) advocates that intention actually predicts behavior with his Theory of Planned Behavior. This theory states that personal attitude towards the behavior, subjective norm, and perceived
behavioral control forms intentions which in turn lead to actual behavior. Kautonen, Van Gelderen, and Fink (2015) find, with their study on start-up behavior, support for this theory in the entrepreneurship context. Even though Ajzen (1991) and Kautonen et al., (2015) raise confidence in the concept entrepreneurial intention, none of the chapters rely solely on this particular outcome: it is always accompanied with at least one other outcome to take Krueger’s (2017) doubts into consideration.

1.1.2 Entrepreneurial Choice

Second, entrepreneurial choice, i.e. the actual choice to become an entrepreneur, is a concept of considerable interest. Several traits that are well-known to exist in entrepreneurs are risk taking propensity (Ahmed, 1985; Stewart Jr & Roth, 2001), need for achievement (Ahmed, 1985; Frese & Gielnik, 2014; Rauch & Frese, 2007), self-efficacy (Chen, Greene, & Crick, 1998; Frese & Gielnik, 2014; Rauch & Frese, 2007), internal locus of control (Ahmed, 1985), opportunity recognition (Baron, 2006), overconfidence (Busenitz & Barney, 1997), and innovativeness (Rauch & Frese, 2007), but also many other traits (Rauch & Frese, 2007) are found in entrepreneurs. Further, wealthier individuals are more inclined to become entrepreneur, but do not necessarily make better entrepreneurs (Evans & Jovanovic, 1989). Also, traits profoundly embedded in psychology, like the Big Five personality traits are associated with entrepreneurs (Brandstätter, 2011; Zhao & Seibert, 2006): entrepreneurs (opposed to managers) score higher on conscientiousness and openness to experience and lower on neuroticism and agreeableness. Results on extraversion are mixed. With respect to psychiatric symptoms, Wiklund, Yu, Tucker, and Marino (2017b) show that ADHD is related to entrepreneurship through aspects of impulsivity and Antshel (2017) reviews associations between ADHD symptoms and entrepreneurship measures and suggests that hyperactivity drives the association.

Inseparably adjacent to the choice of becoming an entrepreneur is the reason behind this choice. Although higher educated entrepreneurs may earn more than their employed counterparts (Sorgner, Fritsch, & Kritikos, 2017), entrepreneurs in the tertiary degree earn less than their counterparts. Åstebro, Herz, Nanda, and Weber (2014) discuss the irrationality of becoming an entrepreneur given the (mostly) negative expected utility: entrepreneurs have lower initial earnings and lower earnings growth than equally educated paid employees (Hamilton, 2000) and suffer from negative side effects such as stress (Blanchflower, 2004; Cardon & Patel, 2013). Åstebro et al. (2014) mention several reasons for entering entrepreneurship despite this negative prospect. They state that not just a risk-loving attitude and nonpecuniary benefits (Hamilton, 2000), i.e. getting pleasure from the organization of setting up a business, being independent of others, and being in control of your own life (Blanchflower, 2004), but also overconfidence could play a role (Åstebro, Jeffrey, & Adomdza, 2007). Further, coercion, in professions such
as farmer or artist, could be a reason to become an entrepreneur as self-employment is the norm in these professions. Hence, in case of coercion, the choice of becoming an entrepreneur is not always voluntary. A similar scenario exist for entrepreneurs in family businesses: children are nurtured such that they can take over the business and this is also expected from them. It is important to distinguish between these different reasons behind the choice of becoming an entrepreneur. Specifically, research should distinguish between entrepreneurs who really chose their occupation themselves and entrepreneurs who are more or less forced into entrepreneurship.

With respect to the role of entrepreneurial choice for the present thesis, the focus is on the reasons to become an entrepreneur as a selection mechanism to identify certain types of entrepreneurs (having different reasons for their entrance as entrepreneurs). The present thesis studies the specific groups resulting from this selection.

1.1.3 Entrepreneurial Orientation

The third entrepreneurial concept is entrepreneurial orientation, or strategic posture. Covin and Slevin (1989) define strategic posture as “a firm’s overall competitive orientation” (p. 77). If this orientation is entrepreneurial, a more specific definition is relevant: “the strategy making processes that provide organizations with a basis for entrepreneurial decisions and actions” (Rauch, Wiklund, Lumpkin, & Frese, 2009, p. 763). Hence, entrepreneurial orientation indicates the degree of entrepreneurship in a firm’s strategic posture (Lumpkin & Dess, 1996).

Entrepreneurial orientation is usually captured by three dimensions – innovativeness, proactiveness, and risk taking (Miller, 1983) – and measured at the firm-level (Covin & Slevin, 1989). Besides firm entrepreneurial orientation, there is individual entrepreneurial orientation (Langkamp Bolton & Lane, 2012) as not only firm-specific traits, but also individual-specific traits eventually lead to firm decisions according to the upper echelon theory. This upper echelon theory claims that organizational outcomes are predicted by managerial characteristics (Hambrick & Mason, 1984). Hence, entrepreneurs, who usually are (in) the managerial team, determine what will happen to the organization. Thus their individual-specific traits, which could be measured by individual entrepreneurial orientation, lead to a firm’s strategic posture.

Entrepreneurial orientation is associated with personality traits such as overconfidence (Engelen, Neumann, & Schwens, 2015) and psychiatric symptoms that are associated with ADHD (Thurik, Khedhaouria, Torrèes, & Verheul, 2016).

The present thesis focuses on entrepreneurial orientation in Chapters 2, 3, and 5.
1.1.4 **Entrepreneurial Success**

The fourth entrepreneurial concept is entrepreneurial success, which is part of a much bigger concept: success. The question ‘when is an individual successful?’ is a philosophical one of which the answer, when focusing on entrepreneurs, could relate to financial success, but also to firm growth, societal movement, or happiness (Lyubomirsky, King, & Diener, 2005).

When referring to financial success of the entrepreneur, findings show that education plays a role (Dickson, Solomon, & Weaver, 2008). Also, with regard to personality traits, self-efficacy and need for achievement (Frese & Gielnik, 2014; Rauch & Frese, 2007), optimism (Crane & Crane, 2007; Hmieleski & Baron, 2009), human capital (Haber & Reichel, 2007; Unger, Rauch, Frese, & Rosenbusch, 2011), social capital (Baron & Markman, 2000; 2003; Bosma, Van Praag, Thurik, & De Wit, 2004), and many other personal characteristics (Duchesneau & Gartner, 1990; Rauch & Frese, 2007) impact financial success. Further, psychological traits, such as several of the Big Five personality traits, relate to entrepreneurial success (Brandstätter, 2011). Besides, entrepreneurial success is correlated with entrepreneurial orientation (Avlonitis & Salavou, 2007; Lumpkin & Dess, 1996; Wiklund, Patzelt, & Shepherd, 2009) and this correlation is moderately large and robust (Rauch, Wiklund, Lumpkin, & Frese, 2009).

The present thesis focusses on financial success in Chapters 3 and 4 while in Chapter 4 also controlling for individuals that do not strive for financial success.

1.2. **Research Topics: Part I and II**

As brought forward in the previous section, there is a rising amount of papers at the intersection of psychology and entrepreneurship (Gorgievski & Stephan, 2016). Also, Frese and Gielnik (2014) notice the importance of investigating the psychology of entrepreneurship. Therefore, Part I of the present thesis builds on the intersection of psychology and entrepreneurship and aims to identify personality traits of the entrepreneurial concepts discussed in the previous section.

Although research at the intersection of psychology and entrepreneurship is often claimed to be important, it cannot explain the entrepreneurial concepts to full extent. Besides, most measures in studies empirically addressing this intersection are based on self-report, while self-reported measures – especially for psychological concepts – could contain biases because of, for instance, social desirability, consistency motif, and common method variance (Podsakoff & Organ, 1986). Therefore, recent studies extended the investigation of micro-entrepreneurship with biological factors such as hormones (Van der Loos et al., 2013b) and genes (Koellinger et al., 2010; Nicolaou, Shane, Cherkas, & Spector, 2008; Van der Loos et al., 2013a), but failed to adequately provide a satisfactory sketch of ‘the entrepreneur’.
Therefore, Part II of the present thesis investigates the intersection of biological traits (resulting from experimental tasks recorded with electroencephalography (EEG)) and entrepreneurial concepts. This is in line with the suggestions of Ridderinkhof, Van den Wildenbergh, Wijnen, and Burle (2004) and Krueger and Welpe (2014) to use behavioral and electrophysiological measures for explaining entrepreneurial constructs. As Krueger and Welpe (2014) state: “If we are to truly understand the entrepreneurial mindset, we need to look deeper” (p. 2). At the present time, there is lack of studies that empirically associate behavior and, in particular, electrophysiology to entrepreneurship, despite the fact that these type of studies is requested for (Pérez-Centeno, 2017).

1.3. Model and Data

The model of Figure 1.1 summarizes all chapters in the present thesis. Chapters 2, 3, and 4 fit in Part I of the present thesis and Chapter 5 and 6 in Part II. The model shows that the (self-reported) entrepreneurial concepts are associated with self-reported psychological measures – such as overconfidence, optimism, affect (Watson, Clark, & Tellegen, 1988), impulsivity, sensation seeking, and reward responsiveness –, and behavioral and electrophysiological measures from four EEG tasks: the Eriksen Flanker task (Eriksen & Eriksen, 1974), the Go/No-Go task (Littel, Van den Berg, Luijten, Rooij, Keeming, & Franken, 2012), the Balloon Analogue Risk Task (BART; Lejuez et al., 2002), and the Reward task (Franken, Van den Berg, & Van Strien, 2010). These EEG tasks constitute a wide variety of behavioral and electrophysiological measures.

![Figure 1.1. The overall model of the present thesis with all chapters (Ch.) presented on the corresponding arrows.](image)

To investigate the presumed associations in the model of Figure 1.1, several samples are employed. The first sample (Sample 1) is a student sample collected by
Wim Rietdijk, a PhD student at the time (September 2013 – May 2014), and consists of 169 third- and fourth-year Erasmus University Rotterdam students. They reported on psychological and entrepreneurial constructs and participated in the Eriksen Flanker task and the Go/No-Go task. The second sample (Sample 2) employed in the present thesis is collected by Indy Bernoster, Plato Leung, and student-assistant Marwan Aboul Magd between May 2015 and April 2016. This sample, consisting of 182 Erasmus University Rotterdam students, provides information about entrepreneurial constructs, psychological constructs, and behavior and electrophysiology from the BART and Reward task. The third sample (Sample 3) is collected by Kristel de Groot, a PhD student (April 2017 – December 2017), and consists of 126 students of the Erasmus University Rotterdam. They reported on psychological and entrepreneurial constructs and participated in, amongst others, the BART. The fourth sample (Sample 4) consist of 851 Dutch sole proprietors. It is collected by Panteia, one of the largest market and policy research institutes in the Netherlands and focusses, amongst many other measures, on affect and entrepreneurial success. The fifth and final sample (Sample 5) used in the present thesis consist of 287 French Small and Medium Enterprise (SME) owners. It is collected by AMAROK, a research institute and partner of Montpellier Business School, of which the primary goal is to analyze the health of SME owners.

Each of the chapters in the present thesis consults one or several of these samples. Specifically, Chapter 2 consults Samples 2 and 5; Chapter 3 Samples 2, 4, and 5; Chapter 4 Sample 4; Chapter 5 Samples 1, 2, and 3; and Chapter 6 Samples 1 and 2. Although samples are used in multiple chapters, aims of these chapters differ such that the exact data used from the samples also differs.

1.4. Thesis Outline: Aims and Results

Chapters 2 through 6 of the present thesis investigate five separate aims. The present section describes the aim(s) and summarizes the results for each of these subsequent chapters.

1.4.1 Part I: The Intersection of Psychology and Entrepreneurship

The second chapter investigates the association between overconfidence and optimism on the one hand and entrepreneurial intention and orientation on the other. Overconfidence consists of three definitions: overestimation (i.e. overestimation of one’s actual performance), overplacement (i.e. overplacement of one’s performance relative to others), and overprecision (i.e. excessive precision in one’s beliefs) (Moore & Healy, 2008) and is often confusingly conflated to optimism (Parker, 2009). Overconfidence is provided as one of the reasons why individuals start a business (Åstebro et al., 2014). Chapter 2 investigates the role of overconfidence in both entrepreneurial intention and entrepreneurial orientation while specifically
controlling for optimism. The findings, based on a student sample (N = 173) and a sample of Small and Medium Enterprise (SME) owners (N = 253), show that overconfidence (measured as overprecision) is positively associated with entrepreneurial intention, but not with entrepreneurial orientation, while optimism is positively associated with both. Others find that overconfidence fosters entrepreneurial orientation, but use overestimation instead of overprecision (Engelen et al., 2015). With these findings, Chapter 2 contributes to the entrepreneurship literature by describing the role of overconfidence and optimism in entrepreneurship. It further contributes to psychology literature by showing that overconfidence and optimism, but also the distinct definitions of overconfidence, play different roles in entrepreneurship.

Chapter 3 investigates the role of affect, the extent to which an individual subjectively experiences feelings and emotions, in entrepreneurial orientation, an important antecedent to entrepreneurial success (Rauch et al., 2009). In their systematic review of affect and entrepreneurship, Delgado García, Quevedo Puente, and Blanco Mazagatos (2015) advocate that one should investigate the consequences of affect across the entrepreneurial process. Also, Hahn, Frese, Binnewies, and Schmitt (2012) mention that affect is a neglected concept in entrepreneurship and that future research should establish its role in the entrepreneurial process. Hence, the third chapter investigates the role of both positive and negative affect in entrepreneurial orientation and, subsequently, entrepreneurial success. The findings, based on 177 Dutch students, 337 Dutch sole proprietors, and 254 French SME owners show that there is a positive association between positive affect and both individual and firm entrepreneurial orientation and a negative association between negative affect and individual entrepreneurial orientation. Further, the chapter hints to a positive association between positive affect and entrepreneurial success and a negative association between negative affect and entrepreneurial success, but the findings show no indirect effect of affect on entrepreneurial success (through entrepreneurial orientation). The third chapter contributes to entrepreneurship literature by exploring the role of affect for entrepreneurial orientation and its consequence, i.e. entrepreneurial success. It further contributes to the field of psychology by showing that the orthogonality of positive and negative affect also holds in entrepreneurship and should not be ignored in studies about affect.

The fourth chapter elaborates on the third by investigating the role of positive affect in the key aspects of the entrepreneurial process and entrepreneurial success. Baron (2008) shows, with his theoretical paper, that positive affect is – via some basic cognitive processes – positively associated with the key aspects of the entrepreneurial process, viz. opportunity recognition, acquisition of financial and human resources, development of broad social networks, capacity to respond effectively to highly dynamic environments, and tolerance for intense levels of stress. In Chapter 4, an adapted version of Baron’s model is augmented with
entrepreneurial success, the focal goal of entrepreneurship. With this augmented model, Chapter 4 provides an empirical test for the by Baron (2008) theoretically substantiated associations between positive affect and the key aspects of the entrepreneurial process and it tests whether positive affect is associated with entrepreneurial success (whether or not mediated by these key aspects of the entrepreneurial process). The findings, based on more than 800 Dutch sole proprietors, show that positive affect is positively associated with the key aspects of the entrepreneurial process and that these key aspects are positively associated with entrepreneurial success. The findings also provide evidence for the indirect positive association between positive affect and entrepreneurial success through the key aspects of the entrepreneurial process. With these findings, Chapter 4 contributes to the knowledge about entrepreneurial success. There are many studies associating positive affect and success (Lyubomirsky et al., 2005), but not many studies investigate the role of affect in entrepreneurial success. The fourth chapter also contributes to the entrepreneurship literature by providing an empirical test of Baron’s (2008) propositions.

1.4.2 Part II: The Intersection of Biology and Entrepreneurship

Chapter 5 is the first chapter devoting attention to the biology of an entrepreneur. It associates behavior and electrophysiology of four experimental tasks measuring impulsivity (Eriksen Flanker task, Go/No-Go task, BART, and Reward task) and self-reported impulsivity to entrepreneurial concepts such as entrepreneurial intention, choice, and orientation, but also entrepreneurial personal attitude, subjective norm, and perceived behavioral control (Ajzen, 1991). The findings, based on three student samples with sizes 133, 142, and 119 – which are perceived as large in the electrophysiology context, show that behavioral and electrophysiological measures are not associated with self-reported entrepreneurial concepts and thus cannot serve as substitutes to or complements for self-reported impulsivity(-related) constructs.

Chapter 6 builds on this null finding by testing the role of behavior and electrophysiology in self-reported impulsivity-related concepts which are ‘closer’ to the behavioral and electrophysiological measures than the self-reported entrepreneurial concepts of Chapter 5. Previous studies report significant associations between the behavioral and electrophysiological measures employed in Chapter 6 and the self-reported impulsivity-related concepts to which they are associated. Hence, the expectation is to find similar associations as found in these previous studies. Nevertheless, the analysis, based on the first two samples of Chapter 5, results in null findings again.

The results of Chapters 5 and 6, i.e. Part II of the present thesis, could be interpreted in several ways. The first interpretation is that there simply exists no association between behavior/electrophysiology and entrepreneurship (Chapter
5)/impulsivity-related concepts (Chapter 6). However, in this case it is hard to explain why so many previous studies found significant associations between behavior/electrophysiology and impulsivity-related constructs similar to the ones of Chapter 6 (Geburek, Rist, Gediga, Stroux, & Pedersen, 2013; Lejuez, Aklín, Zvolenský, & Pedullà, 2003; Littel et al., 2012; Potts, George, Martin, & Barratt, 2006; Zheng, Sheng, Xu, & Zhang, 2014). An explanation for the difference between the findings of Chapter (5 and) 6 and previous studies – i.e. null findings versus significant findings – could be the difference in sample size, which is around 20 to 40 participants for these previous studies and about 134 for the samples of Chapters 5 and 6. The key problem regarding small samples is that they lead to low statistical power and thus have a lower chance that discovered effects are genuinely true (Button et al., 2013; Forstmeier, Wagenmakers, & Parker, 2017; Ioannidis, 2005). Hence, this could explain the significant findings in earlier (small sample sized) studies while the present thesis fails to confirm these findings.

Second, experimental EEG tasks such as the Eriksen Flanker task and the Go/No-Go task have, according to Hedge, Powell, and Sumner (2017), low between individual variance in their outcomes (e.g. reaction time, performance). This low between individual variance is beneficial for experiments, but problematic in testing associations to other (economic) individual differences (Meyer, Lerner, De Los Reyes, Laird, & Hajcak, 2017). Hence, the reason of null findings in Part II of the present thesis could be the use of experimental EEG tasks. However, this would not explain the significant findings in earlier studies.

A third reason for the null findings is that the behavioral and electrophysiological measures are implicit, i.e. representing preconscious processes, while self-reported entrepreneurship concepts and impulsivity-related constructs are explicit, i.e. representing the conscious results of preconscious processes (Dittmar, Krehl, & Lautenbacher, 2011; Eysenck, 1992). Dittmar et al. (2011) also failed to find significant associations between electrophysiological, behavioral, and self-reported measures in pain-related information processing and argue that the reason could be the use of both implicit and explicit measures.

The contribution of Chapters 5 and 6 is inducing awareness that steps forward in the world of electrophysiology as explanatory role are needed. The present thesis discusses these steps in more detail in the section ‘Conclusion: Contributions and the Future’.

1.5. Conclusion: Contributions and the Future

The question ‘What makes an entrepreneur?’ has been a fundamental question for economics, management, and psychology researchers over the last decade. A profound understanding of ‘the entrepreneur’ enables the establishment of better policies to stimulate entrepreneurship in modern economies. This is crucial as
entrepreneurship is essential for economic growth (Erken et al., 2016; Koellinger & Thurik, 2012; Van Praag & Versloot, 2007).

The present thesis deals with the definition of ‘the entrepreneur’ by investigating the roles of psychological traits (Part I) and biological traits (Part II) in several well-known entrepreneurial concepts, such as entrepreneurial intention, entrepreneurial choice, entrepreneurial orientation, and entrepreneurial success. The findings of Chapters 2, 3, and 4 show that overconfidence, optimism, and both positive and negative affect are associated with entrepreneurship. Chapters 5 and 6 fail to provide evidence for the association between biological traits, such as behavioral and electrophysiological traits (obtained from experimental EEG tasks), and self-reported measures of entrepreneurship (and impulsivity).

1.5.1 Overall Contribution

Besides the chapter-specific contributions as discussed earlier, the present thesis provides several overall contributions. First, Chapters 2, 3, and 4 contribute to the great rationality debate of Zhang and Cueto (2017). The great rationality debate asks the question of whether humans are rational such as traditionally assumed. As shown by the results of Chapter 2, overconfidence, a cognitive bias, and optimism are associated with ‘rational’ economic variables: entrepreneurial intention and entrepreneurial orientation. Although a typical entrepreneurial environment with high levels of uncertainty, novelty, and time pressure, could lead to cognitive biases (Baron, 1998) such as overconfidence, this does not necessarily induce negative side effects, but it could also be a good thing for specific groups of the society such as entrepreneurs. In a similar way, Chapters 3 and 4 show that both positive and negative affect, i.e. someone’s subjective experience of feelings and emotions, which are irrational by definition, are associated with more rational concepts such as entrepreneurial process, orientation, and success. Altogether, humans make rational decisions based on irrational psychological traits and hence, in terms of the great rationality debate, the present thesis suggests that human are irrational and that, for some, this irrationality could even lead to preferable outcomes. This is in line with Darwinism: if irrational decisions would not lead to preferable outcomes, humans would have evaluated to being rational.

Second, Chapters 3 and 4 contribute to the urgent request to fill the empirical gaps emerging in the rapidly developed affect-entrepreneurship literature (Cardon, Foo, Shepherd, & Wiklund, 2012; Delgado García et al., 2015; Hahn et al., 2012). Delgado García et al. (2015) write on their research agenda that “entrepreneur’s affect might influence subsequent stages in the entrepreneurial process which could in turn have an impact on venture success” (p. 205) and Hahn et al. (2012) mention that “affect is a neglected concept in entrepreneurship research, and scholars are urged to pay more attention to the role of affect in the entrepreneurial process (Baron, 2008)” (p. 99). With Chapters 3 and 4, the present thesis follows these
studies by showing that positive affect and negative affect are associated with entrepreneurial orientation and that positive affect is (indirectly through the entrepreneurial process) positively associated with entrepreneurial success. This is in line with Baron’s earlier finding that positive affect may enhance the work environment and hence the attitude and performance of the workers within this environment (Baron, 1990).

A third contribution lays in the field of neuro-entrepreneurship (Krueger & Welpe, 2014). The idea to incorporate electrophysiology in entrepreneurship is novel and much demanded (Pérez-Centeno, 2017). Chapter 5 shows however that there is no association between behavioral and electrophysiological measures on the one hand and self-reported entrepreneurial concepts on the other. The chapter reports null findings despite of using large samples, four different experimental EEG tasks generating many different behavioral and electrophysiological measures, and multiple entrepreneurial concepts. Nevertheless, Chapter 5 contributes to a first step in this neuro-entrepreneurship field. The null findings should encourage the field even more to investigate why there is no association between behavior/electrophysiology from the four experimental EEG tasks of Chapter 5 and entrepreneurship. Many suggestions are given about what these null findings would imply for the way forward.

The fourth contribution is based on the null findings of Chapter 6 and is more fundamental for the field of electrophysiology. The null findings of Chapter 6 could be explained by the fact that there is indeed no association between behavior/electrophysiology and self-reported impulsivity concepts. However, previous studies report significant associations between our behavioral/electrophysiological measures and self-reported impulsivity concepts. Therefore, Chapter 6 advances this existing field by ‘replicating’ these earlier findings in large samples. As Chapter 6 fails to find the expected associations between behavior/electrophysiology and self-reported impulsivity concepts, it raises doubt about the actual association found in earlier studies. A possible reason for being unable to find associations in Chapter 6 could be the use of large sample sizes. As explained before, low sample sizes of earlier studies cause a lower chance that discovered effects are genuinely true (Button et al., 2013; Forstmeier, Wagenmakers, & Parker, 2017; Ioannidis, 2005).

Altogether, the present thesis contributes to the field of entrepreneurship by focusing on the psychology of the entrepreneur, with concepts such as overconfidence, optimism, positive affect, and negative affect, and on the biology of the entrepreneur. In other words, the present thesis extends our knowledge of the entrepreneurial profile. It also contributes to the field of psychology by showing the positive role that cognitive biases, such as overconfidence, could play for, for instance, entrepreneurs. Hence, this field will gain insights in why some psychological concepts can be problematic in one person (patient) but beneficial in another (entrepreneur). Finally, the present thesis contributes to the field of biology,
especially electrophysiology, with null findings despite of analyzing large samples and while small samples report significant findings. This field can therefore benefit from the present thesis by investigating why larger samples fail to find presumed associations.

From a practical perspective, the present thesis contributes to our knowledge about the profile of ‘the entrepreneur’. This knowledge can help correctly matching personality profiles to occupations which is important according to Person-Environment Fit theory. A mismatch between the two could be detrimental to one’s mental and physical well-being. By knowing more about the entrepreneurial personality profile matching principles can improve. Further, knowing whether an individual is better suited for entrepreneurship than for being an employee, especially at an early age, can improve education. For instance, the Dutch education system is better fitted for well-organized, disciplined children than for hyperactive, creative ones. The entrepreneurial profile usually does not match this present educational system, but knowing in the early age that a child is suited for entrepreneurship could result in fitting education.

1.5.2 Future Research

While the focus of the present thesis is on (the psychology (Part I) and biology (Part II) of) entrepreneurship, future studies are certainly not confined to this specific form of occupational choice. Investigating personality, behavior, and electrophysiology is possible in other manifestations of economic behavior and outcomes, such as occupational choice in general, unemployment, or education, but also in success, health, and happiness. In the present thesis, entrepreneurship serves as a proof of concept. Future studies are encouraged to expand profiles, not only of entrepreneurs, but also of other types of people and other types of economic outcomes.

Further, future studies should expand knowledge of personality traits fitting ‘the entrepreneur’ and focus especially on entrepreneurial success. The amount of studies on entrepreneurial intention is ample (Krueger, 2017) and an imbalance in the amount of studies per well-known and validated entrepreneurial concept should be avoided. Also, entrepreneurial success is focal for entrepreneurship, and thus, the present thesis urges to expand the knowledge of entrepreneurial success.

Not only could studies expand on the entrepreneurship side, future research could and should also expand on the psychology side. Especially when cognitive biases or even psychiatric disorders could be proven to be beneficial for a small amount of people, i.e. entrepreneurs, this would destigmatize ‘patients’ with certain forms of psychopathology. It would further contribute to the idea derived from evolutionary psychology that psychological ‘symptoms’ should have evolutionary benefits that are needed for survival of the species. Initiatory studies in the entrepreneurship field that show disorders – or symptoms of these disorders – to
have beneficial value for specific groups are based on ADHD (Antshel, 2017; Canits et al., 2018; Thurik et al., 2016; Verheul et al., 2015).

Also, mostly linear associations are investigated, while for instance, optimism and positive affect, could be beneficial, but not if one has too much of these traits. Therefore, the focus should also shift to the ‘optimal’ personality profiles for, for instance, entrepreneurs. Baron, Hmieleski, and Henry (2012) and Baron, Tang, and Hmieleski (2011) take first steps in finding an optimal profile by showing that the association between dispositional positive affect and performance tasks closely related to new venture development and growth is curvilinear. Another perspective of positive affect that should be taken into account in future (entrepreneurship) studies is that besides the orthogonality of positive and negative affect, also an activation and deactivation division is present (Feldman Barrett & Russell, 1998).

With respect to Part II of the present thesis, future research options are plentiful. One conclusion arising from the null findings in our large samples is the lower chance that discovered effects are genuinely true in smaller samples. Hence, the present thesis strongly advices to replicate previous findings based on smaller samples in large samples so that the probability of reporting genuinely true effects becomes higher. This means that, also the in the field of electrophysiology, one should shift to modern big data settings.

Further, future studies should aim to increase our knowledge of the biological traits of the entrepreneur by incorporating not only behavior and electrophysiology, but also other dimensions such as health, physiology (e.g. heartbeat and blood pressure), hormones (Van der Loos et al., 2013b), and genetic information (Koellinger et al., 2010; Van der Loos et al., 2013a), to provide a more complete picture. With respect to behavior and electrophysiology, many more measures of other experimental EEG tasks, such as the (uncensored) Columbia Card Task (CCT), could be incorporated. However, before applying the role of biology in, for instance, entrepreneurship, future research should first develop a consistent and comprehensive knowledge of all these biological dimensions in itself.

In sum, although the present thesis contributes to the psychological and biological knowledge of several entrepreneurial concepts, the entrepreneurial profile still contains plenty of non-discovered mysteries.

1.6. Individual Contributions and Publication Status per Chapter

The present section discusses my contributions for each chapter in the present thesis. I wrote the current chapter, i.e. Chapter 1, independently. However, I received valuable comments of my supervisors which I took into account. Further, I based the idea of Figure 1.1 on models presented in earlier (unpublished) work of Professor Thurik.
The research idea of Chapter 2 is based on earlier work of our research group: “Living forever: entrepreneurial overconfidence at older ages” (Rietveld, Groenen, Koellinger, Van der Loos, & Thurik, 2013). The original first draft of this chapter was mainly written by me and Dr. Rietveld, after which we alternately (re)wrote parts of the text. I was responsible for the data analysis. This analysis was based on two datasets. I collected, together with PhD student Leung and student-assistant Aboul Magd, one of these datasets. The other dataset was obtained via AMAROK (of which Professor Torrès is founding president). Together with Dr. Rietveld, I reviewed and edited the text. Professor Thurik had a supervisory role and was, together with Professor Torrès, responsible for ‘final check’ rounds.

Chapter 3 is based on a research idea developed during the sessions where we (Professor Thurik and I) discussed the role of affect in entrepreneurship. We could not find studies that investigated the role of affect in entrepreneurial orientation and decided to investigate this role. I took the lead in writing the first draft of this chapter and I am responsible for the data analysis referred to in this chapter. Dr. Mukerjee joined in writing and gave suggestions. Together, we processed comments from readers of our manuscript. For the data analysis, three datasets were used. The first dataset was collected by Panteia. I was responsible for several items in Panteia’s survey. I obtained the dataset with the help of Dr. De Vries. He also improved the items that I was responsible for. The second dataset, collected by AMAROK, is described in the preceding paragraph (about Chapter 2) as is the third dataset that was collected by me, PhD student Leung, and student-assistant Aboul Magd. Professor Thurik supervised and edited the text several times.

The idea of Chapter 4 is based on an idea developed by Professor Thurik and Dr. Khedhaouria. The manuscript was written by me and Dr. Khedhaouria, after which we alternately improved and changed parts of the written text. I was responsible for the data analysis, which was based on the dataset of Panteia (as described in the preceding paragraph about Chapter 3). Professor Thurik had a supervisory role.

The research ideas for Chapters 5 and 6 are based on that of a former PhD student – Dr. Riedijk – and existed when I started my PhD. I took over his data, and developed the existing ideas in several ways. That is, I added another dataset (collected by me, PhD student Leung, and student-assistant Aboul Magd, as described in the preceding paragraph about Chapter 2) and the entrepreneurship dimension (in Chapter 5). For Chapter 5, a third dataset, collected by PhD student De Groot, was included. For both Chapters 5 and 6, I am responsible for the data analysis and I took the lead in writing. PhD student De Groot reviewed and edited the final manuscripts. Professor Wieser commented on and edited parts of the text in Chapter 6. Also, PhD student Canits gave comments on the positioning of the psychological concepts in these chapters, and Professor Wiklund suggested the idea to analyze results amongst high-impulsivity groups (Chapter 5). Further, Dr. Luijten, Dr. Marhe, and Dr. De Vlaming gave comments to earlier versions of these
chapters. Professor Thurik and Professor Franken supervised, reviewed, and edited the chapters, where the focus of Professor Thurik was on Chapter 5 and the focus of Professor Franken was on Chapter 6.

The publication status of each chapter is shown in Table 1.1. This table also reports the status of studies that fall outside the content of the present thesis.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Reference</th>
<th>Presentations</th>
<th>Publication status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Overconfidence, Optimism, and Entrepreneurship</td>
<td>Bernoster, Rietveld, Thurik, &amp; Torrès (2018)</td>
<td>Paris (2017)</td>
<td>Published in Sustainability</td>
</tr>
<tr>
<td>3</td>
<td>The Role of Affect in Entrepreneurial Orientation</td>
<td>Bernoster, Mukerjee, &amp; Thurik</td>
<td></td>
<td>Manuscript under review</td>
</tr>
<tr>
<td>4</td>
<td>Positive Affect, the Entrepreneurial Process, and Entrepreneurial</td>
<td>Bernoster, Khedhaouria, &amp; Thurik</td>
<td>Lyon (2016), Montpellier (2016),</td>
<td>Manuscript under review</td>
</tr>
<tr>
<td></td>
<td>Success of Sole Proprietors</td>
<td></td>
<td>Siegen (2017)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The Role of Behavioral and Electrophysiological Measures in</td>
<td>Bernoster, De Groot, Franken, &amp; Thurik</td>
<td>Warwick (2018)</td>
<td>Manuscript to be submitted</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Impulsivity: Different Sides of the Same Coin?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other papers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attention-deficit/hyperactivity disorder (ADHD) symptoms and</td>
<td>Canits, Bernoster, Mukerjee, Bonnet, Rizzo, &amp; Rosique-Blasco (2018)</td>
<td>Siegen (2017)</td>
<td>Published in Small Business</td>
</tr>
<tr>
<td></td>
<td>academic entrepreneurial preference: is there an association?</td>
<td></td>
<td></td>
<td>Economics</td>
</tr>
<tr>
<td></td>
<td>Psychiatric symptoms and entrepreneurial intention: the role of</td>
<td>Leung, Bernoster, Franken, &amp; Thurik</td>
<td>Syracuse (2016)</td>
<td>Manuscript in progress</td>
</tr>
<tr>
<td></td>
<td>behavioral activation system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accurate Computation of Reliability in Event-Related Potentials</td>
<td>Bernoster, Franken, &amp; Groenen</td>
<td></td>
<td>Manuscript in progress</td>
</tr>
<tr>
<td></td>
<td>Associated with the Erisken Flanker Experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part I

Psychology and Entrepreneurship
2. Overconfidence, Optimism, and Entrepreneurship

Indy Bernoster
Cornelius A. Rietveld
A. Roy Thurik
Olivier Torrès

Abstract. Overconfidence is one of the alleged drivers for market entry. However, establishing its effect is challenging and much of the existing entrepreneurship literature confusingly conflates overconfidence with optimism. In the present study, we use validated scales to analyze the relationship between overconfidence and two important aspects of entrepreneurship, while explicitly controlling for optimism. Specifically, we study the role of overconfidence in developing intentions about entering entrepreneurship as well as how overconfidence relates to entrepreneurial orientation. Our findings show that overconfidence is related to intended market entry but not to the market position (entrepreneurial orientation) of the business.
2.1. Introduction

Entrepreneurship is crucial for economic growth and development (Audretsch, 2007; Baumol, 2002; Koellinger & Thurik, 2012), but the high failure rate of business start-ups (Dunne, Roberts, & Samuelson, 1988; Geroski, 1995; Hessels, Grilo, Thurik, & Van der Zwan, 2011) and relatively low average returns compared to wage-work (Hamilton, 2000) suggest that too many people become entrepreneurs (Camerer & Lovallo, 1999; Blanchflower, 2004; Koellinger, Minniti, & Schade, 2007). Part of this excess market entry is thought to result from overconfidence about future entrepreneurial success (Cooper, Woo, & Dunkelberg, 1988; Roll, 1986; Wu & Knott, 2006). Evidence for this hypothesis has been provided by experimental studies in which optimal criteria for market entry behavior were examined and both actual behavior and expectations were observed (Camerer & Lovallo, 1999). However, experimental studies using students in a laboratory setting have limited external validity. Establishing overconfidence as a driver of entrepreneurial activity using field data is nevertheless challenging, for at least three methodological reasons.

First, overconfidence is a heterogeneous concept that includes overestimation, overplacement, and overprecision (Weinstein, 1980; Åstebro, Herz, Nanda, & Weber, 2014). Overestimation refers to “overestimation of one’s actual performance”, overplacement to “overplacement of one’s performance relative to others”, and overprecision to “excessive precision in one’s beliefs” (Moore & Healy, 2008). These three types may relate differently to aspects of the entrepreneurial process (Åstebro et al., 2014).

Second, measures for overconfidence and optimism are often conflated in empirical studies. For example, Trevelyan (2008) used entrepreneurial self-efficacy as a proxy for overconfidence, which is conceptually more closely related to optimism than to overconfidence. Similarly, Giacomin, Janssen, and Shinnar (2016) argued that self-reports on the lack of importance of entrepreneurial skills proxies overconfidence in entrepreneurial abilities. Nevertheless, interpreting overconfidence as a proxy for optimism appears warranted (Åstebro et al., 2014): lacking entrepreneurial skills is unimportant because everything will turn out well (Weinstein, 1980). Unsurprisingly, Parker’s review of the empirical literature on entrepreneurial overconfidence, ends with the conclusion that, “Despite the fact that [over]optimism and overconfidence are distinct concepts, much of the literature confusingly conflates them. At the risk of sounding pedantic, this practice should be discouraged in future.” (Parker, 2009, p. 191). In this respect, Åstebro et al. (2014) also noted that “multiple measures and definitions across empirical studies have made it hard to pin down the precise bias that may be behind entrepreneurship”.

Third, existing field studies linking self-perceptions to entrepreneurial behavior typically used measures of overconfidence that are related to occupational choices and hence are prone to reverse causation problems. For example, the studies
by Koellinger and colleagues (2007, 2013) used data from the Global Entrepreneurship Monitor and asked respondents whether they believe they have sufficient skills to start and run a new company. In such a setting, individual beliefs may cause occupational choices, but occupational choices and experience may also cause changes in individual beliefs as a result of self-justification, learning-by-doing, or new information that becomes available over time (Szerb & Vörös, 2018).

Hence, establishing whether overconfidence drives excess market entry using field data is important. This current study attempts to address this research question by analyzing how a particular underresearched type of overconfidence, overprecision, and optimism are related to two aspects of the entrepreneurial process. First, we analyze entrepreneurial intention (Liñán & Chen, 2009) among students, to circumvent the potential danger of reverse causality between labor market status, and overconfidence and optimism. Students still need to choose their main occupation and effects of entrepreneurial experience on overconfidence or optimism are disregarded. In addition, we analyze how overconfidence and optimism are related to entrepreneurial orientation (Covin & Slevin, 1989) among small and medium-sized enterprise (SME) owners. The market position of a business (i.e., entrepreneurial orientation) plays a crucial role in competitiveness (Lee & Peterson, 2001), business performance (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2003; 2005), and business survival (Rauch, Wiklund, Lumpkin, & Frese, 2009) and is directly linked to the characteristics and behavior of the owner-manager in SMEs.

The main contribution of the present study is the empirical investigation into how overconfidence influences market entry (entrepreneurial intention) and market position (entrepreneurial orientation) using field data. Several studies argued that entrepreneurs are more prone to overconfidence than wage workers (Busenitz & Barney, 1997; Baron, 1998). However, existing field studies on entrepreneurial overconfidence focused only on a relatively specific control group, such as managers (Busenitz & Barney, 1997; Forbes, 2005), or have no control group (Wu & Knott, 2006). More importantly, because entrepreneurial experience may induce overconfidence (Busenitz & Barney, 1997; Forbes, 2005; Hsu, Wiklund, Cotton, 2017) it is difficult to conclude from these studies whether overconfidence is indeed a driver of (excess) business entry. Therefore, the present study investigates the effect of overconfidence on entrepreneurial intention among individuals that still must choose their main occupation to establish if overconfidence is related to entrepreneurial entry. Subsequently, the relationship between overconfidence and entrepreneurial orientation is analyzed among entrepreneurs to understand how overconfidence is related to the business’s market position.

Alongside, our study contributes to the literature by distinguishing the effect of overconfidence from the effect of optimism by analyzing validated measures for
both simultaneously. The present study distinguishes overconfidence (viz. overprecision) from optimism, in explaining entrepreneurial intention and entrepreneurial orientation. If the effects of overconfidence and optimism are distinct, this would clearly underscore Parker’s warning. However, if not, despite the theoretical distinction between the two concepts, it would indicate the practical (empirical) irrelevance of Parker’s advice. Moreover, Cooper et al. (1988) showed that it is empirically impossible to distinguish overestimation and overplacement (as types of overconfidence) from optimism, we attempt to show whether it is possible to empirically distinguish between overprecision and optimism. Hence, our study aims to show the extent to which it is possible and necessary to distinguish between overconfidence (overprecision) and optimism in (future) studies linking cognitive biases to the entrepreneurial process.

2.2. Theory and Hypotheses

The analysis of cognitive biases related to entrepreneurial decision making is an important research area (Åstebro, Herz, Nanda & Weber, 2014; Baron, 1998; Gorgievski & Stephan, 2016; Zhang & Cueto, 2017) and overconfidence is amongst the most studied biases (Busenitz & Barney, 1997; Forbes, 2005; Wu & Knott, 2006). Overconfidence can lead to individually suboptimal decisions. For example, overconfidence in stock investment reduces returns on investment (Barber & Odean, 2001), managerial overconfidence can generate distortions in corporate investment (Malmendier & Tate, 2005), and the trading volume in financial markets is higher than the rational equilibrium expectation due to the presence of overconfident traders (García, Sangiorgi, & Urosevic, 2007). However, overconfidence can also be a positive driver at the individual level. Although accurate judgment and the absence of overconfidence are signs of good mental health (Dunning & Story, 1991; Fu, Koutstaal, Fu, Poon, & Cleare, 2005), overconfidence can also increase ambition, morale, resolve, and persistence (Johnson & Fowler, 2011; Szerb &

---

1 Two other studies relate both overconfidence and optimism simultaneously to aspects of the entrepreneurial process. The working paper by Koudstaal et al. (2015) shows that entrepreneurs are more optimistic than managers and employees, but they find no difference between entrepreneurs and managers with regard to overconfidence (viz. overestimation). We note that their incentivized measure of overestimation (congruence between the number of correctly solved test questions and the number of forecasted correct questions is awarded with 100 euro) may have led to situations in which individuals purposely fail all test questions to correctly forecast 0 correct answers and to win 100 euro. Åstebro, Jeffrey and Adomdza (2007) study the role of optimism and overconfidence in perseverance of inventors after they got the advice to stop their activity. Their overconfidence measure relates to overplacement as it compares the participant’s estimate of being right to the group’s estimate of being right. They find that investors are more optimistic and overconfident than the general population, and that optimism is related to continue spending money (not time) after receiving advice to stop. Overconfidence is not related to continue spending time and money after receiving advice to stop.
Vörös, 2018). In addition, at the social level, a certain amount of overconfidence can provide positive information externalities (Bernardo & Welch, 2001).

Due to the differences in economic uncertainty and the type of authority faced by entrepreneurs compared to employees, two different mechanisms lead to a higher level of overconfidence among entrepreneurs (Forbes, 2005). The first mechanism assumes that overconfident individuals self-select into entrepreneurship. Those who are more susceptible to the use of bias and heuristics to make decisions may be more inclined to become entrepreneurs because these biases and heuristics can be effective and efficient guides to decision-making in highly uncertain and complex environments (Busenitz & Lau, 1996; Busenitz & Barney, 1997). This view implicitly implies that the source of overconfidence is in the individual and it is thought to be a personality trait that is not limited to one specific situation or point in time. The second mechanism assumes that the entrepreneurial environment itself triggers overconfidence. Entrepreneurs constantly face situations that tend to overload their information-processing capacities and that are characterized by high levels of uncertainty, novelty, emotion, and time pressure. Together, these factors may increase entrepreneurs’ susceptibility to a number of cognitive biases (Baron, 1998). Thus, overconfidence could be a function of the contextual factors encountered by entrepreneurs.

The first mechanism relates to the finding in experimental settings that overconfidence is related to market entry (Camerer & Lovallo, 1999). When subjects’ post-entry payoffs are based on their own abilities, individuals tend to overestimate their chances of relative success and enter more frequently than they should. The second mechanism underscores the importance of measuring overconfidence in field data before market entry, to analyze its effect on entrepreneurial entry. Measuring (over)confidence by asking individuals about whether they believe they have sufficient skills to start and run a new company after actual market entry as reported by Koellinger et al. (2007, 2013), makes it difficult to draw definite conclusions about the relationship between overconfidence and (excess) market entry, due to Baron’s (1998) argument as well as self-justification. Hence, to draw conclusions about whether overconfidence drives market entry, individuals should be followed throughout their working life, and overconfidence should be measured before and after actual entry.

To draw conclusions about the relation between overconfidence and entrepreneurship, distinguishing between types of overconfidence is important (Åstebro et al., 2014). Three subtypes of overconfidence exist: overestimation, overplacement, and overprecision, where overestimation refers to the “overestimation of one’s actual performance”, overplacement to the “overplacement of one’s performance relative to others”, and overprecision to the “excessive precision in one’s beliefs” (Moore & Healy, 2008). Overestimation is closely related to optimism, because optimists overestimate the probability of success (Parker, 2009; Sharot, 2011). Overplacement requires a direct comparison with a reference
group, but is often observationally equivalent to overestimation and optimism. For instance, Cooper et al. (1988) could not distinguish between them in a sample of entrepreneurs. Overestimation and overplacement (and optimism) both lead to positively biased perceptions about expected returns in entrepreneurship, so are therefore expected to be positively related to entrepreneurial entry (Åstebro et al., 2014).

Overprecision involves a somewhat different cognitive bias, corresponding to Parker’s (2009) conceptualization of overconfidence as underestimation of the degree of variation in possible outcomes. The effects of overprecision on entrepreneurship are underexplored (Åstebro et al., 2014). However, a positive relation with entrepreneurial entry may be expected. Overprecision may lead to positively biased perceptions about expected returns in entrepreneurship, but for a different reason than overestimation and overplacement. Overprecise individuals underestimate the variance in possible outcomes. The distribution in entrepreneurial income is known to be extremely skewed, with median returns far below the mean (Hamilton, 2000; Sorgner, Fritsch, & Kritikos, 2017). For occupational choice decisions, considering this strong left-skewness of the entrepreneurial income distribution is essential. Overprecision may lead to an overly strong focus on the mean of the income distribution and may hence lead to biased perceptions about the expected returns in entrepreneurship.

To circumvent the potential problem of examining an effect from the entrepreneurial context on entrepreneurship (Baron, 1998), in our empirical analysis we focused on a sample of individuals that still need to choose their main occupation to test whether overconfidence (overprecision) drives market entry. Specifically, we analyzed entrepreneurial intentions among students. Even though this analysis requires a trade off with not measuring actual entrepreneurial behavior, according to the theory of planned behavior (Ajzen, 1985) and several empirical studies (e.g. Krueger & Carsrud, 1993), actual (entrepreneurial) behavior is well predicted by (entrepreneurial) intentions (Kolvereid, 1996). For instance, a study by Kautonen, Van Gelderen, and Fink (2015) found a significant and positive relationship between intentions to start a business and actual activities aimed at starting a business. Hence, we analyzed entrepreneurial intention among students to test whether overconfidence (overprecision) drives market entry. Our first hypothesis is:

**Hypothesis 1.** Overconfidence (overprecision) is positively associated with entrepreneurial intentions among students.

Despite the fact that those susceptible to the use of biases and heuristics are expected to be more likely to become entrepreneurs because overconfidence may help to cope with highly uncertain and complex environments (Busenitz & Barney, 1997; Forbes, 2005), overconfidence remains a cognitive bias that distorts rational decision making. For example, it is associated with distortions in corporate investments (Malmendier & Tate, 2005) and investments in high-risk innovation
projects (Li & Tang, 2010; Tang, Li, & Yang, 2015). Upper echelon theory (Hambrick & Mason, 1984) describes how business outcomes, such as the market position of the business, are influenced by the background characteristics of the managerial team. In line with this theory, Simsek, Heavey, and Veiga (2010) found evidence that the personality of the chief executive officer (CEO) influences their firms' entrepreneurial orientation. Entrepreneurial orientation is the strategic position of a business in the market. The degree of entrepreneurial position in this strategy includes the level of proactivity (for instance, in attacking competitors), risk taking, and innovativeness (Covin & Slevin, 1989).

Engelen, Neumann and Schwens (2015) argued that overconfidence (overestimation) fosters entrepreneurial orientation, because overconfident CEOs may depart from established practices to pursue new opportunities as they feel in control of all current activities and believe that they are better than others in successfully completing challenging tasks (Hayward, Shepherd & Griffin, 2006). Nevertheless, the search for challenging tasks may also result in cognitive overload and goal conflict when the CEO sees new opportunities everywhere (Hmieleski & Baron, 2009). In addition, overconfidence may cause the CEO to commit resources very quickly which may adversely affect the business’ ability to exploit even more profitable opportunities. Specifically, overprecision may deteriorate the entrepreneur’s experimentation phase (Åstebro et al., 2014). Along the same vein, Herz, Schunk, and Zehnder (2014) stated that overprecision reduces the perceived value of exploring new ideas. In an experimental setting they found that overprecision was negatively related to experimentation and realized profits. Hence, some types of overconfidence may make individuals less fit for entrepreneurship.

Altogether, we hypothesize that overconfident (i.e. overprecise) entrepreneurs are more likely to exploit their current business strategy rather than explore alternative business opportunities. This lowers their entrepreneurial orientation, in particular their proactivity and innovativeness. All entrepreneurs in our sample operated in small and medium sized enterprises, and the link between personality and entrepreneurial orientation is likely to be even stronger for them than for entrepreneurs running large businesses. Hence, in line with upper echelon theory, our second hypothesis is:

**Hypothesis 2.** Overconfidence (overprecision) is negatively associated with entrepreneurial orientation among entrepreneurs.

### 2.3. Data and Methods

#### 2.3.1 Samples

For the purpose of the present study, scales for overconfidence and optimism were included in ongoing data collection efforts on entrepreneurship at our
institutions. Our first dataset contained data about students from Erasmus University Rotterdam in the Netherlands who were recruited from different faculties by various university recruitment systems, including the economics department, the psychology department, and one where students of all faculties could apply. Data were collected between May 2015 and April 2016. A total of 182 participating students filled in a questionnaire, but due to missing observations, our analyses were performed on 173 students. The average age of the Dutch students was approximately 21 years, and 55 percent were female.

Our second dataset contained data collected by Observatoire AMAROK2, partner of the Montpellier Business School in France. AMAROK runs a panel of small and medium enterprise (SME) owners to analyze the health of entrepreneurs. Measures for overconfidence and optimism were included in the survey that ran from the end of 2015 to the beginning of 2016. There are 287 individuals in the dataset, but due to missing observations, our analysis was performed with 253 SME owners. The average age of these SME owners was 50 years, and 21 percent were female.

2.3.2 Variables and Measures

**Dependent variables.** In the Dutch dataset, we measured entrepreneurial intentions with the 6-item scale introduced by Liñán and Chen (2009). The items on this scale can be answered on a 7-point Likert scale, and include “I am ready to do anything to be an entrepreneur”, “My professional goal is to become an entrepreneur”, “I will make every effort to start and run my own firm”, “I am determined to create a firm in the future”, “I have very seriously thought of starting a firm”, and “I have the firm intention to start a firm someday”. Cronbach’s alpha was .95, which indicates high internal reliability. Entrepreneurial orientation was measured in the French dataset using the French version of the 9-item scale of Covin and Slevin (1989), also measured on a 7-point Likert scale. Of these nine items, three items addressed innovativeness, three addressed proactiveness, and three addressed risk-taking. Cronbach’s alpha was .73, indicating that internal reliability was good.

**Overconfidence.** The overconfidence scale of Russo and Schoemaker (1989) was used in both the Dutch and French dataset. This scale measures overprecision and includes ten general knowledge items for which participants have to provide a lower and an upper bound such that they are 90 percent sure the correct answer falls within their interval. The items are “Martin Luther King’s age at death”, “Length of the Nile River”, “Number of countries that are members of OPEC”, “Number of books in the Old Testament”, “Diameter of the moon”, “Weight of an empty Boeing 747”, “Year in which Wolfgang Amadeus Mozart was born”, “Gestation period (in days) of an Asian elephant”, “Air distance from London to Tokyo”, and “Deepest

---

2 http://www.observatoire-amarok.net/en.
(known) point in the oceans”. The challenge is not to demonstrate general knowledge, but to be neither too narrow (overconfident) nor too wide (underconfident). The individual’s score for overconfidence equals the number of questions for which the true answer falls outside the indicated interval, minus one (the expected number of answers outside the interval).

**Optimism.** To measure optimism, both datasets included the Life Orientation Test-Revised (LOT-R) 10-item scale, which is measured on a 5-point Likert scale. The items are “In uncertain times, I usually expect the best”, “It’s easy for me to relax” (F), “If something can go wrong for me, it will” (R), “I’m always optimistic about my future”, “I enjoy my friends a lot” (F), “It’s important for me to keep busy” (F), “I hardly ever expect things to go my way” (R), “I don’t get upset too easily” (F), “I rarely count on good things happening to me” (R), and “Overall, I expect more good things to happen to me than bad”. The items indicated with (R) were reverse coded before inclusion. As usual, the fillers (F) in the LOT-R scale were not included in the final optimism measure. Cronbach’s alpha was .69 and .70 for the Dutch and French dataset, respectively, indicating that internal reliability is good and similar across the two datasets.

**Control variables.** Due to the well-documented relationship between entrepreneurship and age (Levesque & Minniti, 2006) and sex (Minniti & Nardone, 2007) and some indications exist that overconfidence is related to these variables (Bengtsson, Persson, & Willenhag, 2005; Bruine de Bruin, Parker, & Fischhoff, 2012), we controlled for age (in years) and sex (0 = female, 1 = male). We also controlled for education, measured as the average grade over the past year for the Dutch students and as the highest completed education level for the French SME owners, because of the relationship between entrepreneurship and education (Dickson et al., 2008) as well as between overconfidence and education (Bhandari & Deaves, 2006).

### 2.3.3 Analysis

The dependent variables in our analyses were continuous and hence we used Ordinary Least Squares (OLS) regression to test our hypotheses. For each dataset, two models were analyzed. In Model 1, only overconfidence was included as an explanatory variable in addition to the control variables. Model 2 included both overconfidence and optimism, to analyze the distinctness from optimism of the relationship between overconfidence and our dependent variables. To facilitate the comparison of effect sizes, all variables except sex were standardized before analysis.
2.4. Results

Tables 2.1 and 2.2 show the means, standard deviations (SDs), variance inflation factors (VIFs), and correlations of the main variables in our analysis of the Dutch and the French datasets, respectively. An unpaired two-sample t-test showed that the mean value for overconfidence in the French SME owners (7.08) was significantly higher (p < .001) than that of the Dutch students (5.73). A possible interpretation for this difference is that entrepreneurs are more overconfident than students, but factors like culture complicate the direct comparison of means across our two samples. The means for optimism were similar across the two datasets: 3.69 in the French dataset and 3.44 in the Dutch dataset, although a t-test on the difference provided a p-value less than .001. Among the independent variables, correlations ranged from -.17 to .21 for the Dutch dataset and from -.14 to .17 for the French dataset. Notably, the correlation between overconfidence and optimism was weakly negative (r = -.17, p < .05) in the Dutch dataset and insignificant (r = -.11) in the French dataset.

To check for multicollinearity, we examined the VIFs (see Table 2.1 and 2.2). The highest VIF is 1.10 in the Dutch dataset and 1.06 in the French dataset, indicating a low danger of multicollinearity (Diamantopoulos, Riefler, & Roth, 2008). We also controlled for common method bias (CMB) by applying Harman’s single-factor test. The rule of thumb is that a single unrotated principal component should not explain more than the threshold level of 50 percent of the variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) for all the indicators measured using the same method. Our results show an explained variance of 31.7 percent for the Dutch dataset and of 16.9 percent for the French dataset, indicating no danger of CMB issues.

Table 2.1. Descriptive statistics of the Dutch Dataset (N = 173). Mean, Standard Deviation (SD), Variance Inflation Factor (VIF), Correlations, and Cronbach’s Alpha (diagonal) are displayed.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>VIF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial Intention</td>
<td>3.28</td>
<td>1.55</td>
<td>0.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overconfidence</td>
<td>5.73</td>
<td>2.20</td>
<td>1.07</td>
<td>0.21**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimism</td>
<td>3.44</td>
<td>0.56</td>
<td>1.10</td>
<td>0.16*</td>
<td>-0.17*</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>20.64</td>
<td>2.02</td>
<td>1.05</td>
<td>0.15*</td>
<td>-0.01</td>
<td>0.05</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.45</td>
<td>0.50</td>
<td>1.02</td>
<td>-0.04</td>
<td>-0.11</td>
<td>0.01</td>
<td>0.07</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>6.89</td>
<td>0.84</td>
<td>1.10</td>
<td>-0.15*</td>
<td>-0.16*</td>
<td>0.12</td>
<td>0.10</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.
Table 2.2. Descriptive statistics of the French Dataset (N = 253). Mean, Standard Deviation (SD), Variance Inflation Factor (VIF), Correlations, and Cronbach’s Alpha (diagonal) are displayed.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>VIF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entrepreneurial Orientation</td>
<td>4.06</td>
<td>0.93</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Overconfidence</td>
<td>7.08</td>
<td>1.50</td>
<td>1.05</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Optimism</td>
<td>3.69</td>
<td>0.65</td>
<td>1.02</td>
<td>0.17**</td>
<td>-0.11</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Age</td>
<td>50.04</td>
<td>8.09</td>
<td>1.06</td>
<td>-0.10</td>
<td>-0.13*</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Gender</td>
<td>0.79</td>
<td>0.41</td>
<td>1.01</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>6. Education</td>
<td>3.79</td>
<td>1.18</td>
<td>1.04</td>
<td>-0.02</td>
<td>-0.11</td>
<td>0.02</td>
<td>-0.14*</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.

Table 2.3 shows the results of the regression analyses using the two datasets. Overconfidence was positively associated with entrepreneurial intentions among the Dutch students (Model 1). The coefficient in Model 1 indicates that a one SD increase in overconfidence was associated with an increase of 0.189 SD, on average, in entrepreneurial intention. The inclusion of optimism in Model 2 increases the coefficient of overconfidence (0.221). Optimism was also significantly positively associated with entrepreneurial intentions. A one SD increase in optimism was associated with a 0.208 SD increase in entrepreneurial intention, on average. These results provide statistical support for Hypothesis 1.

To alleviate concerns about possible confounding by individual risk preferences (Nosić & Weber, 2010) or having parents with entrepreneurial experience (Carr & Sequeira, 2007), we performed a robustness check by controlling for these factors in the model. We used the 8-item Brief Sensation Seeking Scale (BSSS) which uses a 5-point Likert scale (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). Cronbach’s alpha was .78. In Models 1 and 2, a positive and significant association between risk and entrepreneurial intention was found (β = 0.356, SE = 0.070, p < .001 and β = 0.326, SE = 0.071, p < .001 respectively). Nevertheless, the coefficients of overconfidence remained similar in size, magnitude and significance. The coefficient for optimism in Model 2 decreased to 0.129 (SE = 0.072, p = .075) and was only significant at the ten percent level. Hence, the effect of optimism in Table 2.3 was attributed to risk preferences in this extended model. However, our conclusion about Hypothesis 1 did not change when risk preferences were included in the model.

Using a t-test, we found that the average overconfidence level of students who grew up with at least one of their parents owning a firm (N = 57) did not significantly differ (p = .57) from the average of students who did not grow up with at least one parent owning a firm (N = 124). However, the mean of entrepreneurial intention was significantly (p < .05) higher for students with parents having their own firm (mean = 3.71, N = 57) than for students without that kind of parent (mean = 3.03, N = 124). Hence, we tested whether our main results changed when including a binary variable in the regression indicating whether at least one of the parents owns a
business. Although this binary variable was significantly associated with entrepreneurial intention in both Model 1 (β = 0.434, SE = 0.157, p < .01) and Model 2 (β = 0.378, SE = 0.156, p < .05), the coefficients for overconfidence and optimism were similar as in our main specification. That is, in Model 1, overconfidence was significantly associated with entrepreneurial intention (β = 0.201, SE = 0.073, p < .01) and in Model 2, both overconfidence and optimism were significantly associated with entrepreneurial intention (β = 0.228, SE = 0.073, p < .01 and β = 0.182, SE = 0.074, p < .05, respectively).

Also, 7.5 percent of the Dutch students (N = 13) indicated that they were in the process of starting or had stared a business at the time of measurement. After removing these individuals from the analysis sample, we found that the coefficients for overconfidence and optimism were similar in size and significance as in our main specification. In Model 1, overconfidence was significantly associated with entrepreneurial intention (β = 0.213, SE = 0.078, p < .01) and in Model 2, both overconfidence and optimism were significantly associated with entrepreneurial intention (β = 0.255, SE = 0.077, p < .01 and β = 0.228, SE = 0.078, p < .01, respectively). Hence, these findings were in line with our main results.
The analysis of entrepreneurial orientation in the French dataset provided a different picture. As shown in Model 1 of Table 2.3, we found that overconfidence was not significantly associated with entrepreneurial orientation. The coefficient for overconfidence barely changed after including optimism in Model 2, and hence, we concluded that overconfidence is not associated with the entrepreneurial orientation of SME owners. Accordingly, we did not find evidence supporting Hypothesis 2. However, optimism (Model 2) was significantly and positively associated with entrepreneurial orientation. A one SD increase in optimism was associated with a 0.166 SD increase in entrepreneurial orientation. Dropping overconfidence from this model, which resulted in a model with only optimism and the control variables, did not alter this result ($\beta = 0.142$, SE = 0.058, $p < .05$).

To further analyze these unexpected results, we included two additional control variables in our analysis. First, we amended Models 1 and 2 with firm size (number of employees including the entrepreneur), because the larger the business, the smaller the influence of the individual characteristics of the owner-manager on entrepreneurial orientation (upper echelon theory). Nevertheless, we found that neither firm size nor the interaction between firm size and overconfidence were
significantly associated with entrepreneurial orientation (p > .05). Secondly, we amended Models 1 and 2 with the number of years the owner-manager had been in leadership. According to Baron (1998), being in entrepreneurship may increase overconfidence, but this variable was neither significantly correlated with overconfidence (p > .05) nor with entrepreneurial orientation (p > .05). The interaction term with overconfidence was also not significant.

Table 2.4. OLS Regression Results: Coefficients with Standard Errors in Parentheses. Analysis of Subscales of Entrepreneurial Orientation.

<table>
<thead>
<tr>
<th></th>
<th>Innovation</th>
<th>Proactiveness</th>
<th>Risk Taking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(French entrepreneurs)</td>
<td>(French entrepreneurs)</td>
<td>(French entrepreneurs)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.201</td>
<td>0.057</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(0.137)</td>
<td>(0.133)</td>
<td>(0.139)</td>
</tr>
<tr>
<td>Overconfidence</td>
<td>-0.029</td>
<td>-0.114</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>(0.062)</td>
<td>(0.060)</td>
<td>(0.063)</td>
</tr>
<tr>
<td>Optimism</td>
<td>0.038</td>
<td>0.147*</td>
<td>0.177**</td>
</tr>
<tr>
<td></td>
<td>(0.063)</td>
<td>(0.061)</td>
<td>(0.063)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.004</td>
<td>-0.170*</td>
<td>-0.076</td>
</tr>
<tr>
<td></td>
<td>(0.067)</td>
<td>(0.065)</td>
<td>(0.068)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.245</td>
<td>0.017</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
<td>(0.149)</td>
<td>(0.156)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.034</td>
<td>-0.072</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>(0.064)</td>
<td>(0.062)</td>
<td>(0.065)</td>
</tr>
<tr>
<td>F-value</td>
<td>0.719</td>
<td>2.364</td>
<td>0.661</td>
</tr>
<tr>
<td>p-value</td>
<td>0.579</td>
<td>0.054</td>
<td>0.619</td>
</tr>
<tr>
<td>R-squared (adj.)</td>
<td>-0.004</td>
<td>0.021</td>
<td>-0.005</td>
</tr>
<tr>
<td>N</td>
<td>253</td>
<td>253</td>
<td>253</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.

Additionally, we analyzed the three subscales (innovation, proactiveness, and risk-taking) of entrepreneurial orientation separately. Table 2.4 shows that for none of the subscales was there a significant association with overconfidence. The results indicated that the significant association between optimism and entrepreneurial orientation (overall) was primarily present in the proactiveness and risk-taking subscales. Overall, we did not find evidence to support Hypothesis 2.

2.5. Discussion

The present study shows that, using field data, overconfidence is positively associated with the intention to enter entrepreneurship but it is not associated with the market position of the business (i.e., entrepreneurial orientation). The positive association between overconfidence (i.e. overprecision) and entrepreneurial intention in the Dutch students provides evidence for the argument that market entry
may result from overconfidence in future entrepreneurial success (Roll, 1986; Cooper et al., 1988; Wu & Knott, 2006). No significant association was found between overprecision and entrepreneurial orientation among French SME owners, and this was confirmed using several robustness checks. A possible explanation for this null finding, is that overprecision may influence SME owners to depart from established practices to pursue new opportunities which increases entrepreneurial orientation (Engelen et al., 2015). This effect of overconfidence has been linked to overestimation rather than overprecision, but it may nevertheless negate the expected negative association between overprecision and entrepreneurial orientation (Åstebro et al., 2014; Herz et al., 2014).

Together, our results suggest that overconfidence (overprecision) may encourage people to enter entrepreneurship, but does not influence people to develop a particular entrepreneurial orientation in the market. Hence, whereas the overconfident individuals are most likely to enter entrepreneurship, the low average financial returns in entrepreneurship and chances of business failure seem to be the result of an overcrowded market rather than a group of relatively poorly performing overconfident entrepreneurs. In addition, the results showed that overconfidence and optimism play different roles in the entrepreneurial process. First, the correlation between overprecision and optimism was significantly negative among Dutch students and insignificant among French SME owners. Secondly, in our multivariate models, overconfidence was only significantly associated with entrepreneurial intention, whereas optimism was associated with both entrepreneurial intention and entrepreneurial orientation. These findings fit with the results of Åstebro et al. (2007) who found that, among investors, overconfidence was not related to continuing spending time and money after receiving advice to stop, whereas optimism was related to continuing spending money (not time) after receiving this advice. The results for optimism are in line with earlier research showing that students with the intention of starting their own business are more optimistic than students without such an intention (Macko & Tyszka, 2009) and that positive orientation (optimism is one of the components of this construct) is positively related to entrepreneurs’ striving to achieve particular goals (Laguna, Alessandri & Caprara, 2016).

Therefore, the hypothesis that too many people become entrepreneurs because of overconfidence seems to only partially explain the relatively low financial returns in entrepreneurship as well as the high failure rates. Our results indeed suggest that overconfidence regarding entrepreneurship starts at the phase of expressing intention to enter an entrepreneurial career. However, entrepreneurial overconfidence does not express itself in the market position of the business. An alternative explanation could be that overconfident entrepreneurs are eliminated from the market quickly after market entry. However, the descriptive statistics in Tables 2.1 and 2.2 showed that the French entrepreneurs scored significantly higher in overconfidence than the Dutch students. Assuming no difference in the level of
overconfidence between Dutch and French citizens in general, this suggests that the French entrepreneurs score high on overconfidence but they nevertheless do not have a certain market position (i.e., entrepreneurial orientation) because of their overconfidence. Hence, overconfident persons select themselves into entrepreneurship, but do not have a greater proclivity toward a certain market position that could eventually lead to success. As such, overconfidence should be regarded primarily as a driver of excess market entry and not as a driver of lower entrepreneurial orientation. Thus, an overcrowded market rather than a group of relatively poorly performing overconfident entrepreneurs seems to drive the low financial returns and failure rates.

The overcrowded market explanation preempts policies targeted at reducing the overconfidence of a particular individual entrepreneur, because an overcrowded market is not necessarily bad for society. Economists maintain that the crucial role of entrepreneurs in the economy is to absorb uncertainty and to contribute to the accumulation of human capital (Audretsch, 1995). New business prospects are always highly uncertain, in particular if the business is set up around a novel product, service, market, or production method. This uncertainty will result in failures because, for instance, entrepreneurs overestimate their own ability to manage, underestimate the characteristics of competing products, or misinterpret market sentiments. High levels of business births, deaths, expansions, and contractions may thus lead to significant learning processes by improving the capabilities of the workforce from which entrepreneurs typically originate (Metcalfe, 1997).

2.6. Conclusion

The present study analyzed how a particular type of overconfidence (overprecision) and optimism are related to two important aspects of the entrepreneurial process: intention and orientation. Using newly collected field data, we showed that overconfidence and optimism play distinct roles in entrepreneurship. Overconfidence selects people into entrepreneurship but does not place entrepreneurs in a particular position regarding entrepreneurial orientation. Hence, we found only partial evidence for the suggestion that overconfidence drives excess market entry, because the entry of many entrepreneurs in the market also positively impacts competition and learning. Optimism, on the contrary, drives individuals into entrepreneurship and is related to the market position entrepreneurs have, in particular with respect to proactiveness and risk taking. The clearly different roles that overconfidence and optimism play in the entrepreneurial process and the fact that optimism and overconfidence were negatively correlated in our samples, means that the two are indeed distinct phenomena. Hence, Parker’s warning that overconfidence and optimism should not be conflated is not only warranted from a theoretical but also from a practical point of view. Overconfidence (overprecision)
and optimism should be treated as distinct constructs in studies investigating their consequences.

The present study does not come without limitations, which can also be considered as directions for future research. First, the present study focused on overprecision, which is a specific underresearched type of overconfidence, and optimism. A more encompassing study could analyze overprecision and optimism in conjunction with overestimation and overplacement. Moreover, whereas our study employed general measures for overconfidence and optimism, future studies may want to use domain-specific measures such as overconfidence in entrepreneurial skills. The latter measures may be more directly associated with particular aspects of the entrepreneurial process than general measures. Second, we believe that future studies will benefit from linking types of overconfidence to a more diverse set of aspects of the entrepreneurial process. In particular, the link between overconfidence and entrepreneurial performances deserves research attention. A key aspect may be exit from entrepreneurship, an event that may ultimately be expected to occur due to overconfidence in line with Hypotheses 2. Finally, our samples were cross-sectional in nature. If longitudinal data would have been available, then changes in overconfidence and optimism could have been linked to changes in relevant aspects of the entrepreneurial process. In the present study, we proxied the time dimension by investigating the relation between overconfidence and entrepreneurial intention among Dutch students, and the relation between overconfidence and entrepreneurial orientation among French entrepreneurs. Future studies could collect longitudinal data originating from one country to further investigate the revealed associations in the present study.
3. The Role of Affect in Entrepreneurial Orientation

Indy Bernoster
Jinia Mukerjee
Roy Thurik

Abstract. Although the literature on affect (i.e. the extent to which an individual subjectively experiences feelings and emotions) is burgeoning in the general field of entrepreneurship, it has not received sufficient attention with respect to an important antecedent to entrepreneurial success – entrepreneurial orientation. In the present paper, we investigate the role of both positive and negative affect in entrepreneurial orientation (i.e. the strategic posture of a firm or individual with respect to innovativeness, proactiveness, and risk taking) and entrepreneurial success. The results of our analysis, based on two samples (337 Dutch sole proprietors and 254 French small business owners), show that positive affect is positively associated to entrepreneurial orientation, while negative affect is negatively associated to entrepreneurial orientation for sole proprietors. With respect to entrepreneurial success, results are mixed. The present study does not only contribute to the understanding of the role of affect in entrepreneurial orientation, but also to that of entrepreneurial success, the ultimate objective in the field of entrepreneurship.
3.1. Introduction

An appropriate strategy leads to high firm performance (Hitt, Bierman, Shimizu, & Kochlar, 2001; Mills & Bourne, 2002). Not only large firms but also the small ones, and even sole proprietors (entrepreneurs without employees) can benefit from an appropriate strategic posture. Indeed, research shows that an entrepreneurial strategic posture, or an entrepreneurial orientation, is positively associated with small business success (Khedhaouria, Gurău, & Torrèes, 2015; Rauch, Wiklund, Lumpkin, & Frese, 2009; Wiklund & Shepherd, 2005). For instance, an entrepreneurial strategic posture can lead to enhanced positive association between knowledge-based resources and small business performance (Wiklund & Shepherd, 2003) and effective corporate entrepreneurship (Dess & Lumpkin, 2005).

Entrepreneurial orientation is an important antecedent to entrepreneurial success (Rauch et al., 2009; Wiklund & Shepherd, 2005) which is the ultimate goal of entrepreneurship. Knowledge about the strategic posture and its drivers could lead to better evaluation of future success; it could also enable individuals to make well-informed choices about being an entrepreneur on the first place. Firm-level innovation (Avlonitis & Salavou, 2007), as well as individual-level concepts like self-evaluation (Simsek, Heavey, & Veiga, 2010), CEO narcissism (Chatterjee & Hambrick, 2007), and overconfidence (Engelen, Neumann, & Schwens, 2015) have been identified in the literature as drivers for entrepreneurial orientation.

Although these drivers provide insightful understanding of entrepreneurial orientation, the general state of knowledge on entrepreneurial orientation could benefit from identifying more drivers that explain this important concept. Therefore, our study takes research on entrepreneurial orientation a step further and investigates whether affect, a well-known psychological measure for feelings and emotions, plays a role in entrepreneurial orientation.

There are two reasons to conjecture that affect is relevant for entrepreneurial orientation. First, several scholars have pointed out that investigating the role of affect in entrepreneurship is important (Delgado García, Quevedo Puente, & Blanco Mazagatos, 2015; Hahn, Frese, Binnewies, & Schmitt, 2012). For example, Hahn et al. (2012) mention that although entrepreneurs experience extreme emotions in their work-life, “affect is a neglected concept in entrepreneurship research, and scholars are urged to pay more attention to the role of affect in the entrepreneurial process (Baron, 2008)” (p. 99). Similarly, Baron (2008) characterizes entrepreneurial environments as highly unpredictable and rapidly changing and states that affect “most likely exert powerful effects on cognition and behavior”, which could lead to specific actions or decisions. Further, the meta-analysis of Delgado García et al. (2015) shows that there is considerable evidence that affect is associated with a wide range of issues in managing an entrepreneurial venture and plays an important role in several aspects of entrepreneurship, such as self-efficacy, task performance,
negotiation, conflict (Baron, 1990), venture effort (Foo, Uy, & Baron, 2009), opportunity evaluation and exploitation (Grichnik, Smeja, & Welpe, 2010). However, while it has been suggested that affect may influence the different stages of the entrepreneurial process, which could in turn impact entrepreneurial success, there exist no empirical studies associating affect to entrepreneurial orientation, an important stage in the entrepreneurial process (Delgado García et al., 2015).

Second, affect is associated with the three dimensions of entrepreneurial orientation: innovativeness, proactiveness, and risk taking. For instance, affect has been associated with innovation in business (Baron & Tang, 2011; Rutherford & Holt, 2007) as it enhances creativity, which in turn has a positive effect on firm-level innovation. Also, happy individuals work actively towards new goals (Lyubomirsky, King, & Diener, 2005), which means that individuals with higher positive affect has a proactive work attitude. Induced positive affect has also been shown to lead to higher risk taking when stakes are high (Isen & Geva, 1987). Moreover, Baron’s (2008) theoretical work notes that affect has a strong effect on decision making and judgements, which play a key role in the formation of strategy. Thus, it seems that affect could be relevant for entrepreneurial orientation.

With the aim to addresses this affect-entrepreneurial orientation gap in the literature, the present study takes into account both (orthogonal) dimensions of affect, i.e. positive and negative, and the two variants of entrepreneurial orientation (i.e. the original firm-level variant and the individual-level variant). It additionally aims to distinguish between the dimensions of entrepreneurial orientation: innovativeness, proactiveness, and risk taking. Since entrepreneurial success is vital to entrepreneurship, we also aim to analyze the role of affect and entrepreneurial orientation in entrepreneurial success. To summarize, the importance of the two main concepts that we investigate – affect and entrepreneurial orientation, the suspicion in the literature that they could be associated (Baron, 2008; Delgado García et al., 2015; Hahn et al., 2012), and the absence of any empirical investigation in this regard highlights the importance of the present study. The awareness and knowledge of a possible association between affect and entrepreneurial orientation is important because strategy ultimately determines entrepreneurial success.

For our empirical study, we use three samples: one consisting of 337 Dutch sole proprietors and the other consisting of 254 French small business owners. We analyze the affect-entrepreneurial orientation gap further with a sample of 177 Dutch students. However, since students have no or little experience with entrepreneurship, we present the results of this sample in Appendix A. Our results show that positive affect is positively associated with entrepreneurial orientation. Negative affect is negatively associated with entrepreneurial orientation, but for sole proprietors only. However, the positive associations are stronger than the negative associations. Our results further indicate that the associations are mainly visible for the innovativeness dimension. With respect to entrepreneurial success, our results show that positive affect is positively associated to entrepreneurial success, while
negative affect is negatively associated to success. This latter finding is more evident for the sole proprietors than for the business owners.

The present paper contributes to the literature in several ways. First, it contributes to our knowledge of the entrepreneurial profile (Gartner, 1990) by exploring the role of affect in entrepreneurial orientation and thereby fills the (empirical) affect-entrepreneurial orientation gap. We address this gap in several ways. First, we explore multiple measures and dimensions of entrepreneurial orientation. That is, we investigate the role of affect in both firm entrepreneurial orientation and individual entrepreneurial orientation. Second, we analyze all three dimensions of entrepreneurial orientation, i.e. innovativeness, proactiveness, and risk taking. Third, we analyze the affect-entrepreneurial orientation association in three different sample (two presented in the main text and one in Appendix A).

Second, the present paper contributes to our knowledge of entrepreneurial success by analyzing the role of affect and entrepreneurial orientation in entrepreneurial success, in two samples. Although the investigation of entrepreneurial success is an additional goal, our results also contribute to the existing knowledge of the affect-entrepreneurial success association (Baron, 1990; Baron et al., 2011; Lyubomirsky et al., 2005) and the entrepreneurial orientation-success association (Khedhaouria et al., 2015; Rauch et al., 2009; Wiklund & Shepherd, 2005).

Third, the present paper contributes to the field of psychology by taking into account that positive and negative affect are unipolar, and hence they both need to be investigated. Studies analyzing affect and entrepreneurial outcomes tend to neglect this unipolarity as they investigate either positive affect (Baron & Tang, 2011; Baron, Tang, & Hmieleski, 2011; Delgado García et al., 2015, p. 203; Foo, Uy, & Baron, 2009) or negative affect (Doern & Goss, 2014; Shepherd, Patzelt, & Wolfe, 2011). However, positive and negative affect are orthogonal dimensions and should be treated as separate concepts (Watson, Clark, & Tellegen, 1988). In other words, a positive association between positive affect and an entrepreneurial outcome does not imply a similar, but negative association between negative affect and the same entrepreneurial outcome. By showing that the roles of positive affect and negative affect differ – not only in sign, but also in magnitude – we demonstrate that ignorance of this orthogonality does not provide the full picture.

Fourth, from a practical point of view, the present paper is important because it gives entrepreneurs insight in their strategic posture, which could partly determine their entrepreneurial success. Knowledge and awareness of a possible association between one’s feeling and emotions, i.e. affect, and one’s strategic posture, i.e. entrepreneurial orientation, could provide insights on the ultimate entrepreneurial success (as orientation leads to success (Rauch et al., 2009)) and lead to a more deliberate choice of entering entrepreneurship on the first place. This would help select successful entrepreneurs such that less entrepreneurial failures occur.
The rest of the paper is organized as follows. First, we provide an overview of the principle variables under examination – affect and entrepreneurial orientation – and delineate the relationship between the two in order to justify our hypotheses. Then, we present our research method and our empirical results. We conclude by discussing our results and its limitations and suggesting future research directions.

3.2. Literature Review

The present section explains the concept of affect, entrepreneurial orientation, and entrepreneurial success and gives an overview of the current literature with respect to the association between these concepts. It also motivates our two hypotheses as well as the general aims of the present paper. Figure 3.1 summarizes our research set-up. Unlike many other papers, we have used bidirectional arrows (i.e. from affect to entrepreneurial orientation and from entrepreneurial orientation to affect) to clarify that we do not claim causality. As Lyubomirsky et al. (2005) mentioned “success leads to happy people, but happiness, often characterized by high positive affect, leads to success” (p. 803). We hold a similar view for affect and entrepreneurial orientation, i.e. feelings and emotions could lead to a certain strategic posture, but similarly, a particular strategic posture could lead to success and thus (eventually) lead to certain feelings and emotions. Hence, we use the word ‘association’ throughout the paper to highlight these bidirectional arrows.

In the figure, the bold font indicate our main aim of filling the (empirical) affect-entrepreneurial orientation gap, while the non-bold font identifies our additional aims, i.e. investigating the role of affect in the different dimensions of entrepreneurial orientation, and, the role of affect and entrepreneurial orientation in entrepreneurial success.

![Diagram](image)

Figure 3.1. Our main model and hypotheses (in bold) and our additional aims (in non-bold).
3.2.1 Affect

Affect is the extent to which someone subjectively experiences positive or negative feelings and emotions, resulting in positive or negative affect (Watson et al., 1988). High positive affect is associated with “high energy, full concentration, and pleasurable engagement”, whereas low positive affect is associated with “sadness and lethargy” (Watson et al., 1988, p. 1063). On the other hand, high negative affect is associated with “anger, contempt, disgust, guilt, fear, and nervousness”, while low negative affect is associated with “calmness and serenity” (Watson et al., 1988, p. 1063). Affect can be defined over various time frames. Feelings and emotions experienced in general is referred to as trait affect, while feelings and emotions experienced at this moment is referred to as state affect. Watson et al. (1988) developed a reliable, valid, and efficient scale for measuring positive and negative affect while taking the various time frames into account: the Positive and Negative Affects Scale (PANAS). The reliability of the PANAS was tested over a period of two months and proven to be high, independent of the chosen time frame.

Many studies associating affect to entrepreneurship focus on either positive or negative affect (Delgado García et al., 2015). However, positive affect and negative affect are independent concepts (Watson et al., 1988). Hence, investigating one of them does not imply the result for the other. In other words, a positive association between positive affect and an outcome measure does not imply a similar but negative association between negative affect and the same outcome measure. Therefore, in the present study, we focus on both positive affect and negative affect and treat them as separate concepts.

3.2.2 Entrepreneurial Orientation

Different types of strategic postures or orientations exist, such as entrepreneurial orientation and market orientation (Boso, Story, & Cadogan, 2013). Covin and Slevin (1989) define strategic posture as “a firm’s overall competitive orientation” (p. 77). In the present paper, we focus on entrepreneurial orientation which can be defined as “the strategy making processes that provide organizations with a basis for entrepreneurial decisions and actions” (Rauch et al., 2009, p. 763). In other words, entrepreneurial orientation indicates the degree of entrepreneurship in a firm’s strategic posture (Lumpkin & Dess, 1996). Entrepreneurial orientation can be captured by three dimensions: innovativeness, proactiveness, and risk taking (Miller, 1983). However, the scale for measuring entrepreneurial orientation (Covin & Slevin, 1989) is unidimensional with a high factorial validity such that it is also appropriate to combine all three dimensions in a single scale.

Entrepreneurial orientation is usually measured at the firm-level. Besides firm entrepreneurial orientation, another type of entrepreneurial orientation exists:
individual entrepreneurial orientation (Langkamp Bolton & Lane, 2012). The upper echelon theory claims that organizational outcomes are predicted by managerial characteristics (Hambrick & Mason, 1984). Thus, not only firm-specific traits, but also individual-specific traits eventually lead to firm decisions. Hence, for sole proprietors, individual entrepreneurial orientation is now deemed an appropriate concept.

Entrepreneurial orientation has an impact on entrepreneurial success (Khedhaouria et al., 2015; Rauch et al., 2009; Wiklund, Patzelt, & Shepherd, 2009; Wiklund & Shepherd, 2003; 2005). For this reason, one of the aims of entrepreneurship literature is to investigate its drivers, of which several have been identified. For instance, Khedhaouria et al. (2015) mentions creativity, while Avlonitis and Salavou’s (2007) study of SME owners shows a clear association between innovation and entrepreneurial orientation. Simsek et al.’s (2010) work shows that CEOs personality reflecting higher core self-evaluations have a stronger positive influence on the firms’ entrepreneurial orientation, especially for firms facing dynamic (instead of stable) environments. Similarly, Chatterjee and Hambrick (2007) found CEO narcissism to play a role in both strategic posture and firm performance. Overconfidence of CEOs have also been shown to play a role in firm’s entrepreneurial orientation (Engelen et al., 2015), since such CEOs feel more in control, consider themselves to be better than others in successfully completing challenging tasks, and are more likely to depart from established practices to pursue new opportunities (Hayward, Shepherd, & Griffin, 2006). Since entrepreneurial orientation is considered to be an important concept in entrepreneurship literature and different scholars have hinted that affect could play a role in entrepreneurial orientation (Baron, 2008; Delgado García et al., 2015; Hahn et al., 2012), the present paper explores the nature of this concept by investigating the role that affect plays in entrepreneurial orientation.

3.2.3 Affect and Entrepreneurship

Scholars have recently pointed out the importance of investigating the role of affect in entrepreneurship (Delgado García et al., 2015; Hahn et al., 2012). The recent and rapid development of the affect-entrepreneurship literature has yielded several results. For instance, Baron’s (2008) theoretical framework indicates the important role played by positive and negative affect in entrepreneurship via opportunity recognition, acquisition of financial and human resources, development of broad social networks, capacity to respond effectively to highly dynamic environments, and tolerance for intense levels of stress. Baron’s work serves as an excellent starting point for further research. For instance, affect has been associated with innovation in the business (Baron & Tang, 2011; Baron et al., 2011; Rutherford & Holt, 2007); affect has also been associated to the level of effort, personal initiative and persistence, propensity to continue investments in an underperforming
project, the types of goals set (Delgado García, Rodrigues-Escudero, & Martin-Cruz, 2012), performance and attitude (Baron, 1990), and creativity (Isen, Daubman, & Nowicki, 1987). However, we seem to be lacking in work that focuses on affect and entrepreneurial orientation.

Furthermore, most studies investigating the role of affect in entrepreneurship focus on either positive or negative affect. For instance, positive affect has been found to be positively associated with firm performance (Baron et al., 2011), attitude (Baron, 1990), and individual innovativeness in mid-sized organizations (Baron & Tang, 2011; Rutherford & Holt, 2007). What seems surprising though is that none of the above-mentioned studies take negative affect into account. Studies that investigate negative emotions have shown that it plays a role in moving forward after project failure (Shepherd et al., 2011) or in social processes of entrepreneurship (Doern & Goss, 2014). However, these latter studies do not take positive affect into account.

Studies that have investigated both the bright and dark side of feelings and emotions, have used concepts like passion (Cardon & Kirk, 2015), affective well-being (Hahn et al., 2012), and emotion (Brundin & Gustafsson, 2013; Grichnik, Smeja, & Welpe, 2010) instead of affect. Studies that investigate the role of both positive and negative affect in entrepreneurship are scarce. As mentioned earlier, Baron’s (2008) conceptual paper indicated that both positive and negative affect influences the entrepreneurial process. Foo et al.’s (2009) empirical work showed that both positive and negative affect positively influences venture effort, while negative affect is only related to the immediately required effort for the venture. Positive and negative affect have also been empirically shown to be associated with positive orientation towards personal goal realization (consisting of the subscales self-esteem, life satisfaction, and optimism) in entrepreneurs (Laguna, Alessandri, & Caprara 2016).

Thus, although affect, a prominent psychological construct (Watson et al., 1988) seems to be playing an important role in entrepreneurship (Baron, 2008; Delgado García et al., 2015; Hahn et al., 2012), we are not aware of any empirical study that has investigated the role of affect in entrepreneurial orientation.

Summarizing the extant literature reviewed above, we can conclude that positive affect positively influences (firm-specific) characteristics such as the entrepreneurial process (Baron, 2008) and innovation (Baron & Tang, 2011; Rutherford & Holt, 2007), which are positively associated to entrepreneurial orientation (Avlonitis & Salavou, 2007), and personal goal orientation (Laguna et al., 2016); while negative affect negatively influences the entrepreneurial process (Baron, 2008) and personal goal orientation (Laguna et al., 2016). However, it is not clear whether and how affect is associated to entrepreneurial orientation (Rauch et al., 2009, Wiklund et al., 2009; Wiklund & Shepherd, 2005). Therefore, in the present paper we aim to investigate the direct link between affect and entrepreneurial orientation in order to supplement the indirect and scattered
evidence that this link may exist. Based on the indications of prior studies, we expect a positive association between positive affect and entrepreneurial orientation and a negative association between negative affect and entrepreneurial orientation. Hence, we hypothesize:

**Hypothesis 1.** Positive affect is positively associated with entrepreneurial orientation.

**Hypothesis 2.** Negative affect is negatively associated with entrepreneurial orientation.

### 3.2.4 Additional Test

To obtain a deeper understanding of the role of affect in entrepreneurial orientation, we distinguish its role on the three dimensions of entrepreneurial orientation, i.e. innovativeness, proactiveness, and risk taking. It is possible that the association between affect and entrepreneurial orientation is driven by one of these dimensions. That is, there is stronger evidence in the literature of the association between affect and innovativeness or risk taking than between affect and proactiveness (Mittal & Ross Jr, 1998; Rutherford & Holt, 2007). For instance, positive affect was found to be associated with individual innovativeness in the field of corporate entrepreneurship using a sample of mid-sized organizations (Rutherford & Holt, 2007), and with firm-level innovation (Baron & Tang, 2011). Further, Isen and Geva (1987) showed that induced positive affect leads to higher risk taking when stakes were high, but to being more risk prone when stakes were low, while Mittal and Ross Jr (1998) showed that MBA students with a positive mood, (as compared to those with negative mood), displayed lower levels of risk taking. Positive affect has been shown to induce active work attitude towards new goals, the latter being similar to a proactive attitude (Lyubomirsky et al., 2005). Due to the possibility of different associations per dimension of entrepreneurial orientation, we also tested our Hypothesis 1 and 2 for each of these dimensions.

We have also enriched our main model by including entrepreneurial success (see Figure 3.1). This model has two additional goals. It helps us to analyze the role of affect in entrepreneurial success; it also allows us to analyze the role of entrepreneurial orientation in entrepreneurial success. Several studies serve as a rationale for investigating these associations. For instance, with respect to the affect-entrepreneurial success association, studies show that (environmentally induced) dispositional positive affect is positively associated with firm performance (Baron, 1990), but after a certain point, higher dispositional positive affect could lead to a decline in firm performance (Baron et al., 2011). Further, positive affect has been associated to several dimensions of the Big Five, which in turn impact entrepreneurial success. Specifically, positive affect is associated with extraversion (Shiota, Keltner, & John, 2006), while negative affect is associated with neuroticism (Costa & McCrae, 1980). This is confirmed by Gutiérrez, Jiménez, Hernández, and
Penacoba Puente (2005). Besides, Roccas, Sagiv, Schwartz, and Knafo (2002) mention that positive affect is associated with openness to experience and conscientiousness. Additionally, conscientiousness, openness to experience, and extraversion are positively associated with entrepreneurial performance, while neuroticism negatively associated with entrepreneurial performance (Brandstätter, 2011). Hence, as positive affect is associated with conscientiousness, openness to experience, and extraversion, and since these are associated with entrepreneurial performance, positive affect may also impact entrepreneurial performance. A same reasoning holds for negative affect and entrepreneurial success: negative affect is associated with neuroticism which has a negative impact on entrepreneurial performance. Thus it may be possible that negative affect has a negative impact on entrepreneurial performance.

With respect to the entrepreneurial orientation-entrepreneurial success association, Wiklund et al.’s (2009) model has linked entrepreneurial orientation and success, and several scholars have pointed to evidence for this association (Chatterjee & Hambrick, 2007; Khedhaouria et al., 2015; Rauch et al., 2009; Wiklund & Shepherd, 2005). For instance, Khedhaouria et al., (2015) show that self-efficacy and entrepreneurial orientation are positively and directly associated to firm performance, while creativity is positively associated to firm performance indirectly through entrepreneurial orientation. Further, Kreiser, Marion, Kuratko, and Weaver (2013) found that different dimensions of entrepreneurial orientation have a difference impact on SME performance. Where innovativeness and proactiveness display a positive U-shape relation with SME performance, risk taking displays a negative U-shape relation.

Together with our two main hypotheses, the associations between affect/entrepreneurial orientation and entrepreneurial success suggest the possibility that entrepreneurial orientation could play an indirect or mediating role in the association between affect and entrepreneurial success. Therefore, we also intent to investigate this mediation, which would contribute to our existing knowledge of entrepreneurial success. However, investigation of the association between affect and entrepreneurial success remains our secondary goal, as the main focus of our paper is to fill the affect-entrepreneurial orientation gap in the extant literature. We believe that such a focus is justified as it has not been done yet (compared to some evidence that already exist regarding the role of affect in entrepreneurial success (Baron, 1990; Baron et al., 2011). Additionally, since entrepreneurial success is an immensely broad construct and latent in nature, it is hard to validate measures for entrepreneurial success. For this reason, our measure of entrepreneurial success is not validated. Therefore, our main focus is on entrepreneurial orientation for which we use validated measures.
3.3. Method

To investigate the association between affect and entrepreneurial orientation, we used two samples: Panteia and AMAROK. The present section discusses each sample and their measures and presents the analysis that we performed on these samples.

3.3.1 Panteia

The Panteia sample consisted of 851 Dutch sole proprietors. However, for this study, our sample consists of 337 sole proprietors. Panteia\(^3\) used to be one of the largest market and policy research institutes in the Netherlands, maintaining a nationally representative panel of Dutch sole proprietors. The data was collected between December 2014 and January 2015\(^4\); however, the data on entrepreneurial orientation was collected in 2013. The fact that our data on entrepreneurial orientation was collected a year before the data on affect does not affect the credibility of our results, because we looked at trait affect which is considered to be stable over time (Watson et al., 1988). The average age of the final 337 sole proprietors was 53 years and 69 percent of them are male. Majority of them had obtained a university or higher education degree (58 percent), followed by those with secondary vocational education (21 percent).

Variables and Measures

**Entrepreneurial Orientation.** Sole proprietors fully represent their own business. To measure entrepreneurial orientation amongst sole proprietors, it is appropriate to use an individual-level scale since it is hard to discriminate between individual and firm entrepreneurial orientation (since the sole proprietors’ individual strategy matches that of the firm, given they solely decide). Hence, we used the individual entrepreneurial orientation scale of Langkamp Bolton and Lane (2012) that was especially developed for the purpose of measuring entrepreneurial orientation in individuals solely responsible for the firm’s strategic posture. Similar to the regular firm entrepreneurial orientation scale of Covin and Slevin (1989), this individual entrepreneurial orientation scale consists of three dimensions: innovativeness, proactiveness, and risk taking. In total, ten items – four for innovativeness, three for proactiveness, and three for risk taking – were rated on a five-point Likert scale. Sample items for each category were “I often like to try new and unusual activities that are not typical but not necessarily risky.”, “I usually act

---

3  http://www.panteia.nl/
4  An e-mail with a link to a questionnaire was sent to 2,498 registered e-mail addresses of the panel. In total three reminders were sent, ultimately resulting in responses of 851 sole proprietors and hence a response rate of 34.1 percent.
in anticipation of future problems, needs or changes.”, and “I like to take bold action by venturing into the unknown.”, respectively. Cronbach’s alpha is equal to .81 indicating a good reliability for this scale.

**Affect.** To measure positive and negative affect, a Dutch version of the PANAS (Watson et al., 1988) was used. The PANAS consists of twenty items: ten for positive affect and ten for negative affect. An item is basically a single word indicating a certain feeling or emotion, such as ‘inspired’ for positive affect and ‘afraid’ for negative affect. Prior to this word, the PANAS instructs participants to indicate how often they feel this particular way. The PANAS can be framed with various temporal perspectives, such as ‘at this moment’, ‘over the past few days’, and ‘in general’. As we investigated a stable concept, i.e. entrepreneurial orientation, we focused on trait affect and thus framed the instructions of the PANAS as ‘Indicate to what extent you generally feel this way, that is, how you feel on average’. Cronbach’s alpha for positive affect was .84 and for negative affect .87. These values are similar to the same as the values of .88 for positive affect and .87 for negative affect reported in Watson et al. (1988).

**Entrepreneurial Success.** Entrepreneurial success was measured using an average measure of standardized measures of past and current revenue growth (Hmieleski & Baron, 2009; Wiklund et al., 2009). Past revenue growth indicated whether the revenue in 2014 was less than, equal to, or more than the revenue in 2013. Current revenue growth was measured with an indication of whether the revenue at the end of 2014 was much lower (less than 20%), lower, similar, higher, or much higher (more than 20%) than the expectation of revenue in 2014 measured at the beginning of 2014. Cronbach’s alpha was .76.

**Control variables.** Three control variables were used because of their well-documented associations with affect and entrepreneurship: gender (where male is 1) (Kring and Gordon (1998) and Minniti and Nardone (2007), respectively), age of the entrepreneur (Santorelli, Ready, and Mather (2018) and Levesque and Minniti (2006), respectively), and education (Demenescu et al. (2014) and Dickson, Solomon, and Weaver (2008), respectively). Education was measured as the highest finished type of education, where the options range from primary education to university. We also controlled for experience, measured as the number of years one is a sole proprietor at the moment of measuring.

### 3.3.2 AMAROK

The AMAROK sample consisted of 349 French small business owners and was collected by Observatoire AMAROK, partner of Montpellier Business School. AMAROK runs a panel of these owners with the primary goal of analyzing the health of entrepreneurs. The data was collected in the winter of 2015-2016. There are 254 individuals in the final sample since some small business owners exited the
panel and there were some incomplete observations. Of these small business owners, most had two to three years higher education or had obtained a Bachelor’s degree (37 percent); the second largest group had four to five years higher education or had obtained a Master’s degree (26 percent). Four percent owned a business of size 1 (i.e. these owners can be classified as sole proprietors), 25 percent fitted the definition of a micro-sized business (less than 10 employees), 56 percent fitted the definition of a small-sized business (10 to 49 employees), and the remaining 15 percent were medium-sized business with more than 50 employees. The average age of these small business owners was 50 years, and 80 percent of them were male.

**Variables and Measures**

**Entrepreneurial Orientation.** As the AMAROK sample consisted of small business owners, who usually have employees, the strategic posture of the business usually depended not only on the owner, but also on other board members. Therefore, firm entrepreneurial orientation was the appropriate measure for small business owners and hence, we measure entrepreneurial orientation using the (slightly adapted) French version of the 9-item scale of Covin and Slevin (1989), using a seven-point Likert scale. Of these nine items, there were three items for innovativeness, three for proactiveness, and three for risk-taking. Sample items were “In general, the top managers of my firm favor a strong emphasis on R&D, technological leadership, and innovation”, “In dealing with its competitors, my firm typically responds to actions which competitors initiate” (reversed), and “In general, the top managers of my firm have a strong proclivity for high-risk projects (with chances of very high return)”, respectively. Cronbach’s alpha was .73, indicating that internal reliability was good.

**Affect.** For measuring affect, we used the PANAS with time frame ‘generally’ as we did for the Panteia sample. Cronbach’s alpha for positive affect was .71 and for negative affect .83, similar to the values reported in Watson et al. (1988).

**Entrepreneurial Success.** We used two measures for entrepreneurial success. The first measure, referred to as ‘entrepreneurial success’, was an average of three questions regarding finance, profitability, and turnover. The question regarding finance was ‘Was your business this year?’: ‘strong beneficiary’, ‘beneficiary’, ‘balanced’, ‘deficient’, and ‘strongly deficient’. Regarding profitability, the question was ‘Compared to last year, your profit is?’: ‘strong increase’, ‘increase’, ‘stable’, ‘decrease’, and ‘strong decline’. Regarding business turnover, it was ‘Compared to last year, your turnover is?’: ‘strong increase’, ‘increase’, ‘stable’, ‘decrease’, and ‘strong decline’. Cronbach’s alpha over these items is .78. The second measure, referred to as ‘entrepreneurial success (%)’ or ‘percentage measure of entrepreneurial success’ simply asked small business owners ‘All things considered, how would you evaluate the success of your company/venture?’, where they responded with a number between 1 (‘very unsuccessful’) and 100 (‘very
successful’). These two success measures were acquired at the same time as our measures for the main analysis.

**Control variables.** In line with the controls used in the Panteia sample and due to the well-documented association between affect/entrepreneurship and these controls, we used gender (where male is 1), age of the entrepreneur, education, and experience as control variables. Education was measured as the highest completed education level. Experience was measured as the number of years the small business owner owned the business. The larger the number of years one owns a business, the higher is the change that the business’s entrepreneurial orientation is based on the owner (Quigley & Hambrick, 2012).

### 3.3.3 Analysis

To investigate the role of positive and negative affect in entrepreneurial orientation, we used linear regression models with entrepreneurial orientation as the dependent variable and both positive affect and negative affect, together with the controls, as independent variables. Positive affect and negative affect were assumed to be orthogonal meaning that including them in one regression model did not cause danger for multicollinearity. The coefficients of the regression models were estimated by Ordinary Least Squares (OLS). To easily compare coefficients across the samples, we standardized all variables except gender. For our additional tests, we developed our model further. First, we analyzed our models by replacing entrepreneurial orientation with its different dimensions: innovativeness, proactiveness, and risk taking. Second, we analyzed our models by replacing entrepreneurial orientation with entrepreneurial success and we added entrepreneurial orientation to our set of independent variables such that we could analyze the role of affect in entrepreneurial success (possibly indirectly through entrepreneurial orientation).

Besides, to get a more thorough view of our main goal, the association between affect and entrepreneurial orientation, we repeated the analysis (with respect to entrepreneurial orientation) for a student sample (referred to as Woudestein). The motivation behind using this sample, a description of the sample, and the corresponding results are presented in Appendix A.

### 3.4. Results

Tables 3.1 and 3.2 present the unstandardized means, standard deviations (SD), minima (min), maxima (max), percentage of missing observations (missing (%), variance inflation factors (VIF), and a correlation matrix with the value of Cronbach’s alpha on the diagonal for the Panteia and AMAROK sample, respectively. The correlations of the Panteia sample (Table 3.1) varied from -.20 till .75. The correlations between positive affect and entrepreneurial orientation (.27)
and between negative affect and entrepreneurial orientation (-.12) were significant and in the expected direction. For the AMAROK sample (Table 3.2), the smallest correlation was -.31 and the highest was .62. For this sample, the correlation between positive affect and entrepreneurial orientation was significant and positive (.16), but the correlation between negative affect and entrepreneurial orientation was not significant (.07). For both samples, correlations between positive affect and entrepreneurial orientation were larger in absolute values than the correlations between negative affect and entrepreneurial orientation. Also, correlations between positive affect and negative affect were (close to) zero (.00 for Panteia and .02 for AMAROK) indicating that positive affect and negative affect are indeed orthogonal.

Furthermore, the maximum variance inflation factors for Panteia and AMAROK were 2.54 and 1.87 respectively. These variance inflation factors were below 4, thus indicating no danger of multicollinearity (Diamantopoulos, Riefler, & Roth, 2008; Hair, Anderson, Babin, & Black, 2010). Also, common method bias was checked for by applying Harman’s single factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The rule of thumb is that a single unrotated principal component should not explain more than the threshold level of 50 percent of the variance for all of the indicators measured with the same method. The first principal component of Panteia explained 16.8 percent and that of AMAROK explained 15.4 percent. Hence, these low percentages indicated no serious threat of common method bias.

Table 3.1. Means, standard deviations, minima, maxima, percentage of missing values, variance inflation factors, correlations, and Cronbach’s alpha’s of the unstandardized variables of the Panteia sample (N = 337).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Missing (%)</th>
<th>VIF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entrepreneurial Orientation</td>
<td>3.52</td>
<td>0.61</td>
<td>1.7</td>
<td>5</td>
<td>0</td>
<td>1.12</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Entrepreneurial Success</td>
<td>3.72</td>
<td>0.76</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>2.39</td>
<td>0.22</td>
<td>***</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Positive Affect</td>
<td>3.52</td>
<td>0.52</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>2.54</td>
<td>0.27</td>
<td>***</td>
<td>0.75</td>
<td>***</td>
<td>0.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Negative Affect</td>
<td>1.56</td>
<td>0.54</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>1.10</td>
<td>-0.12</td>
<td>*</td>
<td>-0.10</td>
<td>0.00</td>
<td>0.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Gender</td>
<td>0.69</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1.07</td>
<td>0.11</td>
<td>-0.05</td>
<td>-0.04</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Age</td>
<td>53.07</td>
<td>8.77</td>
<td>24</td>
<td>76</td>
<td>0</td>
<td>1.19</td>
<td>0.04</td>
<td>0.02</td>
<td>-0.08</td>
<td>-0.19</td>
<td>***</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td>7. Education</td>
<td>5.05</td>
<td>1.29</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>1.12</td>
<td>0.09</td>
<td>0.12</td>
<td>*</td>
<td>0.21</td>
<td>***</td>
<td>-0.01</td>
<td>-0.19</td>
</tr>
<tr>
<td>8. Experience</td>
<td>14.47</td>
<td>9.82</td>
<td>1</td>
<td>52</td>
<td>0</td>
<td>1.22</td>
<td>0.03</td>
<td>-0.12</td>
<td>*</td>
<td>-0.17</td>
<td>**</td>
<td>0.09</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.
Table 3.2. Means, standard deviations, minima, maxima, percentage of missing values, variance inflation factors, correlations, and Cronbach’s alpha’s of the unstandardized variables of the Amarok sample (N = 254).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Missing (%)</th>
<th>VIF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entrepreneurial Orientation</td>
<td>4.05</td>
<td>0.94</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>1.08</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Entrepreneurial Success</td>
<td>3.01</td>
<td>0.92</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1.21</td>
<td>0.09</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Entrepreneurial Success (%)</td>
<td>66.15</td>
<td>19.22</td>
<td>2</td>
<td>100</td>
<td>13</td>
<td>1.24</td>
<td>0.14*</td>
<td>0.33***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Positive Affect</td>
<td>3.56</td>
<td>0.51</td>
<td>1.4</td>
<td>4.7</td>
<td>0</td>
<td>1.08</td>
<td>0.16*</td>
<td>0.13*</td>
<td>0.11</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Negative Affect</td>
<td>2.25</td>
<td>0.65</td>
<td>1</td>
<td>4.4</td>
<td>0</td>
<td>1.08</td>
<td>0.07</td>
<td>-0.06</td>
<td>-0.13</td>
<td>0.02</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Gender</td>
<td>0.80</td>
<td>0.40</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1.03</td>
<td>0.00</td>
<td>0.04</td>
<td>-0.01</td>
<td>-0.10</td>
<td>-0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Age</td>
<td>50.44</td>
<td>7.80</td>
<td>27</td>
<td>74</td>
<td>0</td>
<td>1.78</td>
<td>-0.08</td>
<td>-0.13*</td>
<td>0.08</td>
<td>-0.10</td>
<td>-0.10</td>
<td>-0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Education</td>
<td>3.80</td>
<td>1.17</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>1.17</td>
<td>-0.01</td>
<td>0.09</td>
<td>-0.15*</td>
<td>0.03</td>
<td>-0.07</td>
<td>-0.04</td>
<td>-0.13*</td>
<td></td>
</tr>
<tr>
<td>9. Experience</td>
<td>16.32</td>
<td>8.86</td>
<td>0.33</td>
<td>42</td>
<td>0</td>
<td>1.87</td>
<td>0.03</td>
<td>-0.06</td>
<td>0.16*</td>
<td>-0.08</td>
<td>0.03</td>
<td>0.04</td>
<td>0.62***</td>
<td>-0.31***</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.

Table 3.3 shows the results of the linear regression models. We found confirming results for Hypothesis 1 (the positive association between positive affect and entrepreneurial orientation) in both samples. Indeed, a significant and positive association between trait positive affect and individual entrepreneurial orientation was found for the 337 sole proprietors of the Panteia sample (coefficient = 0.27, p < .001) and the 254 small business owners of the AMAROK sample (coefficient = 0.15, p < .05).

With respect to Hypothesis 2, we found confirming results for Panteia, but not for AMAROK. That is, we found a significant and negative association between trait negative affect and individual entrepreneurial orientation in the Panteia sample (coefficient = -0.13, p < .05). In the AMAROK sample, however, the association between trait negative affect and firm entrepreneurial orientation was insignificant and not even in the right direction (coefficient = 0.05, p = .44).

Moreover, we noted that the absolute coefficients between positive affect and entrepreneurial orientation were larger than the absolute coefficients between negative affect and entrepreneurial orientation. As variables were standardized, the table presents standardized, and thus comparable, coefficients. In both the samples, the coefficient for positive affect was more than twice as large as the coefficient for negative affect.
To test robustness of the linear regression models, we repeated the procedure but with either positive or negative affect. Positive affect had a coefficient of 0.27 (p < .001) for Panteia and 0.15 (p < .05) for AMAROK, while negative affect had a coefficient of -0.13 (p < .05) for Panteia and 0.05 (p = .43) for AMAROK. Hence, results were, based on two decimals, the same for the main results. This is not surprising, as positive affect and negative affect are independent dimensions (Watson et al., 1988) and orthogonal in a statistical sense (see also Table 3.1 and 3.2). Fredrickson and Losada (2005) has argued the usefulness of the ratio of positive affect to negative affect. Therefore, we also repeated the procedure with positive affect divided by negative affect as independent variable. We found a coefficient of 0.22 (p < .001) for Panteia and 0.04 (p = .49) for AMAROK. Thus, although the coefficients obviously have a different interpretation, results remained similar.

As our first additional test, we analyzed the three dimensions of entrepreneurial orientation, i.e. innovativeness, proactiveness, and risk taking, separately (see Table 3.B.1 in Appendix B). For positive affect, the results of Panteia sample were similar to the main results. That is, positive and significant associations were found between positive affect and all entrepreneurial orientation dimensions. For negative affect, we found that innovativeness and risk taking are mainly responsible for the association. With respect to the association between positive affect and the entrepreneurial orientation dimensions in AMAROK, the results showed that innovativeness mainly drove the association.

For the second additional aim, we augmented the model with entrepreneurial success to investigate whether affect is associated (either directly or indirectly

Table 3.3. OLS results of the linear regression models for both samples.

<table>
<thead>
<tr>
<th></th>
<th>Entrepreneural Orientation (Panteia)</th>
<th>Entrepreneural Orientation (AMAROK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.01</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>0.27***</td>
<td>0.15*</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>-0.13*</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.13*</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Age</td>
<td>0.03</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Education</td>
<td>0.07</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Experience</td>
<td>0.07</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>6.80***</td>
<td>1.76</td>
</tr>
<tr>
<td>p-value</td>
<td>0.00</td>
<td>0.11</td>
</tr>
<tr>
<td>Adjusted R squared</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of observations</td>
<td>337</td>
<td>254</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001, SEs between brackets, p-value for F-statistic.
through entrepreneurial orientation) to entrepreneurial success. The results are presented in Table 3.B.2 in Appendix B. In the Panteia sample, we found a direct association between trait positive affect and entrepreneurial success (coefficient = 0.16, p < .01), and between trait negative affect and entrepreneurial success (coefficient = -0.12, p < .05). For the AMAROK sample however, neither did we find a significant association between positive affect and entrepreneurial success (coefficient = 0.11, p = .10), nor between positive affect and the percentage measure of entrepreneurial success (coefficient = 0.12, p = .05) although this latter coefficient was significant (coefficient 0.14, p < .05) when the total effect was examined (i.e. without controlling for entrepreneurial orientation). With respect to negative affect, there was no significant and direct association for entrepreneurial success (coefficient = -0.08, p = .05), but there was a significant association between negative affect and the percentage measure of entrepreneurial success (coefficient = -0.16 p < .05). Note that some p-values were just higher than .05, such that the results were insignificant. However, these low p-values hint an association between affect and entrepreneurial success.

In both samples we tested for indirect associations (i.e. the association of positive or negative affect and entrepreneurial success through entrepreneurial orientation) using a Sobel test (Sobel & Leinhart, 1982) but found no significant results. This is possibly due to the fact that none of the coefficients for entrepreneurial orientation (when associated to entrepreneurial success) were significant. That is, there was no significant association between entrepreneurial orientation and entrepreneurial success for the Panteia sample (coefficient = -0.07, p = .22), nor between entrepreneurial orientation and entrepreneurial success/the percentage measure of entrepreneurial success for the AMAROK sample (entrepreneurial success: coefficient = 0.07, p = .22; percentage measure of entrepreneurial success: coefficient = 0.13, p = .05).

Finally, we investigated the role of affect in entrepreneurial orientation in a sample of students (see Appendix A). The results of this student sample confirmed both our hypotheses.

### 3.5. Discussion

Although affect plays a key role in the entrepreneurship literature (Baron, 2008; Delgado García et al., 2015; Hahn et al., 2012), its role as a driver for entrepreneurial orientation has not yet been established. To fill this gap, the present study investigated the association between (both positive and negative) affect and entrepreneurial orientation in two main samples: 337 Dutch sole proprietors (Panteia) and 254 French small business owners (AMAROK). Additionally, we investigated the role of affect in three dimensions of entrepreneurial orientation and its role in entrepreneurial success. Our investigation led to several findings.
First, we found a positive association between positive affect and entrepreneurial orientation in both samples, despite using slightly different measures for entrepreneurial orientation (i.e. the individual variant versus the firm variant). Hypothesis 1 was convincingly confirmed: positive affect is positively associated to individual entrepreneurial orientation in sole proprietors and to firm entrepreneurial orientation in small business owners. This indicates that positive feelings and emotions are associated with acting more entrepreneurial in terms of innovativeness, proactiveness, and risk-taking; although for the small business owners, positive feelings and emotions are mostly associated to innovativeness. The positive association between positive affect and innovativeness is in line with earlier findings (Baron & Tang, 2011; Rutherford & Holt, 2007).

Second, the unambiguous result for positive affect did not hold for negative affect. Although there was a negative association between negative affect and individual entrepreneurial orientation for sole proprietors, there was no significant negative association between negative affect and firm entrepreneurial orientation in small business owners. Therefore, Hypothesis 2 was only confirmed for sole proprietors. For these sole proprietors, the association was mainly visible in the innovativeness and risk taking dimensions of entrepreneurial orientation. The extant literature indeed shows more evidence for the associations between affect and these dimensions than between affect and proactiveness (Baron & Tang, 2011; Isen & Geva, 1987; Mittal & Ross Jr, 1998; Rutherford & Holt, 2007). Our finding could mean that for sole proprietors, having negative feelings and emotions is associated with less entrepreneurial strategic posture (especially with respect to innovativeness and risk taking), while negative feelings and emotions experienced by small business owners do not impact their firm’s strategic posture. A possible reason could be that the business owner’s affect is ‘too distant’ from firm’s entrepreneurial orientation. In other words, firm entrepreneurial orientation is perhaps not only based on the small business owner’s affect, but also on characteristics of other (important) members of the board as predicted by Hambrick and Mason’s (1984) upper echelon theory. Another reason could be that firms, opposed to sole proprietors, are confronted with task conflicts as well as relationship conflicts in entrepreneurial tasks both which impact negative affect (Breugst & Shepherd, 2017). These conflicts may also impact the strategic posture of the firm. Therefore, our estimated coefficient between negative affect and (firm) entrepreneurial orientation may be biased because conflicts have not been incorporated in our study. Hence, the affective characteristics of the small business owner alone do not impact firm entrepreneurial orientation as dramatically when compared to sole proprietors.

Third, although prior studies focus on either positive affect or negative affect (Delgado García et al., 2015), our results show that it is important to distinguish between positive and negative affect and investigate both, as they represent separate and independent dimensions (Watson et al., 1988). Our results confirm this in three ways. First, the correlations between both dimensions of affect are very small or
even zero. Second, the coefficients of the linear regression models including only one of the affect dimensions, i.e. either positive affect or negative affect are the same as the coefficients of the linear regression models including both affect dimensions simultaneously. Third, our results show that rather than just being opposites, positive and negative affect constitutes completely separate associations with different signs, strengths, and significance.

Indeed, the positive association between positive affect and entrepreneurial orientation was stronger than the negative association between negative affect and entrepreneurial orientation. The absolute coefficient for positive affect was more than two times as large as the absolute coefficient of negative affect in the Panteia sample. Due to the insignificant association between negative affect and entrepreneurial orientation in the AMAROK sample, we did not compare the absolute coefficients for the AMAROK sample. Nonetheless, we may conclude that positive feelings and emotions play a more important role for entrepreneurial orientation than negative feelings and emotions.

Finally, we investigated the role of affect in entrepreneurial success. We found evidence for a positive association between positive affect and entrepreneurial success and a negative association between negative affect and entrepreneurial success in the Panteia sample. This is in line with the meta-analytic results of Luybomirsky et al. (2005) showing that positive affect is associated with many successful outcomes across different domains of life. The findings, however, were less evident in the AMAROK sample, where we found a negative association between negative affect and the percentage measure of entrepreneurial success, but no clear association between positive affect and entrepreneurial success. Nevertheless, p-values for positive affect (when associated to entrepreneurial success) were low and thus hint to the existence of an association between affect and entrepreneurial success.

3.5.1 Implications for Theory and Practice

The findings of the present study have several theoretical implications. First, the present study adds to our knowledge of the entrepreneurial profile (Gartner, 1990). Specifically, it investigates the role of affect in entrepreneurship (Delgado García et al., 2015; Hahn et al., 2012) Our findings reveal that both positive and negative affect play different but significant roles in entrepreneurial orientation – and partly in entrepreneurial success – and thus qualify as drivers of entrepreneurial orientation and entrepreneurial success. This is in line with other findings related to the present study. For instance, in their review, Shepherd, Williams, and Patzelt (2015) explain the characteristics of the entrepreneurial decision maker. They explain that decision making strategies can differ across entrepreneurs because of gender, national and cultural heritage, but also in the amount of experience – which in itself enhances self-efficacy, such that strategy may be more aggressive and
seemingly riskier. Further, emotions may indeed also impact entrepreneurial decision making as Baron (2008) mentions first. As Shepherd et al. (2015) show, not only affect explains entrepreneurial orientation, but also risk and problem framing do. Particularly, Lawrence, Clark, Labuzetta, Shahkian, and Vyakarnum (2008) write that there is no difference in entrepreneurs and managers when they perform in cold decision making, i.e. risk-free decision making, while entrepreneurs behaved significantly riskier in hot decision making, i.e. decision making with risk involved. This higher risk taking found in entrepreneurs was accompanied with an enhanced score on impulsivity. Further, Dew, Read, Sarasvathy, and Wiltbank (2009) show that problems are framed completely different by expert entrepreneurs when compared to MBA students. Where expert entrepreneurs use ‘effectual’ logic, the students go by the textbook. Hence, next to gender, culture, risk taking, and problem framing, the importance of affect in strategic posture and success of entrepreneurs is underlined.

Second, results of our study show the importance of investigating both positive affect and negative affect as separate concepts. We found no correlations between both dimensions of affect and the results differed in sign, strength, and significance. While many studies have reported results of only one measure of affect (Baron & Tang, 2011; Baron et al., 2011; Foo et al., 2009), our work shows the importance of investigating both.

Third, the affect-Big Five literature is connected with the Big Five-entrepreneurship literature. With respect to literature linking affect and the Big Five, findings show that there is a positive association between positive affect and conscientiousness, extraversion, and openness to experience and between negative affect and neuroticism (Costa & McCrae, 1980; Gutiérrez et al., 2005; Roccas et al., 2002; Shiota et al., 2006). With respect to the Big Five-entrepreneurship literature, Zhao and Seibert (2006) show that entrepreneurs score higher than managers on conscientiousness and openness to experience and lower on neuroticism and agreeableness. Similarly, Caliendo, Fossen, and Kritikos (2014) show that entry into self-employment is positively impacted by extraversion and openness to experience. The Big Five further plays a role in entrepreneurial performance (Zhao, Seibert, & Lumpkin, 2010), where conscientiousness, extraversion, and openness to experience positively impact success, while neuroticism negatively impacts it. Taking these two fields of literature together, we expect a positive association between positive affect and entrepreneurship (as both are positively associated with conscientiousness, extraversion, and openness to experience) and a negative between negative affect and entrepreneurship (as both are negatively associated with neuroticism). Indeed, the present study shows positive associations between positive affect and entrepreneurial orientation and success and negative associations between negative affect and (some of) our entrepreneurship measures.

Fourth, the present study contributes to the great rationality debate which concerns the rationality of individuals in (economic) decision making. This debate
is recently recognized to play a role in entrepreneurship (Zhang & Cueto, 2017). With the present study, we show that irrational characteristics, such as affect, could have an impact on (rational) strategic postures. Additionally, the findings of Smith, Gannon, Grimm, and Mitchell (1988) showed that entrepreneur’s decision behavior follows a less formal rational decision process than professional managers from a larger firm. For both the entrepreneur and the manager however, a lower organizational performance is obtained when the degree of formality and rationality in the decision process declines.

From a practical point of view, the present study adds value to the understanding of how affect influences the degree of entrepreneurship in the strategic posture of sole proprietors and small business owners. For sole proprietors, trait positive affect implies a more entrepreneurial strategic posture in terms of innovativeness, proactiveness, and risk-taking, while for small business owners, trait positive affect implies a more entrepreneurial strategic posture in terms of innovation. However, while for sole proprietors, negative affect is negatively associated with individual entrepreneurial orientation, for small business owners, negative affect does not impact their strategic posture. One could speculate that having other members in the organization buffers the negative affect of small business owners from influencing the firm’s strategic position negatively, as these other members also influence the firm’s strategy, either directly or indirectly (Quigley & Hambrick, 2012). Since an appropriate strategic posture leads to higher performance in business environment, this knowledge of the association between affect and entrepreneurial orientation can inform sole proprietors and small business owners on how to better run their business, and help future entrepreneurs make a deliberate choice on whether to start a business. Encouraging everyone to become entrepreneur is not our message: only the high growth potential enterprises are beneficial for the economy (Shane, 2009). Finally, knowledge about the important link between affect and entrepreneurial orientation can also guide mental health intervention programs to help entrepreneurs unleash their full potential.

3.5.2 Limitations and Future Research Directions

Our study has certain limitations, and at the same time, has opened the avenue for future research directions.

First, some may view using both individual and firm entrepreneurial orientation as a limitation. Indeed, one may be concerned about using two different measures and comparing their results. However, we believe that in this specific situation, the use of both individual entrepreneurial orientation and firm entrepreneurial orientation is appropriate. There are several reasons that guide our belief in this regard. First, the measure of entrepreneurial orientation fits the type of subjects we studied in our sample: while sole proprietors are individually responsible for their firm outcomes, small business owners are influenced
by/influence their employees so that the firm-level outcome is a more appropriate
measure. Second, although the items of the measures differ in their wording, they
show similarity in the sub dimensions (innovativeness, proactiveness, and risk
taking). Third, although one could argue that affect is an individual-level measure
and hence cannot be associated with a firm-level concept like entrepreneurial
orientation, the upper echelon theory suggests that individual characteristics can
predict organizational outcomes (Hambrick & Mason, 1984).

Second, one may question the credibility of the results from the Panteia sample
due to the fact that two different temporal points were used while collecting the data.
Nevertheless, we believe that our results are trustworthy for two reasons. First, we
intentionally measured trait affect instead of state affect. Trait affect measures
general affect, i.e. affect deeply embedded in a person. This deeper form of affect
is more stable and is considered to remain the same over years. Second, the results
of the Panteia sample are in line with the results of the Woudesteijn sample (Appendix A) and AMAROK sample, which gives confidence in our results.

Third, our measure of entrepreneurial success is not embedded in the literature,
which could raise doubt about our results with regard to entrepreneurial success. For
this reason, we included multiple measures and multiple-item constructs. The
constructs show high internal reliability and are therefore trustworthy. Also, results
are in the expected direction. Nevertheless, the use of well-validated measures of
entrepreneurial success in the future could lead to clearer (i.e. significant) results,
since our results signal such a significance. The insignificant results for
entrepreneurial success could also lay in the focus on entrepreneurial orientation –
instead of its dimensions – in our analysis. As mentioned by Kreiser et al., (2013),
the different dimensions of entrepreneurial orientation may have different impact
on entrepreneurial success. Therefore, future studies should adopt well-validated
measures of entrepreneurial success and investigated the relationship of
entrepreneurial orientation and success through the three dimensions of
entrepreneurial orientation.

Our work does not claim to have identified any causality between affect and
entrepreneurial orientation. On the one hand, feelings and emotions may influence
strategy, but on the other hand, strategy may also lead to certain feelings and
emotions, possibly through entrepreneurial success. Hence, we used the word
‘associations’ throughout the paper. Although we cannot formally identify causality,
we can surmise that the direction of affect to entrepreneurial orientation is a more
reasonable direction, given that we investigated trait affect in two of the three
samples. Trait affect is related to a general characteristic of a person and is a long-
term concept. However, entrepreneurial orientation is more likely to change since
the characteristics of the market, the product, the competitors, and the business itself
may change. Therefore, it is more conceivable that long-term affect influences
dynamic strategic posture, rather than a dynamic strategic posture influencing the
long-term feelings and emotions of an entrepreneur. Nevertheless, we recommend
future studies to use experimental or panel data to obtain a clearer understanding of which of the two causal direction prevails.

3.6. Conclusion

Entrepreneurial orientation is often associated with venture success (Rauch et al., 2009). However, the drivers of entrepreneurial orientation have not yet been firmly established. Recent literature has called for investigating the links between affect and entrepreneurial orientation (Delgado García et al., 2015; Hahn et al., 2012). Our study empirically investigated the role of both (orthogonal) dimensions of affect, i.e. positive and negative, on two variants of entrepreneurial orientation (i.e. the original firm-level variant and the individual-level variant). It additionally tested the role of affect on the separate dimensions of entrepreneurial orientation and on entrepreneurial success. Using two samples, we show that positive affect is positively associated to both variants of entrepreneurial orientation, while negative affect is negatively associated to only individual entrepreneurial orientation. Results for entrepreneurial success are mixed. Our findings add to our knowledge about the roles of both positive and negative affect on entrepreneurial orientation and links two fields of literature: the field investigating the association between affect and the Big Five and the field investigating the role of the Big Five in entrepreneurship.

3.7. Appendix A

Appendix A presents the results with regard to a student sample (referred to as Woudestein). These results are not part of the main text for two reasons. First, the focus is on actual sole proprietors/business owners, who possess a strategic posture or entrepreneurial orientation because they own a business. Students can answer question about a strategic posture, but for most students, the answers are hypothetical and hence not based on actual behavior. Further, it is hard, if not impossible, to measure entrepreneurial success in students who are in a different phase of life. The few that started a business probably could not say much about actual success yet.

Nevertheless, we see merit in adding the results for students. Although the results are not an internal replication, they do add to our knowledge of the main goal: investigating the affect-entrepreneurial orientation association. In the present appendix, we discuss the sample and present the results.

3.7.1 Woudestein

The Woudestein sample consisted of 182 students of the Erasmus University of Rotterdam in the Netherlands who were recruited from different faculties by various university recruitment systems, i.e. that of the economics department, that
of the psychology department, and one where students of all schools could apply. Most students studied economics (41 percent), psychology (28 percent), or other social sciences (14 percent). About 35 percent of the students was taking entrepreneurship courses. The data was collected between May 2015 and April 2016. Although 182 students filled in the questionnaire, only 177 were analyzed due to missing observations. The average age of these 177 students was 21 years (median was 20 years) and slightly more than half of the sample (56 percent) was female.

Variables and Measures

**Entrepreneurial Orientation.** To measure entrepreneurial orientation amongst students, who are usually individuals without a business, it was appropriate to use an individual-level scale. Hence, we used the individual entrepreneurial orientation scale of Langkamp Bolton and Lane (2012). To avoid repetition, we referred to the subsection ‘Variables and measures’ in our Panteia section for more information about this scale. Cronbach’s alpha was equal to .76 indicating a good reliability for this scale.

**Affect.** To measure affect, we used the PANAS (as explained in the section for the Panteia sample) with the time frame ‘generally’, i.e. participants have to indicate to what extent they generally feel a certain feeling or emotion. Cronbach’s alpha for positive affect was .79 and for negative affect .89, similar to the ones (.88 for positive affect and .87 for negative affect) reported by Watson et al. (1988).

**Control variables.** For the same reasons as mentioned in the Panteia/AMAROK section and to be able to compare results across samples, we included the same three control variables as we did for the Panteia sample, viz. gender (where male is 1), age, and education. Education was measured as the average grade of the last year. Experience was not added because (most) students simply had no experience in their own business.

### 3.7.2 Results

Table 3.A.1 presents the unstandardized means, standard deviations (SD), minima (min), maxima (max), variance inflation factors (VIF), and a correlation matrix with the value of Cronbach’s alpha on the diagonal for the Woudestein sample. The correlations range from -.16 till .44. These two extreme correlations are exactly the correlations of our focal associations, i.e. the correlation between negative affect and entrepreneurial orientation is significantly negative (-.16) and the correlation between positive affect and entrepreneurial orientation is significantly positive (.44). Results for the Woudestein sample were similar to the results for the Panteia and AMAROK samples. The correlation between positive affect and entrepreneurial orientation was larger in absolute values than the correlation between negative affect and entrepreneurial orientation. Also, the
correlation between positive affect and negative affect was .00 indicating that positive affect and negative affect are indeed orthogonal.

The maximum variance inflation factor for Woudestein was 1.30 and thus far below 4, indicating no danger of multicollinearity (Diamantopoulos et al., 2008; Hair et al., 2010). Also, common method bias was checked for by applying Harman’s single factor test (Podsakoff et al., 2003). The first principal component of Woudestein explained 17.0 percent of the variance indicating no serious threat of common method bias.

Table 3.A.1. Means, standard deviations, minima, maxima, variance inflation factors, correlations, and Cronbach’s alpha’s of the unstandardized variables of the Woudestein sample (N = 177).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>VIF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Entrepreneurial Orientation</td>
<td>3.55</td>
<td>0.50</td>
<td>2.3</td>
<td>5.0</td>
<td>1.29</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Positive Affect</td>
<td>3.68</td>
<td>0.45</td>
<td>2.2</td>
<td>4.9</td>
<td>1.30</td>
<td>0.44***</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Negative Affect</td>
<td>2.25</td>
<td>0.68</td>
<td>1.1</td>
<td>4.0</td>
<td>1.05</td>
<td>-0.16*</td>
<td>0.00</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Gender</td>
<td>0.44</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
<td>1.02</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.12</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Age</td>
<td>20.67</td>
<td>2.06</td>
<td>18</td>
<td>30</td>
<td>1.02</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. Education</td>
<td>6.86</td>
<td>0.86</td>
<td>4.0</td>
<td>9.0</td>
<td>1.05</td>
<td>-0.01</td>
<td>0.17*</td>
<td>0.05</td>
<td>-0.01</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001.

Table 3.A.2 shows the results of the linear regression models. Similar as for our main samples, we find confirming results for Hypothesis 1: a significant and positive association between trait positive affect and individual entrepreneurial orientation is found for the 177 students of the Woudestein sample (coefficient = 0.45, p < .001). With respect to Hypothesis 2, we also find confirming results: a significant and negative association (coefficient = -0.16, p < .05) between trait negative affect and individual entrepreneurial orientation. Moreover, we note that, also for the Woudestein sample, the absolute coefficients between positive affect and entrepreneurial orientation are larger than the coefficients between negative affect and entrepreneurial orientation: the coefficient for positive affect is almost three times larger than coefficient for negative affect.

To test robustness of these results, we repeat the procedure but with either positive or negative affect. Positive affect has a coefficient of 0.45 (p < .001) while negative affect has a coefficient of -0.16 (p < .05) such that results are the same as the main results. This proves independency of positive and negative affect (Watson et al., 1988) and orthogonal in a statistical sense (see also Table 3.A.1). For the same reason as explained in the main text, we repeat the procedure with positive affect divided by negative affect as independent variable. We find a coefficient of 0.33 (p < .001). Hence, although coefficients obviously have a different interpretation, results remain similar.

64
Table 3.A.2. OLS results of the linear regression models (with the three dimensions of entrepreneurial orientation as dependent variable) for the Woudestein sample.

<table>
<thead>
<tr>
<th></th>
<th>Entrepreneurial Orientation (Woudestein)</th>
<th>Entrepreneurial Orientation - Innovativeness (Woudestein)</th>
<th>Entrepreneurial Orientation - Proactiveness (Woudestein)</th>
<th>Entrepreneurial Orientation - Risk taking (Woudestein)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>0.45***</td>
<td>0.22**</td>
<td>0.43***</td>
<td>0.40***</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>-0.16*</td>
<td>-0.12</td>
<td>-0.16*</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.03</td>
<td>-0.08</td>
<td>-0.12</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Age</td>
<td>0.04</td>
<td>0.08</td>
<td>-0.05</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.08</td>
<td>-0.12</td>
<td>0.14*</td>
<td>-0.18*</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.08)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>10.06***</td>
<td>2.86*</td>
<td>11.64***</td>
<td>8.29***</td>
</tr>
<tr>
<td>p-value</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Adjusted R squared</td>
<td>0.21</td>
<td>0.05</td>
<td>0.23</td>
<td>0.17</td>
</tr>
<tr>
<td>Number of observations</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001, SEs between brackets, p-value for F-statistic.

For the student sample, we could also analyze the three dimensions of entrepreneurial orientation, i.e. innovativeness, proactiveness, and risk taking (see Table 3.A.2). Positive affect is significantly and positively associated to all three dimensions. With respect to negative affect, we find that it is mostly proactiveness that drives the negative association for the students in the Woudestein sample.

3.8. Appendix B

In Appendix B, we present the tables for our additional tests. The first table (Table 3.B.1) shows results when analyzing the different dimensions of entrepreneurial orientation and the second table (Table 3.B.2) shows results corresponding to the analysis of entrepreneurial success.
Table 3.B.1. OLS results of the linear regression models for the three dimensions of entrepreneurial orientation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.02</td>
<td>0.02</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>0.23***</td>
<td>0.23***</td>
<td>0.17**</td>
<td>0.17**</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>-0.11*</td>
<td>-0.04</td>
<td>-0.12*</td>
<td>0.06</td>
<td>0.06</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.07</td>
<td>0.04</td>
<td>0.18***</td>
<td>0.04</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Age</td>
<td>0.09</td>
<td>0.00</td>
<td>-0.05</td>
<td>0.06</td>
<td>-0.22*</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Education</td>
<td>0.12*</td>
<td>-0.02</td>
<td>0.04</td>
<td>0.02</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Experience</td>
<td>0.02</td>
<td>0.07</td>
<td>0.09</td>
<td>0.11</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>5.71***</td>
<td>2.98***</td>
<td>4.32***</td>
<td>1.97</td>
<td>1.49</td>
<td>0.72</td>
</tr>
<tr>
<td>p-value</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.07</td>
<td>0.18</td>
<td>0.63</td>
</tr>
<tr>
<td>Adjusted R squared</td>
<td>0.08</td>
<td>0.03</td>
<td>0.06</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of observations</td>
<td>337</td>
<td>337</td>
<td>337</td>
<td>254</td>
<td>254</td>
<td>254</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001, SE between brackets, p-value for F-statistic.
Table 3.B.2. OLS results of the linear regression models for entrepreneurial success.

<table>
<thead>
<tr>
<th></th>
<th>Entrepreneurial Success (Panteia)</th>
<th>Entrepreneurial Success (AMAROK)</th>
<th>Entrepreneurial Success (%) (AMAROK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.05 (0.06)</td>
<td>0.00 (0.06)</td>
<td>-0.00 (0.07)</td>
</tr>
<tr>
<td>Productive Orientation</td>
<td>-0.07 (0.06)</td>
<td>0.07 (0.06)</td>
<td>0.13 (0.07)</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>0.14* (0.06)</td>
<td>0.12 (0.06)</td>
<td>0.11 (0.06)</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>-0.11 (0.06)</td>
<td>-0.07 (0.06)</td>
<td>-0.08 (0.07)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.02 (0.06)</td>
<td>0.05 (0.06)</td>
<td>-0.00 (0.07)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.15* (0.06)</td>
<td>-0.17 (0.06)</td>
<td>-0.16 (0.07)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.01 (0.06)</td>
<td>0.09 (0.09)</td>
<td>-0.12 (0.10)</td>
</tr>
<tr>
<td>Experience</td>
<td>-0.06 (0.06)</td>
<td>0.07 (0.08)</td>
<td>0.16 (0.09)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.41**</td>
<td>3.14**</td>
<td>1.98</td>
</tr>
<tr>
<td>p-value</td>
<td>0.00</td>
<td>0.00</td>
<td>0.07</td>
</tr>
<tr>
<td>Adjusted R squared</td>
<td>0.04</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of observations</td>
<td>331</td>
<td>331</td>
<td>252</td>
</tr>
</tbody>
</table>

Note: *: p < .05, **: p < .01, ***: p < .001, SE between brackets, p-value for F-statistic.
The question ‘What makes an entrepreneur?’ has been fundamental for economics and psychology researchers over the last decade. A profound understanding of ‘the entrepreneur’ enables the establishment of better policies to stimulate entrepreneurship in modern economies. This is crucial as entrepreneurship is essential for economic growth (Erken et al., 2016; Koellinger & Thurik, 2012; Van Praag & Versloot, 2007). The present thesis deals with the definition of ‘the entrepreneur’ by investigating the roles of psychological (Part I: Chapters 2, 3, and 4) and biological (Part II: Chapters 5 and 6) traits in entrepreneurship. This interdisciplinary setting is a result of limitations of the traditional ‘homo economicus’ perspective, in which rational individuals are utility maximizing decision makers.

The results of Chapter 2 show that, based on a student sample and a sample of Small and Medium Enterprise (SME) owners, overconfidence is positively associated with entrepreneurial intention, but not with entrepreneurial orientation, while optimism is positively associated with both. The findings of Chapter 3, which are based on Dutch students, Dutch sole proprietors, and French SME owners, demonstrate a positive association between positive affect and entrepreneurial orientation and a negative association, although less strong, between negative affect and entrepreneurial orientation. Further, the chapter hints to a positive association between positive affect and entrepreneurial success and a negative association between negative affect and entrepreneurial success. Chapter 4 takes on this hint and provides evidence for the indirect positive association between positive affect and entrepreneurial success through the key aspects of the entrepreneurial process of which examples are opportunity recognition, development of broad social networks, and tolerance for intense levels of stress (Baron, 2008).
Chapters 5 and 6 show lack of evidence for the association between behavior and electrophysiology on the one hand and self-reported measures in entrepreneurship as well as impulsivity on the other. Specifically, Chapter 5 shows that behavior and electrophysiology from tasks such as the Eriksen Flanker task, the Go/No-Go task, the Reward task, and the Balloon Analogue Risk Task cannot be substitutes for nor complements to self-reported measures of impulsivity in explaining entrepreneurship. Chapter 6 addresses whether self-reported, behavioral, and electrophysiological measures of impulsivity reflect one construct, but cannot not provide evidence for significant correlations across the different measurement levels.

The present thesis contributes to the field of entrepreneurship by focusing on the psychology of the entrepreneur, with concepts such as overconfidence, optimism, positive affect, and negative affect, and on the biology of the entrepreneur with concepts such as behavior and electrophysiology. It also contributes to the field of psychology by showing the positive role that cognitive biases, such as overconfidence, could play for entrepreneurs. Hence, this field will gain insights in why some psychological concepts can be problematic in one person (patient) but beneficial in another (entrepreneur). Finally, the present thesis contributes to the field of biology, especially electrophysiology, with null findings despite of analyzing large samples and while small samples report significant findings. This field can therefore benefit from the present thesis by investigating why larger samples fail to find presumed associations.

From a practical perspective, the present thesis contributes to our knowledge about the profile of ‘the entrepreneur’. This knowledge can help correctly matching personality profiles to occupations, which is important according to Person-Environment Fit theory. A mismatch between the two could be detrimental to one’s mental and physical well-being. By knowing more about the entrepreneurial personality profile, matching principles can be improved. Further, knowing whether an individual is better suited for entrepreneurship than for being an employee, especially at an early age, can improve education. For instance, the Dutch education system is better fitted for well-organized, disciplined children than for hyperactive, creative ones. The entrepreneurial profile usually does not match this present educational system, but knowing in the early age that a child is suited for entrepreneurship could result in fitting education.

Of course, psychology and biology could play a role in many occupations. Therefore, with the present thesis, we do not want to underline entrepreneurship, but rather use it as a proof of concept. Future research should not just further develop the understanding of the role of psychology and biology in entrepreneurship, but also investigate other manifestations of economic behavior and outcomes.
5. **Summary in Dutch**

De vraag ‘wat is een ondernemer?’ is belangrijk voor onderzoekers in de economie en psychologie. Met grondige kennis van ‘de ondernemer’ kan een beter beleid worden toegepast om ondernemerschap in moderne economieën te stimuleren. Dit is belangrijk omdat ondernemerschap essentieel is voor economische groei (Erken et al., 2016; Koellinger & Thurik, 2012; Van Praag & Versloot, 2007). Dit proefschrift onderzoekt de definitie van ‘de ondernemer’ door zowel psychologie (Deel I: hoofdstukken 2, 3 en 4) als biologie (Deel II: hoofdstukken 5 en 6) te relateren aan ondernemerschap. Deze interdisciplinaire opzet is het resultaat van de beperkingen die de oorspronkelijke focus op ‘homo economicus’, waarin rationele individuen nut maximaliseren, met zich meebrengt.

De resultaten van Hoofdstuk 2 tonen aan dat ‘overconfidence’ positief geassocieerd is met de intentie om ondernemer te worden, maar niet met de uiteindelijke strategie die de ondernemer hanteert. Optimisme wordt daarentegen positief geassocieerd met zowel intentie als strategie. Deze resultaten zijn gebaseerd op een steekproef onder studenten en een steekproef onder eigenaren van midden- en kleinbedrijven (MKB’ers). Hoofdstuk 3 gebruikt drie steekproeven: Nederlandse studenten, Nederlandse zelfstandigen zonder personeel (ZZP’ers) en Franse MKB’ers. De resultaten, op basis van deze steekproeven, duiden op een positieve asociatie tussen positief affect en strategie en een (minder sterke) negatieve associatie tussen negatief affect en strategie. Verder attenderen de resultaten op een positieve associatie tussen positief affect en het succes als ondernemer en een negatieve associatie tussen negatief affect en het succes als ondernemer. Hoofdstuk 4 gaat hierop door en geeft bewijs voor een positieve, maar indirecte, associatie tussen positief affect en het succes als ondernemer via de zogenoemde kernaspecten van het ondernemerschapsproces. Voorbeelden van deze kernaspecten zijn het herkennen van kansen, het ontwikkelen van brede, sociale netwerken en het kunnen omgaan met intense stresslevels (Baron, 2008).
Hoofdstukken 5 en 6 kunnen geen bewijs geven voor de associatie tussen gedrag en elektrofysiologie aan de ene kant en zelfrapportage maten uit ondernemerschap en impulsiviteit aan de andere kant. Zo laat Hoofdstuk 5 zien dat gedrag en elektrofysiologie, gemeten met de Eriksen Flanker taak, de Go/No-Go taak, de Reward taak, en de Balloon Analogue Risk Task, geen substituerende of complementerende rol innemen voor zelfrapportage maten van impulsiviteit in het verklaren van zelfrapportage maten van ondernemerschap. In Hoofdstuk 6 wordt geanalyseerd of zelfrapportage, gedrags- en elektrofysiologische maten van impulsiviteit één dimensie omvatten. Er is echter geen bewijs gevonden voor significante correlaties tussen deze drie meetniveaus.

Dit proefschrift draagt bij aan onze kennis van ondernemerschap door zich enerzijds te richten op de psychologie van de ondernemer met begrippen als ‘overconfidence’, optimisme, positief affect en negatief affect en anderzijds op biologie van de ondernemer aan de hand van gedrag en elektrofysiologie. Het draagt ook bij aan psychologie door aan te tonen dat cognitieve bias (zoals ‘overconfidence’) een positieve rol kan spelen voor ondernemers. Daarmee krijgt de psychologie inzicht in waarom sommige psychologische concepten problematisch kunnen zijn voor de ene persoon (patiënt), maar gunstig voor de ander (ondernemer). Als laatste draagt dit proefschrift bij aan onze kennis van elektrofysiologie door het gebrek aan bewijs voor de associatie tussen elektrofysiologie en ondernemerschap/impulsiviteit ondanks het gebruik van grote steekproeven en terwijl kleine steekproeven wel significante associaties vinden. Elektrofysiologisch onderzoek kan zich ontwikkelen door te onderzoeken waarom grote steekproeven de vooraf veronderstelde associaties niet kunnen aantonen terwijl kleine steekproeven dit wel kunnen.

Vanuit praktisch oogpunt draagt dit proefschrift bij aan kennis over het profiel van ‘de ondernemer’. Deze kennis kan helpen om een persoonlijkheidsprofiel succesvol aan een beroep te koppelen. Dit is belangrijk volgens de ‘Person-Environment Fit’ theorie. Een verkeerde match kan schadelijk zijn voor iemands mentale en fysieke gezondheid. Door meer kennis te hebben over de persoonlijkheid van een ondernemer kunnen matchingsprincipes verbeteren. Verder kan deze kennis bijdragen aan gerichter onderwijs. Als al vroegtijdig bekend is dat iemand geschikter is als ondernemer dan als werknemer, kan specifiek onderwijs worden verzorgd. Het Nederlandse onderwijssysteem is bijvoorbeeld meer gericht op goed georganiseerde, gedisciplineerde kinderen dan op hyperactieve, creatieve kinderen.

Biology en psychologie kunnen ook het profiel van andere beroepen verklaren. Daarom is het doel van dit proefschrift niet om het onderzoek naar ondernemerschap te onderstrepen, maar om ondernemerschap te gebruiken als een bewijs voor het idee dat biologie en psychologie een rol kunnen spelen in het verklaren van beroepskeuze. Toekomstig onderzoek moet zich dus niet alleen richten op het verder ontwikkelen van onderzoek naar de rol van psychologie en biologie in ondernemerschap, maar ook andere uitingen van economisch gedrag onderzoeken.
6. References


88


7. 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 (ESE) at the Erasmus University Rotterdam (EUR).

Dissertations in the last four years


Szatmari, B., *We are (all) the champions: The effect of status in the implementation of innovations*, Promotors: Prof. J.C.M & Dr D. Deichmann, EPS-2016-401-LIS, http://repub.eur.nl/pub/94633


