TOWARD A CONFIGURATIONAL UNDERSTANDING OF ENTREPRENEURSHIP USING QUALITATIVE COMPARATIVE ANALYSIS

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1. Introduction

The world is said to be becoming more complex; however, complex does not simply mean more complicated (Urry, 2005). Understanding the complexity surrounding us changes the requirements faced by entrepreneurs and entrepreneurship researchers alike. Accordingly, Tobak (2014) advises entrepreneurs on "How to think differently to succeed in a complex world" and Harms, Kraus, and Schwarz (2009) advocate a configurational approach to studying complex phenomena in entrepreneurship. However, "Scientists' tools are not neutral" (Gigerenzer, 1991, p. 264), which implies that the research decisions scholars make also need to be adapted in light of the increasing degree of complexity.

This doctoral thesis focuses on the research method Qualitative Comparative Analysis (QCA), which complies with the configurational approach and thus complexity science. The aim of the thesis is to show the potential of capturing the complexity of entrepreneurial phenomena by applying a configurational approach and an aligned research method. Capturing a higher degree of complexity, not only enables a more holistic comprehension from a scientific view, but will also benefit entrepreneurs seeking to understand equifinal paths to success.

The introductory section continues with a brief primer on complexity science and the relationship between complexity and entrepreneurship (section 1.1.). Subsequently, the configurational approach and QCA as a research method are presented (section 1.2.). In section 1.3., I will then present the structure of my thesis and in section 1.4. I summarize the main findings.

1.1. Complexity and entrepreneurship

Complexity theory deals with "the question of how coherent and purposive wholes emerge from the interactions […] [of] components" (Lissack, 1999, p. 112). The components might again present a complex system in itself (Woodside, 2014) and because of its mutual dependent links between components and sub-components be "more than the sum of its parts" (Simon, 1962, p. 468).

Complex systems can be characterized by four assumptions (Berger & Kuckertz, 2016; Lichtenstein, 2000):

(1)*Irreducibility of elements* - Due to the entwined nature of the elements, it is insufficient to focus on the effects of the single elements since the system as such cannot be reduced to them.

(2)*Interdependencies* - The causality in complex systems cannot be described by linear models, since the causality is interdependent. The impact of one element depends on the context, expressed by the other elements.

(3)*Non-proportionality* - The effect of an antecedent or input factor is not proportional to the strength of that antecedent. Due to the non-proportionality or disproportionality, small inputs might have a large impact, whereas large inputs might hardly change the outcome.

(4)*Dynamics* - Complex systems are dynamic and constantly changing.

Social science increasingly recognizes the relevance of the movement in sciences toward complexity and has produced a large body of literature discussing its implications and advantages for social science and also for management in particular (Phelps & Hase, 2005; Urry, 2005; Woodside, 2014).

Entrepreneurship is a discipline, which is naturally complex (McKelvey, 2004). Part of the reason is its emergence from building on established theories and methods from other fields (Bygrave, 1989). However, entrepreneurship as a discipline has evolved and created a common understanding of its (possibly fuzzy, but certainly dynamic) boundaries. The most cited definition of entrepreneurship is provided by Shane and Venkataraman (2000, p. 218), and suggests that entrepreneurship research deals with:

> *"(1) why, when, and how opportunities for the creation of goods and services come into existence; (2) why, when, and how some people and not others discover and exploit these opportunities; and (3) why, when, and how different modes of action are used to exploit entrepreneurial opportunities."*

A content analysis of entrepreneurship articles published in recent years by Kuckertz and Mandl (2016, p. 430) confirms that "*Entrepreneurship research explores how a) individuals b) on the basis of opportunity c) effectively organize d) any e) growth-oriented f) creation process.*" Both definitions emphasize that entrepreneurship copes with both the inner environment in terms of the psychology of the individual and the resources of an individual firm as well as the outer environment such as institutional frameworks or technology

trajectories (Sarasvathy, 2004). The position implies entrepreneurship naturally has many interfaces with other research fields, those interfaces being contingent, intertwined, and dynamic; in other words, a naturally complex system. Accordingly, McKelvey (2004) argues that studying entrepreneurship requires complexity science, since the discipline can only be understood in terms of creating order rather than achieving the state of equilibrium. Because of its position *in between* entrepreneurial phenomena are required or expected to integrate theoretical approaches from multiple disciplines and hence link several complex systems. However, "complexity science is still new to entrepreneurship" (Lichtenstein, Carter, Dooley, & Gartner, 2007, p. 257), which implies possible challenges will confront researchers combining the holistic view of complexity science and entrepreneurship.

1.2. Configurational approach and qualitative comparative analysis

Several researchers have tried to establish a common understanding of the perspectives that complexity science imposes. Meyer, Tsui, and Hinings (1993) consider the configurational approach to be rooted in complexity science, but to go beyond the contingency theory, particularly with respect to dynamics. Accordingly, the configurational approach permits complexity to be captured by identifying "sets of different configurations that collectively exhaust a large fraction of the […] [phenomenon] under consideration" (Miller & Friesen, 1984, p. 12). That means configurations can be understood as "patterns of attributes" (Fiss, 2007, p. 1181) that can lead to different outcomes depending on the context.

Harms et al. (2009) argue that the assumptions of the configurational approach, which is rooted in complexity theory, complies well with entrepreneurship research despite potential challenges arising from its applications. Schulze-Bentrop (2013) reviews past publications that adopt a configurational approach to entrepreneurship and concludes based on two pivotal studies that a configurational approach has promise if seeking to understand the interdependencies of entrepreneurial orientation (Short, Payne, & Ketchen, 2008) and the configurations of new ventures (Harms, Kraus, & Reschke, 2007).

Short and colleagues (2008) argue that the configurational approach is far more popular than researchers might think. However, the language used to explain the approach scholars take to deal with complexity has led to considerable confusion due to the plethora of different labels

employed. With regard to entrepreneurship, they consider in particular entrepreneurial orientation to be a complex construct that has led to a number of ambiguous empirical results, which might be due to the negligence of interdependencies and context. Harms et al. (2007) argue that the configurations of new venture creation in particular require a configurational approach. In light of the definition provided by Shane and Venkataraman (2000) cited earlier, Harms and colleagues (2007) suggest a configurational approach to new venture creation is arguably as broad as it can be, since it comprises more or less the entire entrepreneurship discipline.

However, research designs are shaped by the interplay between the studied phenomenon, the theory considered and the methods employed. Therefore, changing one corner of the triangle in terms of linking entrepreneurship theory with a configurational approach, requires an adaptation of the research methods applied. As Bygrave (1989, p. 7–8) puts it:

> *"Entrepreneurship begins with a disjointed, discontinuous, non-linear (and usually unique) event that cannot be studied successfully with methods developed for examining smooth, continuous, linear (and often repeatable) processes."*

The configurational approach, rooted in complexity theory is fundamentally different from the approach of separability and linear cause and effect relationships, and thus complexity theory is not in accordance with most of the common research methods. Despite the increasing degree of complexity in many disciplines and the growing awareness of adapting a configurational approach, an analogous shift in the definition of research designs cannot be observed. Shook, Ketchen, Cycyota, and Crockett (2003) provide evidence from strategic management, where the application of linear models is still the most prevalent research approach. The conclusion of new methods having to follow new theory has thus not been fulfilled and leads to an increasing mismatch between theory and research methods (Ketchen, Boyd, & Bergh, 2008).

Qualitative research methods such as case studies are able to adequately capture rich contexts, since it requires the researcher to profoundly understand the subset explaining an outcome. However, it can be difficult to detect patterns from case studies that serve to draw more general conclusions about the path to an outcome. A complexity-informed research method was developed nearly 30 years ago by Charles Ragin (1987). *Qualitative Comparative Analysis* (QCA) is a research method based on case studies, as it aims to study cases as a whole.

However, through the comparison across cases, patterns explaining an outcome are derived from reductions based on Boolean algebra (Ragin, 1987). QCA thus presents a middle path between qualitative and quantitative research without claiming to be a compromise between them but rather to "transcend many of their respective limitations" (Ragin, 2008, p. 6). At the heart of QCA lies the concept of *multidimensional conjunctural causation*, which has three main assumptions: First, rather than single factors, it is a combination (configurations) of factors (conditions) that explain a phenomenon (outcome). Second, different configurations might equifinally lead to the same outcome. Third, the impact of a condition on the outcome depends on the context, that is, on other conditions of the configuration (Rihoux, 2006).

Ragin's (1987) original introduction of QCA suggested the analysis of cases using crisp-sets, which implies the dichotomization of variables, indicating whether a condition is a member or non-member in a set. The crisp-set approach can be limited because it reduces the information content captured by the conditions. Ragin (2000, 2008) further developed QCA and suggested the application of fuzzy-set QCA (fsQCA) to deal with this potential limitation. The particularity of fsQCA is the calibration of data. Rather than including uninterpreted variables, based on case knowledge or other anchor points external to the data set, variables are calibrated to present the degree of membership ranging between 0 and 1 on a continuous scale.

Due to the complexity of entrepreneurial phenomena, which frequently requires researchers to take a configurational approach, the research methods also need to comply with the underlying assumptions of complexity. This thesis aims to show the potential of applying the complexity-informed research method QCA to study complex phenomena in entrepreneurship, for research at both macro and micro levels.

1.3. Structure of this thesis

The doctoral thesis comprises four empirical studies, which together highlight the state of the art and the potential of applying QCA to complex phenomena in entrepreneurship, at both macro and micro levels. This introductory chapter is followed by four chapters each representing one empirical study. All but one of the studies have been published in journals or peer-reviewed edited volumes. Next, I briefly summarize the objectives of each study.

The first study titled *"Is Qualitative Comparative Analysis an Emerging Method? – Structured Literature Review and Bibliometric Analysis of QCA Applications in Business & Management Research"*[1] (chapter 2) provides a broad understanding of QCA as a research method and answers the question of whether this research method has already gained the status of an emerging method. The focus is expanded to study not only entrepreneurship research, but also business and management (B&M) research for two reasons. First, to date the number of QCA applications in entrepreneurship is rather small. However, Kuckertz and Mandl (2013) show that entrepreneurship scholars might very well be aware of QCA as an emerging research method. Second, the entrepreneurship community tends to adopt methods from different disciplines such as social science as well as B&M (Blackburn & Kovalainen, 2009). In other words, even if a research method is not yet popular in entrepreneurship, its emergence in B&M research might indicate a future development in entrepreneurship. To establish an overview of QCA applications in B&M research I asked four questions: 1) (Why) is QCA applied in B&M research? 2) How is QCA applied in B&M research? These first two questions were approached by conducting a structured literature review of applications in B&M research published between 1987 and 2015. The third question: 3) What is the knowledge base of QCA applications in B&M? is addressed by conducting a citation analysis of the previously 96 identified articles. Finally, I ask 4) What is the structure of the current research front? That question was tackled with the aid of a bibliometric coupling analysis.

After reviewing the previous application of QCA in B&M research, two illustrative fuzzy-set QCA processes were conducted at the macro-level. Both studies dealt with one of the most pressing questions affecting entrepreneurship at a macro-level; the attempt to understand what drives entrepreneurial activity. Owing to the beneficial effect of entrepreneurial activity on growth and development, many researchers have studied why some countries have higher levels of entrepreneurial activity than others. However, because of the natural limitation of sample sizes, cross-country comparisons are frequently conducted by means of case studies or include only few variables in linear models (Bruton, Ahlstrom, & Li, 2010). The adequacy of

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[1] Cf. Chapter 2, published in double-blind peer-reviewed edited volume: Berger, E. S. C. (2016). Is qualitative comparative analysis an emerging method? – Structured literature review and bibliometric analysis of QCA applications in business & management research. In E. S. C. Berger & A. Kuckertz (Eds.), *Complexity in entrepreneurship, innovation and technology research – Applications of emergent and neglected methods* (pp. 287–308). Cham, Switzerland: Springer International Publishing.

cross-country comparisons is one of the reasons explaining the popularity of QCA in political science, since patterns can be identified despite small sample sizes. Furthermore, the elements of the institutional framework are interdependent and irreducible – a fact that linear models fail to consider, but QCA accounts for (Ragin, 1987).

To illustrate the adequacy of analyzing the level of entrepreneurial activity across countries, which has entangled antecedents, the second study (chapter 3) asks how institutional framework elements explain a high level of opportunity-driven and necessity-driven entrepreneurship among 23 innovation-driven economies. The study titled *What drives entrepreneurship? A configurational analysis of the determinants of entrepreneurship in innovation-driven economies*[2] also emphasizes the need to apply research methods that account for causal asymmetry, as the sets of conditions explaining high levels of opportunity-driven entrepreneurship are not symmetric counterparts of the configurations explaining necessity-driven entrepreneurship.

The third paper of this thesis titled *The more the merrier? Economic freedom and entrepreneurial activity*[3] can be understood as an advancement of the preceding study. Instead of trying to embrace the entire institutional framework, the study focuses on the regulatory pillar. This narrows the superset to be explained to influences that can actually be shaped by policymakers. Therefore, the study asks how components of economic freedom ought to be designed to enable high levels of entrepreneurial activity. On the other hand, the study investigates more countries and also identifies patterns explaining entrepreneurial activity in factor-driven, efficiency-driven, and innovation-driven economies. The last study presented as part of this thesis turns to the micro level. The study titled *Overcoming the Matthew effect in status-dominated environments – a configurational analysis of venture capital investments*[4] (chapter 5) combines Social Network Analysis and QCA using a large longitudinal sample of 333 venture capital investments in order to analyze what combination of deal resources

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[2] Cf. Chapter 3, published in double-blind peer-reviewed journal: Kuckertz, A., Berger, E. S. C., & Allmendinger, M. P. (2015). What drives entrepreneurship? A configurational analysis of the determinants of total entrepreneurial activity in innovation-based economies. *Business Administration Review*, *75*(4), 273–288.

[3] Cf. Chapter 4, published in double-blind peer-reviewed journal: Kuckertz, A., Berger, E. S. C., & Mpeqa, A. (2016). The more the merrier? Economic freedom and entrepreneurial activity. *Journal of Business Research*, *69*(4), 1288–1293.

[4] Cf. Chapter 5, earlier version (full paper) published in double-blind peer-reviewed conference proceedings *Frontiers of Entrepreneurship Research* and currently under review at a B-ranked journal according to VHB-JOURQUAL 3

accumulated by venture capital partners leads to high deal performance. The aim is to explore whether new entrants can overcome the burden of being new, which usually involves having a low status position and only weak ties with current actors in status-dominated environments. Finally, in the last chapter I summarize and discuss the contribution of this thesis to the entrepreneurship literature and the research method community as a whole. Apart from providing a conclusion based on the preceding chapters, I also suggest future research avenues that can contribute toward a configurational understanding in the field of entrepreneurship. Figure 1-1 presents the structure of the thesis.

Figure 1-1 Structure of doctoral thesis

Towards a configurational understanding of entrepreneurship using qualitative comparative analysis

1 Complexity & Entrepreneurship

2 Study 1: State of the art of QCA applications

QCA APPLICATIONS MACRO-LEVEL

3 Study 2: Configurations of culture, well-being and economic freedom explaining entrepreneurial activity

4 Study 3: Configurations of economic freedom explaining entrepreneurial activity

QCA APPLICATION MICRO-LEVEL

5 Study 4: Configurations of deal resources explaining high performance of venture capital deals

6 Discussion, avenue for future research and conclusion

1.4. Key findings

Overall, the thesis provides strong evidence that studying complex entrepreneurial phenomena from a configurational perspective using Qualitative Comparative Analysis can lead to an alignment between theory, phenomena and research designs and thereby provide new insights into open questions on entrepreneurship, as well as shed light on questions that have produced ambiguous results.

The structured literature review in chapter two presents the analysis of 96 applications of QCA in B&M research, covering a large range of different research questions. The citation analysis identifies some seminal publications on the research method (Ragin, 1987, 2000, 2008) and applications of QCA in business & management (Fiss, 2011) to have fostered an increase in the number of published journal articles since 2011. The analysis of the research front using bibliometric coupling showed the sparse coverage of topics making use of QCA. The naturally complex discipline of entrepreneurship has seen ten publications since 1995. They feature no analysis on a country level, and few studies using a mixed-method design or larger sample sizes.

The results of the two studies at the macro-level comparing the institutional framework across countries with respect to the level of entrepreneurial activity emphasize the need to understand the interdependencies and non-reducibility of the subset, which explains entrepreneurial activity. Despite small sample sizes, the studies identified patterns fostering entrepreneurial activity. The third chapter then presents a more holistic view by considering culture, well-being, and economic freedom as the subset that when applied in the right combination, such as in the Nordic role model, can foster opportunity-driven entrepreneurship. The fourth chapter on the other hand addresses the dimension of the institutional framework that policy makers have the greatest impact upon, namely economic freedom. The results highlight the relevance of the interdependencies among the elements of economic freedom and with the developmental stage. The different paths promoting higher levels of entrepreneurial activity can be mapped adequately using QCA.

Chapter 5 showcases applying QCA at a micro level, using a large, longitudinal dataset and employing social network analysis to construct four of the eight conditions relating to network

resources. The results point to a path that enables even new entrants into a status-dominated market to succeed. Applying QCA in this context provides an alignment between theory and research design, as other research methods such as regression or cluster analysis suggest eliminating outliers, and accordingly would have blocked identifying this rare path of how new entrants can overcome the Matthew effect.

The results and contribution of this thesis are discussed in further detail in chapter six. I also suggest further research challenges and avenues in order to establish a configurational understanding of QCA.

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2. Is qualitative comparative analysis an emerging method? – structured literature review and bibliometric analysis of QCA applications in business & management research[5]

Abstract

Qualitative comparative analysis (QCA) is a powerful method originating in the fields of political science and sociology, where it is becoming a mainstream method. This article analyzes the state of QCA applications in business and management (B&M) research by conducting a structured literature review, which results in the identification of 96 studies between 1995 and 2015. Additionally, the knowledge base of those articles is analyzed by means of a citations analysis. The 5,141 unique citations serve to also structure the research front using a bibliometric coupling analysis. The results point toward a somewhat deferred development of QCA in the discipline, which has recently undergone a quantum leap with regard to the number of publications as well as the advance of the method application. The current development is strongly determined by the originator of the method, Charles Ragin, and by the first studies applying QCA in business and management. Yet, the research front is only loosely connected, underlining that QCA remains at an early stage of adoption in business and management. The chapter gives three recommendations for future QCA studies and predicts a progressing profile formation of QCA in business and management research that can contribute to the adoption of configurational thinking within the discipline.

2.1. Relevance of QCA in business & management and research objective

In political science and sociology, the twenty-fifth anniversary of Qualitative Comparative Analysis (QCA) was recently marked with a special issue of Political Research Quarterly presenting the advantages of the method and how it has developed in several articles (Rihoux & Marx, 2013). QCA is particularly celebrated for capturing high degrees of complexity as a set or outcome is explained by its subset(s), which can consist of combinations of different variables in QCA, better known as conditions. Thereby, different paths can lead to the equifinal outcome, which are not necessarily the same configurations explaining the non-outcome. This characteristic is referred to as causal asymmetry (Ragin, 1987, 2000, 2008). Most researchers consider the seminal work by Charles Ragin, The Comparative Method (1987), to mark the beginning of the QCA era, and since its publication the method has gained in popularity, so that in the special issue, Rihoux, Álamos-Concha, Bol, Marx, and Rezsöhazy (2013) study the development of QCA applications since Ragin's introduction of it and conclude that QCA might be on the way to becoming a mainstream method. While this might be true for political science and sociology, QCA in B&M research is a younger phenomenon: the first application of QCA in that research stream appeared in 1995 (Romme, 1995), giving QCA a twenty-year history in B&M research. Fiss (2007) shows that the notion of configurational thinking is inevitable and the approach fruitful also for B&M research. In recent years, a plethora of textbooks and articles providing step-by-step instructions on how to conduct QCA studies were published (e.g. Marx, Cambré, & Rihoux, 2013; Rihoux & Ragin, 2009; Schneider & Eggert, 2014; Schneider & Wagemann, 2012; Schulze-Bentrop, 2013). While reviews of QCA applications in general (Rihoux et al., 2013; Schulze-Bentrop, 2013), focusing on one type of QCA, such as fuzzy-set QCA (Mello, 2013), or on the application in one specific research area, such as the welfare state (Emmenegger, Kvist, & Skaaning, 2013) have been conducted and numerous calls for the application of the method in B&M exist (Greckhamer, Misangyi, Elms, & Lacey, 2008; Harms, Kraus, & Schwarz, 2009; Schneider & Eggert, 2014) and have resulted in a considerable number of publications, there remains little transparency on how QCA is applied in this discipline.

Nevertheless, for both QCA experts and for novices to the method, it is relevant to understand how the application in the discipline has developed and what the state of the art of employing QCA in B&M studies is, in order to generate high-quality publications and to advance QCA applications.

The purpose of this study is to analyze the state of the application of QCA in B&M research. To achieve this objective, this chapter includes a structured literature review of applications in B&M research published between 1987 and 2015. This serves to identify the research front. The citations of the identified articles are also analyzed to reveal both the traditions and roots and the development of QCA applications in B&M research over the years. The approach also illuminates which are the most influential publications. In other words, the citation analysis aids the identification of the knowledge base. In order to map the structure of the current research front, the technique of bibliometric coupling is applied, which is based on the citations of the articles and was therefore conducted subsequently. The article continues with the methodology section. The results of the analysis of 96 research articles, of the selected citations, and the results of bibliometric coupling are subsequently presented. The article ends with a summary of the discussion and a call for further innovative and high-quality applications of QCA in B&M research, which are aided by three recommendations for further QCA studies.

2.2. Methodology

Mapping the state of the QCA application in B&M research, involved conducting a structured literature review following Tranfield, Denyer, and Smart (2003), and as mentioned above, both a citations analysis and bibliometric coupling.

2.2.1. Identification of research

To identify the relevant articles, the researcher and one other expert together determined four search strings to track QCA articles in several databases: Those search terms were qualitative comparative analysis, Boolean comparative analysis, configurational analysis, and comparative method. The search term configurational analysis was included because QCA can be described as a configurational analysis, but other methods such as cluster analysis, can also be subsumed under this heading (Fiss, 2007). The search term comparative method also covers

all studies citing Ragin's (1987) book The Comparative Method. However, the term could also identify all studies applying or mentioning the constant comparative method, mainly developed by Glaser and Strauss (1967), which is at the core of grounded theory and cannot be classified as QCA. The methods, however, are not completely alien to each other, therefore an adapted search term such as comparative method AND NOT constant comparative would have risked excluding articles mentioning both approaches.

The analysis is restricted to peer-reviewed journals in the English language. The time period examined starts with the seminal work by Ragin (1987). Some researchers argue that Ragin, Mayer, and Drass (1984) might be viewed as the first QCA study (Rihoux et al., 2013), however they also show no further major QCA applications in the years to 1987. Other authors choose shorter time periods for a QCA overview (e.g. Schulze-Bentrop (2013) includes articles after 2000 or Mello (2013) includes articles from 2011 onwards) in order to improve comparability among the articles and the standard levels. However, this study deliberately includes all publications available online since 1987 until December, 31 2014 with the aim of showing the development of QCA applications in B&M research.

2.2.2. Selection of articles

To select the articles, the researcher followed a two-step procedure. The first step was to access the ISI web of knowledge journal citation report (JCR) and select all journals listed under the subject categories business and management. Ensuring a full-text search in the 240 identified peer-reviewed journals required the use of 35 different databases. When the researcher could not retrieve an article from a database, the authors of the articles were contacted directly to request the publication.

The second step involved accessing the compasss database, which encompasses comparative studies, particularly QCA studies. According to Rihoux et al. (2013) this database provides a near exhaustive coverage of QCA articles. All papers in the category applications in Business and Economics, Management & Organization and in other areas were added if they were:

a) not a duplicate of the articles already identified and

b) published in a business or management journal and

c) written in English.

This second step resulted in the identification of a further 12 articles, adding up to an initial sample of 710 articles. To identify the relevant articles, inclusion and exclusion criteria were defined. The criterion for inclusion was the article being one primarily featuring empirical research. The exclusion criteria were accordingly an article being non-empirical, a non-research paper, and not applying QCA. As anticipated, the search string comparative method also produced many articles applying constant comparative methods, which were then also excluded. As suggested by Tranfield et al. (2003), the author also applied a study quality assessment by excluding articles that did not disclose sufficient details of the QCA conducted.

Having distilled the final data set of 96 articles, two researchers reviewed the full-length articles independently and summarized the study design, key characteristics, and results using a structured data extraction form as suggested by Tranfield et al. (2003). The agreement percentage between the authors ranges between 0.9 and 1.0 and points to indicate an acceptable interrater reliability (Neuendorf, 2002). Discrepancies were resolved through discussion.

2.2.3. Citation analysis

Citation analysis is based on the understanding of more frequently cited references wielding greater impact (Garfield, 1955). Instead of considering the citation counts of a publication by any other scientific publication, such as Google Scholar citation counts, the focus is on the references cited by the previously identified QCA application articles. Hence in a next step, the data of the citations of the identified articles were extracted from several databases such as ISI, Scopus, and EBSCO. Additionally, the list of citations was complemented and verified by extracting the citations manually from the articles' bibliographies. Due to different data sources, it was necessary to perform substantial data cleansing as detailed by Zupic and Čater (2015). Following Harzing (2010), internal citations were not excluded, as they are mostly a justified acknowledgement of the researcher's prior work in the same field.

2.2.4. Bibliometric coupling

In comparison to other citation analysis approaches, such as co-citation analysis, bibliometric coupling is not directed toward the past of a research field, but focuses on the research front and is hence suitable to identify present and prospective priorities in the academic field (Vogel & Güttel, 2013). According to Kessler (1963), two publications are bibliometrically coupled when they share at least one common reference. Hence, links are established by the authors of the identified articles, ergo the current research community (Zupic & Čater, 2015). On the basis of the list of citations, a matrix of bibliometric couples was created to enable the construction of a bibliometric network, where the strength of the links between two articles reflected the similarity of their bibliographies. For the visualization of the network, the open source network gephi (https://gephi.org) was applied.

2.3. Findings: The state of QCA applications in B&M research

2.3.1. (Why) is QCA applied in B&M research?

The final sample of QCA applications in the B&M encompasses 96 articles. As is evident from Figure 2-1, the number of publications has grown considerably, especially since 2009. The exact years of publication depend inter alia on the duration of review processes so do not matter, therefore Figure 2-1 collates articles for several years and also differentiates between the type of QCA – crisp-set (csQCA) or fuzzy-set (fsQCA). One single article applies both csQCA and fsQCA (Skaaning, 2007). Although the considered time period starts in 1987, the first application in B&M research was published in 1995 and only three more studies followed until the year 2000. From 2000 on, when another seminal work was published by Ragin (2000), the applications of QCA in B&M picked up, until in 2008, 22 QCA applications in B&M were published, the majority (73 %) being csQCA. However, a major increase can be observed from 2009 on, that is, after the publication of Ragin's (2008) and of Rihoux's and Ragin's (2009) seminal textbooks providing guidance on the methodology. Another influential publication for B&M research in this period was the article "A set-theoretic approach to organizational configurations" by Fiss in the Academy of Management Review (2007). The article emphasized the relevance of configurations in organizational studies and can be understood as

an influential call to adopt the configurational approach in the discipline. Simultaneously, the introduction of the fuzzy-set variant of QCA seems to have increased the method's attractiveness and acceptance. To visualize how the number of publications have increased recently, Figure 2-1 shows the articles published since 2014 separately, with the year of publication referring to printed issues. That the number of articles in 2014 and 2015 is already higher than in the five preceding years is remarkable, given that the 20 articles categorized as 2015 publications only include articles published online up until December 31 2014 that will be printed in 2015. It seems inevitable that more will be published in the course of the year, and the trend for QCA publications in B&M research will progress.

Most authors (87 %) in our sample have only published one article. Three authors, namely Ruth V. Aguilera, Roberto García-Castro, and Na Ni have published (as first or co-author) three articles and could possibly be called experts in the application of QCA in B&M research. This is certainly true for Arch G. Woodside, who has published as many as nine articles as a first or co-author.

Figure 2-1 *Applications of QCA studies in B&M research 1987–2015*
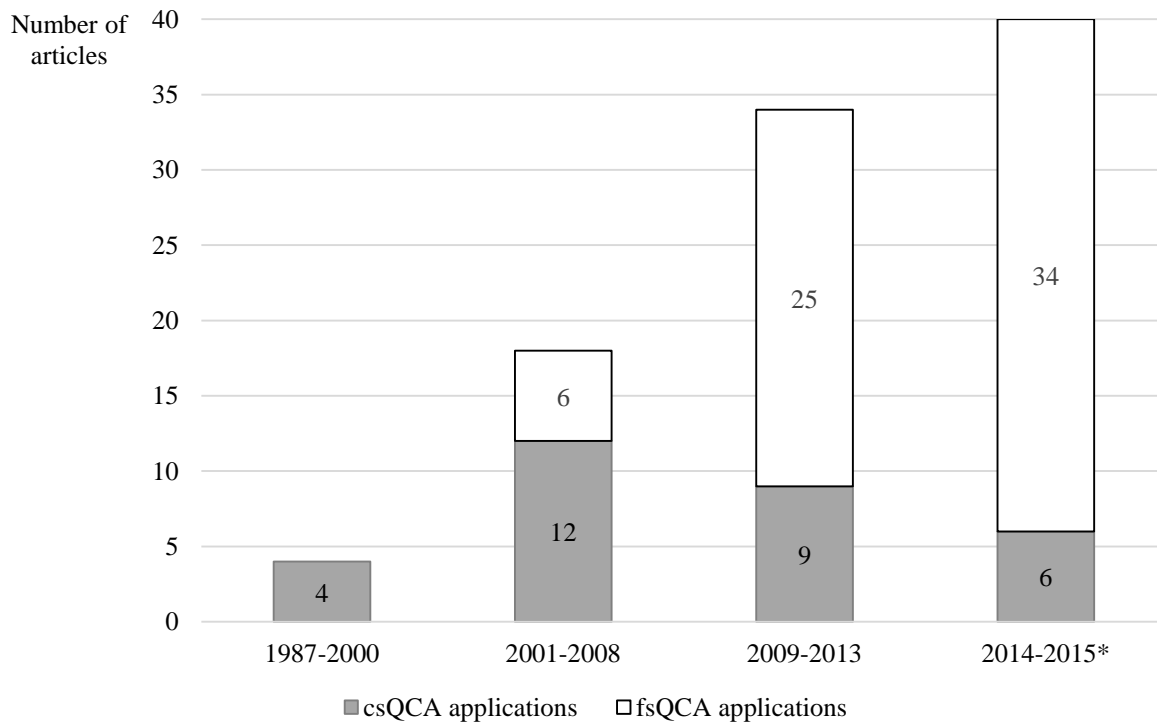
* Only articles published online up until December 31 2014 are considered.

Furthermore, while Rihoux et al. (2013) reveals csQCA as the dominant type of QCA in a review of QCA applications across all disciplines until 2011, the dataset clearly shows a strong preference toward fsQCA in B&M research.

However, although there is a trend of more QCA publications, this is not the case across the entire discipline. Table 2-1 lists the five journals with the greatest number of published studies applying QCA. The Journal of Business Research (JBR) hosted the first article in this discipline (Romme, 1995) and has gone on to become the clear leader in publishing QCA studies. However, simply listing the number of QCA articles published by a journal is not as informative as knowing the proportion of QCA articles of the journal's total output, and accordingly, Table 2-1 also lists the yearly output of the journals for one exemplar year, 2014. This helps to put the 26 articles in the JBR into perspective, as the journal publishes more articles in total than some others. In 2014 for instance, 4.4 % of the articles in Organization Studies were applications in QCA, as were 2.8 % of those in the Academy of Management Journal (AMJ) and only 1.6 % in the JBR. Accordingly, Organization Studies and the AMJ might be considered just as much an enabler of QCA studies as the JBR. The 96 articles identified appeared in only 50 different B&M journals, or in other words 20 % of the discipline's journals according to the ISI JCR.

Table 2-1 Top five journals in B&M research publishing QCA studies

Ranking	Journal	No. of articles	Yearly output*
1.	Journal of Business Research	26	377
2.	Organization Studies	6	68
3.	Academy of Management Journal	5	72
4.	Journal of International Business Studies	5	67
5.	International Journal of Project Management	3	139

*Yearly output refers to number of articles published by the journal in sample year 2014

However, a research trend should not be the reason why a method is applied, and there are good reasons why QCA is the most appropriate methodology in certain contexts. Most studies elaborate a plethora of QCA characteristics, and all studies give at least one specific reason for applying QCA in the particular setting of the study; four out of five journals give two or more study-specific reasons. In B&M the characteristic of QCA enabling the analysis of combinations of conditions or characteristics leading to an outcome, rather than analyzing net-effects, appears to be the most relevant, as in 80 % of the articles this is cited as one reason for choosing the method. This is in line with the arguments made by several researchers who want to encourage the application of QCA in the B&M field specifically (Greckhamer et al., 2008; Schneider & Eggert, 2014) and in research in general (Woodside, 2013). While those researchers present further advantages, the following arguments are all cited by around 30 % of the studies (multiple reasons are possible): causal asymmetry, equifinal configurations leading to the same outcome, the possibility of capturing a higher degree of complexity, and the appropriateness of the approach to analyze small sample sizes (this includes possible natural, limited diversity in the studies' context).

2.3.2. How is QCA applied in B&M research?

QCA can be used for a range of purposes from pure description, to hypothesis, or ideal type testing (Berg-Schlosser, de Meur, Rihoux, & Ragin, 2009; Kvist, 2007). In the studied QCA applications, the tendency to create hypotheses or propositions is increasing. Whereas in the period 2001–2008, only 29 % of the studies created hypotheses or propositions prior to the QCA, in the most recent period 2014–2015, this is true of 59 % of the studies. This development might point toward QCA in B&M research being increasingly applied as a holistic method covering all analytical questions, rather than being used only for descriptive purposes.

Over one in three studies (37 of 96) explicitly follow a multi-method approach to analyzing data either preceding or following the QCA, for instance to offer an alternative analysis of a phenomenon (e.g. Huang & Huarng, 2015). A considerable number of the studies (16 %) even argue for the application of QCA to be able to compare the results to other research methods. In comparison to Mello's (2013) findings of multi-method approaches being rare for fsQCA

across disciplines, the B&M research appears to follow this approach more often. Some studies apply a multi-method approach as an integral part of the QCA, for instance to derive values for the conditions or outcome (e.g. Provan & Lemaire, 2015) using network analysis to determine the outcome positional embeddedness). The findings are in line with the share of mixed methods across disciplines (Rihoux et al., 2013). In the B&M sample, the total number of multi method approaches has increased, yet, when looking at the share of multi-method approaches relative to the number of studies published in a year, it is difficult to trace a pattern, as the share ranges inconsistently between 20 % and 56 % in 2007–2015. Therefore, on the basis of this review the conjecture of Rihoux et al. (2013) that QCA is maturing as a method, and therefore that stand-alone applications might be more frequently accepted by reviewers and editors, cannot be confirmed. Instead, whether a multi-method approach is applied might not only depend on the journal format or on the research context, but also on the study design in terms of sample size. Larger samples for instance might apply other forms of quantitative analysis such as regression analysis or factor analysis (e.g. Bijlsma & van de Bunt, 2003; Chang, Tseng, & Woodside, 2013). Smaller samples on the other hand could apply other qualitative methods, such as qualitative observations (Mol & Birkinshaw, 2014). In the setting of B&M studies, the category of 51–200 cases reveals the largest share (61 %) of multi-method approaches. Among them the majority of studies are at an organizational level of analysis.

Although, QCA was originally developed as a method enabling comparison even between sample sizes, the methodology has progressed and may be applied to (very) small, intermediate, or large sample sizes (Berg-Schlosser et al., 2009; Ragin, 2008). In the B&M literature, the sample sizes range from three cases (Häge, 2007) to more than 6,000 cases (García-Castro & Aguilera, 2014; García-Castro & Casasola, 2011). Figure 2-2 shows the sample sizes of the 96 selected studies and underlines how, in B&M, QCA is applied for all sample sizes, yet more often with (very) small sample sizes. Over time, studies have evolved to use increasingly larger sample sizes (see Table 2-2).

Figure 2-2 *Sample sizes and the level of analysis of QCA studies in B&M research*
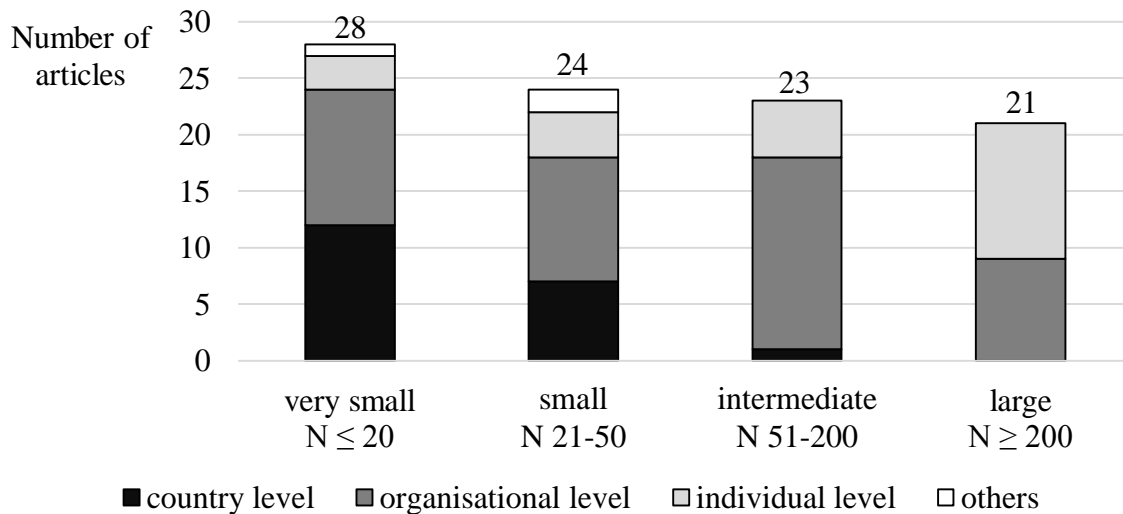
As Figure 2-2 also differentiates between the levels of analysis, two further observations are possible: Naturally, country-level analyses have rather smaller samples due to the limited number of countries in the world, this is also reflected in the studies at hand. Secondly, a large proportion of studies (49 out of 96) conduct the analysis at an organizational level, given that the focus is on B&M research it is rather surprising that the individual and organizational level do not make up an even larger share.

Although most studies can be assigned to an analytical level, tracing a pattern of the specific outcome that is analyzed is more challenging. The studied supersets range from ergonomic injuries (Marx & van Hootegem, 2007) through whistle-blowing behavior (Henik, 2015) to successful shaming for misbehavior (Stokke, 2007). Nevertheless, on the organizational level, two groups of outcomes are clearly identified: firm performance, and innovations. On the country level, performance in terms of growth and attractiveness creates the parameters for some of the outcomes. As a whole, researchers in B&M apply QCA to the defining set in strategic management research on performance, but also to a variety of other set-subset relations.

To better understand how QCA studies are conducted in B&M research, Table 2-2 offers an overview of the key characteristics of the studies. When different analysis or models within one article exist, the Table 2-2 considers the average for one article.

Table 2-2 *Key characteristics of QCA studies in B&M research 1987–2015.*

	1987-2000			2001-2008			2009-2013			2014-2015		
	Mdn	Min	Max	Mdn	Min	Max	Mdn	Min	Max	Mdn	Min	Max
No. of cases	30.5	10	43	274	3	2841	364	6	6611	441	11	6592
No. of conditions	5.75	3	11	5.39	3	9	5.8	3	10	5.88	2	11
No. of analyses	3	1	5	3.17	1	8	2.18	1	9	3.76	1	20
Consistency cut-off	-	-	-	0.72	0.65	0.9	0.78	0.65	0.93	0.83	0.75	1
Frequency cut-off	-	-	-	8.25	1	30	2	1	6	3.3	1	27
Solution consistency	-	-	-	1	1	1	0.86	0.68	1	0.87	0.44	1
Solution coverage	-	-	-	0.58	0.55	0.6	0.61	0.22	0.97	0.49	0.02	0.86

The upper part of Table 2-2 shows key characteristics of the study design in terms of number of cases, number of conditions, and the number of analyses conducted. All B&M QCA applications seem to follow the recommendation of keeping the number of conditions low, and on average the studies employ around six conditions to explain the outcome; slightly fewer for analysis on the country level and slightly more for individual-level analysis. No pattern concerning the number of employed conditions and the number of cases, the use of primary or secondary data or the type of QCA is evident.

The number of analyses conducted varies across all years between one and as many as twenty. Whereas a single analysis indicates that the study does not analyze the outcome and the non-outcome, as is suggested as good practice by Schneider and Wagemann (2012), a large number of analyses imply the testing of different outcomes and possibly different models.

The lower part of Table 2-2 presents the summary of the quality measures for QCA: consistency (i.e. the degree to which the configurations are a subset of the outcome) and

coverage (i.e. the proportion of the outcome explained by the solution configurations). As those measures were developed by Ragin in 2006, the first period naturally has no values either for the threshold requirements or for the reported solution consistency and coverage. Furthermore, in the second period, consistency and coverage were not determined, meaning the measures disclosed in the time periods 2009–2013 and 2014–2015 are more relevant. Both thresholds are within the recommended range, although a consistency cut-off of 0.65 is considered rather lax (Ragin, 2006, 2008). The results presented in the studies show a wide range of solution coverage (in 2009–2015 between 0.04 and 0.89), which emphasizes that not only empirically relevant results are presented. Quite the contrary, applying QCA can point to those configurations that might not be statistically relevant but may be theoretically so.

One strength of QCA lies in the calibration of measures, in other words, measures are transformed into concepts by assigning a membership, either in a binary form in the case of csQCA, or on the interval of 0 to 1 for fsQCA (Ragin, 2000, 2008). Among the selected studies, 17 % mentioned this as a reason for applying QCA in the specific research setting. The process of calibrating the data relies on theory and case knowledge (Ragin, 2000, 2008). Disclosing the membership criteria and providing arguments for them (derived from theory and case knowledge, preferably external to the data) are therefore essential to understand the underlying assumptions and is considered good practice (Ragin, 2008; Schneider & Wagemann, 2012). The majority of QCA studies in the B&M field follow this recommendation. However, with regard to the time periods the disclosure of anchor points for calibration has declined from full consistency in the early period to three out of four articles in the most recent publications in 2014 and 2015. Specifying the reasons for the choice of calibration criteria is even less frequently done in the articles. This might point to a tendency of researchers applying QCA increasingly according to step-by-step instructions rather than having a deep understanding of the underlying assumptions of QCA. Across all years, the share of articles listing the anchor points as well as the reasons for choosing them, varies between 60–75 %. As the number of QCA studies increases, researchers have more reference points when determining the membership criteria. By doing so the impression of arbitrary calibration can be reduced, which is often mentioned as a possible weakness of QCA (García-Castro & Casasola, 2011). But researchers can only take advantage of prior calibrations when prior studies disclose the criteria. In other words, if the quality of QCA applications in B&M research is to be improved,

full disclosure of the calibration procedure will be essential and will also prevent blind, mechanical applications of QCA. If space is limited, online appendices can provide an appropriate option (Rihoux et al., 2013).

There are now several options available when presenting the results of a QCA. Figure 2-3 presents the chosen modes of presenting the results in relation to the total number of QCA applications in the time period under consideration. Given that QCA is based on Boolean algebra, it is perhaps not surprising that writing the results using Boolean algebra is apparently the most frequently adopted form of presentation in B&M research. However, this preference seems to be in decline. Disclosing the truth table to show the findings is a popular choice, yet whereas in the first period, two of four studies used the truth table, most recently less than 30 % of all studies chose this option. There are two forms of presentation of results that are gaining in popularity. One is the XY plot, which plots a case's membership in the outcome against the membership in the condition(s) and can be easily generated with the currently most popular fs/QCA software (Ragin, Drass, & Davey, 2006). The second popular presentation mode is what Ragin and Fiss (2008) labelled a circle presentation. The form visualizes the results using filled and empty circles for the presence or absence of conditions, and in some studies the size of the circles further differentiates between core and peripheral conditions, which refers to the extent to which logical remainders were used for minimization (Fiss, 2011). Finally, Figure 2-3 also shows the proportion of studies employing more than one presentation mode, an option that was growing until recently, but which now seems to be declining.

The use of Venn diagrams is another illustrative option, however, only around 6 % of the studies chose this mode (e.g. Freitas, Gonçalves, Cheng, & Muniz, 2013) and therefore it was omitted from the Figure 2-3, as were other even rarer modes such as pattern presentations or path development diagrams. The reason for the low numbers of studies opting for Venn diagrams despite its suitability to visualize results, might be due to the fact that most software programs, which are used for QCA do not enable an automatic generation of Venn diagrams, Tosmana (Cronqvist, 2011) being a notable exception for csQCA results. In conclusion, Figure 2-3 clearly shows a shift away from the traditional modes of presenting the results, as they are used in political and social science. Instead, B&M researchers seem to rely increasingly on presentation modes unique to their discipline.

The growing preference for using only one presentation mode might point toward a maturing of the method in the discipline as one mode is adjudged sufficient to convey the results.

Figure 2-3 *Proportion of studies using different modes for presenting the QCA results 1987-2015*

* Only articles published online up until December 31 2014 are considered, (BN= Boolean Notation, CP = Circle presentation, TT = Truth table, XY = XY plot, >1 = more than one presentation type employed)

2.3.3. What is the knowledge base of QCA applications in B&M?

Extracting the citations of the 96 original articles, resulted in a list of 5,141 unique references, published between 1904 and 2014. Table 2-3 ranks the most often cited publications with at least 15 citations and shows the proportion of the 96 articles that refer to those publications. Furthermore, the Table 2-3 also shows the citation counts in Google Scholar.

Because Charles Ragin is considered the originator of QCA, it is not surprising that he authored or co-authored seven of the twelve most cited publications listed. All but one (Dai & Huang,

2015) of the 96 articles cite at least one Ragin publication. That Ragin's books from 2000 and 2008 are more relevant than the first book from 1987 might be due to the increasing application of fsQCA over csQCA in the B&M literature (see Figure 2-1), which requires referencing Ragin's books published after 2000. Peer Fiss should also be designated an expert. His conceptual paper in 2007 and his application in the context of organizational typologies in 2011 – the first empirical paper on the list – are cited by around 40 % of all publications

Table 2-3 also shows that there is no bias toward older publications, as more recent publications such as Fiss (2011) or Woodside and Zhang (2013) are also frequently cited.

Table 2-3 *Ranking of most cited publications*

Rank	Times cited in data set	Overall % in data set	Times cited in *Google Scholar*[6]	Reference	Type
1	57	59 %	2,529	Ragin (2000)	Book
2	55	57 %	1,106	Ragin (2008)	Book
3	49	51 %	5,820	Ragin (1987)	Book
4	38	40 %	470	Fiss (2007)	Article
5	37	39 %	289	Fiss (2011)	Article
6	27	28 %	376	Ragin (2006)	Article
7	26	27 %	105	Greckhamer et al. (2008)	Article
8	25	26 %	660	Rihoux and Ragin (2009)	Book
9	17	18 %	70	Schneider, Schulze-Bentrop, and Paunescu (2010)	Article
10	16	17 %	223	Ragin, Drass, and Davey (2006)	Software
11	15	16 %	80	Ragin and Fiss (2008)	Book
12	15	16 %	13	Woodside and Zhang (2013)	Article

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[6] As at June 2015

It is striking that the top three citations are all books, but that would not be unusual in other academic fields such as knowledge management (Walter & Ribière, 2013).

Comparing the ranking of the cited publications with the number of citations in Google Scholar reveals that the relevance of these publications in the academic literature differs to the relevance in the B&M research. For instance, Greckhamer et al. (2008) with only 105 citations stands out and emphasizes how this publication has a great impact, not necessarily on the application of QCA across disciplines but certainly on the application of QCA in B&M research. Again, Ragin's first QCA book is more relevant in the academic community than the later publications according to the Google Scholar citation counts, possibly also because over all academic fields there have been significantly more csQCA studies (Rihoux et al., 2013), which was introduced in Ragin's The Comparative Method in 1987.

2.3.4. What is the structure of the research front?

The bibliometric coupling analysis enables the structuring of the research front based on its reference to the knowledge base. The analysis results in a matrix of articles linked together by common citations. Among the 96 articles examined, 92 are connected by at least one common citation. The corresponding network is presented in Figure 2-4. The network is shown in the force atlas layout, which emphasizes the attraction between strongly linked nodes and accentuates dispersion between nodes, which repel each other based on their connections. Nodes represent the articles, their size relates to the number of other articles they are linked to, in other words the degree of a node. Edges represent the links between the articles based on the similarity of their bibliographies. Stronger ties are presented by thicker lines. A list of the strongest links can be found in the appendix. There are 312 links between the articles ranging from one to 16, most of them (75 %) are only linked because of one shared reference. Yet, one common citation might be arbitrary, therefore only bibliography similarities composed of at least three citations (tie strength = 3) are considered. Vogel and Güttel (2013) argue for also setting a minimum level for the number of connections to other publications an article has, and suggest a degree of two, which was adopted here. The resulting network is presented in Figure 2-5 and consists of 30 articles (nodes) and 20 connections between them (edges).

Due to the introduction of the thresholds for the degree and strength of ties, the visualization is focused on the articles with the greatest similarity, and the network becomes considerably less connected.

Figure 2-4 Network of bibliometrically coupled articles
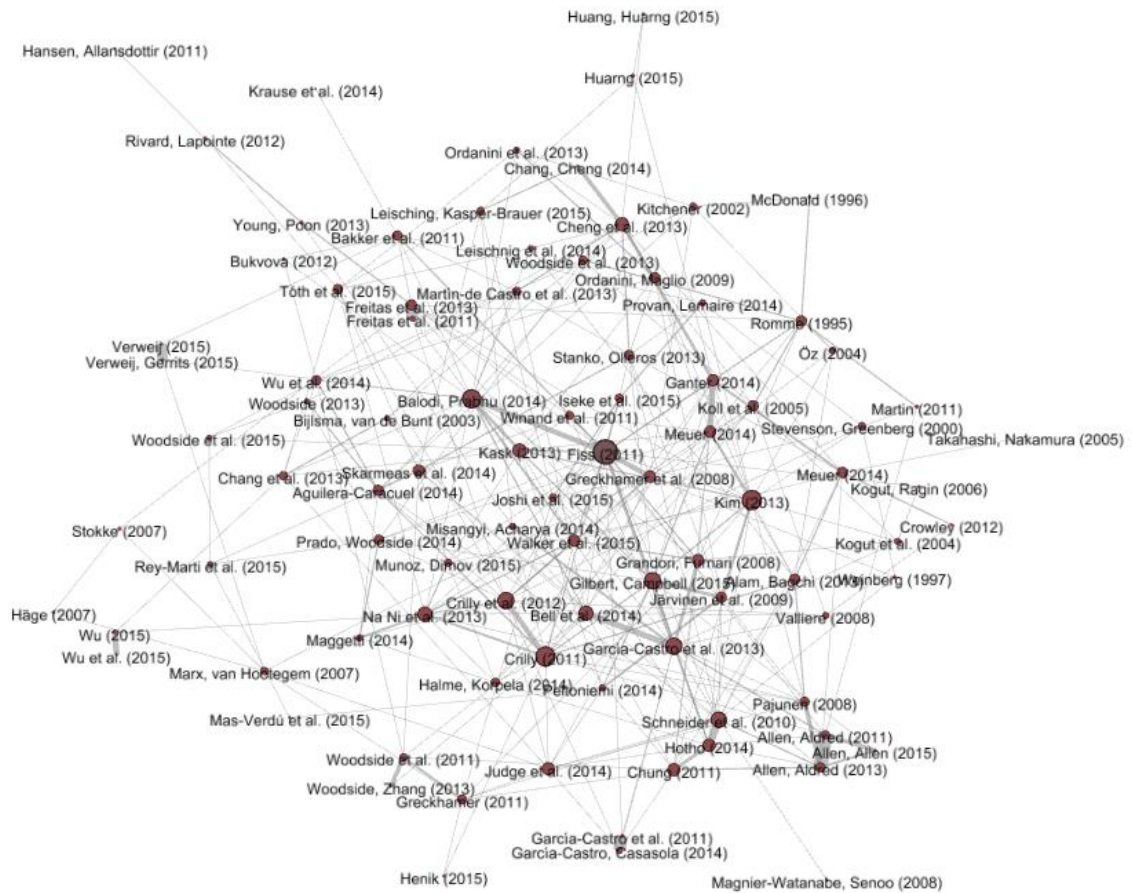
This suggests that the research front in terms of topics is rather dispersed. There are ten components. Five of the components consist of only two articles, and it is striking that for each pair, at least one author is involved in both articles. The tendency of authors to include the same references, especially when applying the same method, is, however, insufficient to explain the strong bibliometric links. For instance Woodside has authored nine articles in the data set, but only two of them are bibliometrically coupled. The five pairs all apply the same type of QCA, share the same level of analysis, and very similar sample sizes to the coupled article.

With regard to content, this ranges from comparable research questions and outcomes (Verweij, 2015; Verweij & Gerrits, 2015) to only sharing a common considered concept as large as culture (Woodside, Hsu, & Marshall, 2011; Woodside & Zhang, 2013). The largest component is that which has evolved around the frequently cited management studies of Fiss (2011) and Greckhamer et al. (2008).

Figure 2-5 *Network of bibliometrically coupled articles with a strength of at least 3*
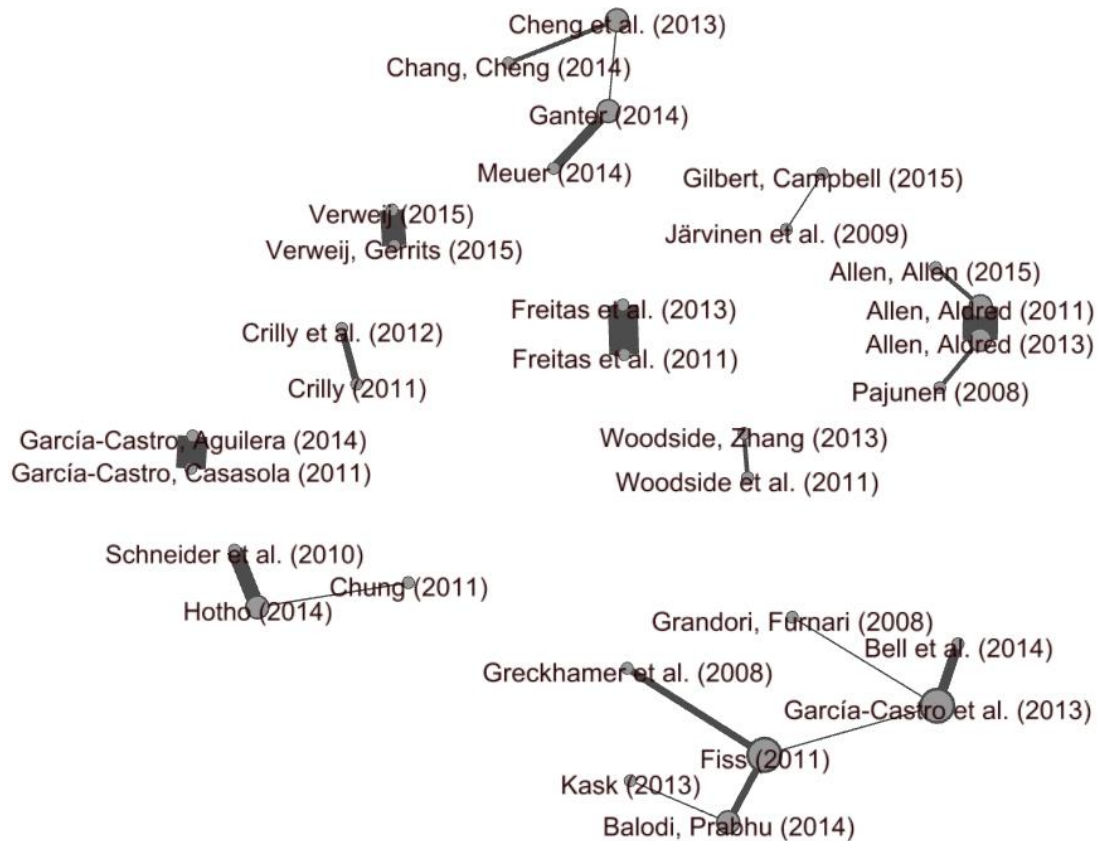
While sample sizes and type of QCA applied vary in these studies, all articles in this cluster approach organizational performance as a complex phenomenon, suited to analysis via a configurational approach, such as QCA. Accordingly, the seven articles in the cluster each focus on an organizational level.

In summary, the bibliometric coupling analysis shows that some authors already make use of past studies in QCA in B&M, whereas others tend to neglect the advances in this area. This might also be due to the fact that the field of QCA in B&M is still evolving. Accordingly, the

structure of the research front is not yet sufficiently transparent to every researcher. This also indicates countless gaps for valuable QCA applications to different concepts and phenomena in B&M research. When future studies take past achievements (and hence studies) into consideration, this will strengthen the acceptance of QCA in B&M research and also lead to a more distinct map of the research front.

2.4. Implications and conclusion

This review has aimed to shed light on the application of QCA in B&M research, in order to assess the maturity of QCA as a research method. The adoption of QCA in the B&M field initially progressed more slowly than it did in the fields where it originated, political science and sociology. QCA applications started off rather diffidently in the mid-1990s and the publications have only really picked up since 2007/2008, but there has been an almost explosive development since 2011. The structured literature review has shown, that the execution and documentation of QCA applications have gained in sophistication and acquired recognition within the discipline in recent years. Nevertheless, the review has also given rise to concern regarding the tendency of studies applying QCA like cookbook-instructions and thereby underestimate the power and requirements of the method (Hesse-Biber & Leavy, 2010). Furthermore, one might argue that QCA in B&M research is distancing itself from the original political science study designs and thereby gaining a unique profile, which is likely to find a place in the discipline's portfolio of standard methodologies in the future. To advance and clarify this profile, three recommendations for QCA applications in B&M studies should be considered by future research:

•   having a strong case for choosing a configurational study design and a willingness to create innovative study designs, or to revisit research questions that are suited to a configurational approach

•   having methodologically sound and rigorous applications, including the full disclosure of thresholds and calibration criteria

•   having clear presentations of the results, to help B&M researchers unfamiliar with QCA to understand the particularities of the method, especially employing different visualization modes

Adopting these recommendations would promote a detailed and configurational understanding of phenomena, help researchers not to fall for the illusion of blind, mechanical applications of QCA and might also be an inspiration for other disciplines.

The citation analysis above identified the most influential publications for the application of QCA in B&M research. Apart from the original methodology publications by Ragin (1987, 2000, 2008), applications of QCA in B&M such as Fiss (2011), Greckhamer et al. (2008) or Schneider et al. (2010) greatly influence academic fields. These publications could also constitute a good reading list for QCA novices in the B&M field. Yet, while the methodological basics of QCA might remain relatively constant in terms of their relevance, one sure sign that the application of QCA in B&M research is moving forward will be when the empirical studies are replaced by more recent ones, which take new paths in the application of QCA and thereby set new standards. The advances might be in identifying new topics to be tackled employing QCA or new methodologies and standards.

This bibliometric coupling analysis has connected studies based on the similarity of their bibliographies and shown that the research front is still looser than at first sight. There is one distinct cluster, which applies QCA on an organizational level and focuses on the outcome of performance. Naturally, this is one of the most pressing outcomes in the B&M area. However, many research questions and concepts in B&M research are truly configurational and applying QCA to those, can provide new insights. The bibliometric coupling analysis emphasizes the plethora of gaps regarding QCA applications in B&M research.

This literature review and bibliometric analysis structured both the research front and knowledge base and has shown how heterogeneous the studies are, but it has also pinpointed similarities between recent articles. Researchers conducting QCA studies in B&M should be aware of the development of this emerging research method and consider past studies and their shortcomings and advances in QCA in B&M more acutely, as doing so will improve the quality and acceptance of the studies in our field.

Appendix 2-1

Table A1 List of weights between articles based on bibliometric coupling analysis
(undirected)

Weight	Node1	Node2
16	Allen and Aldred (2011)	Allen and Aldred (2013)
14	Freitas et al. (2013)	Freitas, Goncalves, Cheng, and Muniz (2011)
14	García-Castro and Casasola (2011)	García-Castro and Aguilera (2014)
12	Verweij and Gerrits (2015)	Verweij (2015)
9	Hotho (2014)	Schneider et al. (2010)
7	Bell, Filatotchev, and Aguilera (2014)	García-Castro, Aguilera, and Ariño (2013)
7	Wu, Wu, Lee, and Lee (2015)	Wu (2015)
7	Ganter and Hecker (2014)	Meuer (2014)
6	Fiss (2011)	Greckhamer et al. (2008)
6	Crilly, Zollo, and Hansen (2012)	Crilly (2011)
6	Balodi and Prabhu (2014)	Fiss (2011)
5	Woodside et al. (2011)	Woodside and Zhang (2013)
5	Chang and Cheng (2014)	Cheng, Chang, and Li (2013)
5	Allen and Aldred (2013)	Pajunen (2008)
5	Allen and Aldred (2011)	Allen and Allen (2015)

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3. What drives entrepreneurship? A configurational analysis of the determinants of entrepreneurship in innovation-driven economies[7]

Abstract

We analyze the effects of culture, economic freedom and well-being on entrepreneurial activity (EA). We employ a fuzzy-set qualitative comparative (fsQCA) analysis to identify previously unknown combinations of predictors of EA in 23 innovation-driven economies. The analysis differentiates between necessity-driven entrepreneurship (NDE) and opportunity-driven entrepreneurship (ODE), reveals different configurations explaining EA, and proposes a role model for policymakers aiming to secure a high proportion of ODE in a particular economy.

3.1. Introduction

Entrepreneurship can be defined as the process (Gartner, 1989) of the pursuit of an opportunity (Shane & Venkataraman, 2000) during which a completely new organization is established. Even if only a small number of all newly founded organizations are a result of an innovative process, product or business model, studies show that these strongly innovation-orientated companies, sometimes also called high-growth firms, are more likely to drive economies, and particularly to create more employment, than their less innovative counterparts (OECD, 2013a). For established and economically successful economies, such as those of the USA or Germany, entrepreneurship plays a decisive role in securing overall competitiveness in an ever-changing global economic environment. This is because further economic development in such economies depends on innovation, giving rise to the innovation-driven label often applied to these economies (Schwab, 2012).

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[7] Kuckertz, A., Berger, E.S.C., & Allmendinger, M.P. (2015). What drives entrepreneurship? A configurational analysis of the determinants of entrepreneurship in innovation-driven economies. *Die Betriebswirtschaft (DBW) / Business Administration Review*, *75*(4), 273–288. An earlier version of this study was presented at the G-Forum 2014 in Oldenburg, Germany.

Given that entrepreneurship is a complex phenomenon, numerous different academic disciplines inform us about its determinants. Researchers from sociology, psychology and economics have analyzed entrepreneurial aspects on various levels (Freytag & Thurik, 2007; Hisrich, Langan-Fox, & Grant, 2007). Despite these explanations in the academic literature, complete depictions of macro-determinants from the different disciplines affecting entrepreneurial activity (EA) compared across countries are still scarce. Specifically, there are not enough explanations available to provide a detailed, yet comprehensible, explanation of the phenomenon, although there have been attempts to reduce the explanation of EA to only one single determinant such as culture (Hechavarria & Reynolds, 2009), happiness as a part of well-being (Naudé, Amorós, & Cristi, 2014) or economic freedom (Díaz-Casero, Díaz-Aunión, Sánchez-Escobedo, Coduras, & Hernández-Mogollón, 2012). In order to achieve a more holistic picture, we established a multidisciplinary and integrated model applying main concepts from sociology, psychology and economics, namely culture, well-being and economic freedom to analyze their combined impact on EA. Considering these different perspectives simultaneously allows for a clearer picture of the phenomenon.

Hence, this paper suggests an answer to the research question asking how well known and widely accepted determinants of EA exert their influence depending on the presence or absence of other determinants. In particular, we will focus on the potential differences regarding the share of opportunity-driven entrepreneurship (ODE) and the share of necessity-driven entrepreneurship (NDE) within total EA (Williams, 2009), given that the first form of entrepreneurship has the potential to enhance the competitiveness of innovation-driven economies, whereas the latter form of entrepreneurship is sometimes characterized as a problematic form of EA (Acs & Varga, 2005).

In contrast to traditional, regression-based analytical strategies, a configurational perspective will support the goal of providing a detailed (but still interpretable) picture of the phenomenon (Harms, Kraus, & Schwarz, 2009), and one taking account of the possibility that EA is the result of a combination of factors rather than the sum of net-effects (Aus, 2009). The current research utilizes the analytical approach of a fuzzy-set qualitative comparative analysis (fsQCA: see Ragin, 2008) and conceives of EA as a set, and the chosen determinants as related sub-sets. Secondary data from four different and recently available sources will be used to

support that cross-country analysis. The Global Entrepreneurship Monitor (GEM) informs us about the level of entrepreneurship in different economies (GEM Consortium, 2013). Hofstede's cultural dimensions are used to describe potential cultural antecedents of EA (Hofstede, 2001), the OECD Better Life Index (BLI) provides a comprehensive picture of the level of well-being (OECD, 2013b), and the Index of Economic Freedom published by The Heritage Foundation (Miller, Holmes, & Feulner, 2013) serves to illustrate how much actual economic freedom potential entrepreneurs have in their respective institutional settings.

Our study is exploratory in nature because configurations do not lend themselves to hypothesize probabilities beforehand, as would be possible when investigating clear relationships among certain theoretical concepts. The study is nonetheless deeply grounded in entrepreneurship theory and prior research, as it relies only on key concepts that proved to be important determinants of EA in prior sociological, psychological and economic research.

In order to address its research questions, the paper is structured in the following way. Following this introduction, we discuss the importance of entrepreneurship to innovation-driven economies, and we illustrate the determinants affecting the level of entrepreneurship in these economies in section 2. The subsequent section introduces our data and methodology, before section 4 presents two models of configurations explaining the level of ODE and NDE. In section 5, we discuss the implications of our research results before concluding the paper in section 6.

3.2. Theoretical background

3.2.1. The importance of entrepreneurship for innovation-driven economies

The Global Competitiveness Report (Schwab, 2012) suggests that an economy's productivity is driven by several key pillars of competitiveness, among them the macroeconomic environment, the available infrastructure, and — quite importantly — the capacity to innovate. Innovation, however, is not of equal importance when comparing economies globally. Because of great disparities, economies can be classified under three stages of development: factor-driven economies, efficiency-driven economies, and innovation-driven economies. The last in particular is characterized by a high standard of living and intense competition between

companies in wages, developing new products, and designing production processes or business models: it is therefore the primary focus of the present study. Although it would be interesting to consider countries in other developmental stages as well, the determinants of EA differ dramatically depending on the developmental stage of a particular country. Accordingly, we concentrate on innovation-driven economies in order to be able to produce precise and clear recommendations.

For innovation-driven economies, it is not only important that existing businesses engage in innovative behavior; the number of new firms established based on innovation is of equal or even greater importance. This phenomenon is called entrepreneurship and can be understood as the ability of individuals to perceive business opportunities (Shane & Venkataraman, 2000) and to act upon those opportunities despite related uncertainty (Bjørnskov & Foss, 2008). Such entrepreneurs make an essential contribution to economies, because all aspects related to the growth process can be seen to result from entrepreneurship. Furthermore, innovation is a key component of entrepreneurship and a key activity of entrepreneurs (Drucker, 1998). Galindo and Méndez (2013) elaborate on the relationship between innovation and entrepreneurship and illustrate the feedback effects among innovations, economic growth, and entrepreneurship. Their research indicates that all three concepts exert positive effects on each other.

3.2.2. Necessity-driven versus opportunity-driven entrepreneurship

Focusing only on the creation of a maximum number of new companies should be of less strategic importance than focusing on companies that have the capacity to drive the economy, to create jobs and to contribute to social and economic development (OECD, 2013a). In the early phases of international, comparative entrepreneurship studies, researchers were puzzled by the fact that EA in developing countries was far higher than in the most developed (i.e. innovation-driven) countries (Reynolds, Camp, Bygrave, Autio, & Hay, 2001). The phenomenon led researchers to distinguish the proportions of NDE and ODE relative to total EA. The former concept describes people engaging in EA due to a lack of employment options. On the contrary, ODE covers founding a venture based on an active choice. While NDE does not necessarily lead to failure (Block & Wagner, 2010), ODE is (at least from the perspective of policy makers in innovation-driven economies) the preferred form of EA.

This differentiation allows scholars to make specific statements on how these two different types of entrepreneurship affect economic development. By comparing the ratio of ODE to NDE with the per capita income of a country, researchers have found that ODE has a positive and significant effect on economic development while NDE apparently does not (Acs, 2006; Acs & Varga, 2005). It seems the more an economy develops toward the innovation-driven stage, the higher the proportion of ODE becomes (GEM Consortium, 2013). Determinants influencing the level of any type of EA that are often analyzed from a sociological, psychological or economical perspective might be culture, the overall well-being of individuals, and the level of economic freedom. These will be discussed in detail in the paragraphs that follow.

3.2.3. Determinants of entrepreneurial activity

The phenomenon of entrepreneurship is a subject in the research disciplines of sociology, psychology, and economics. Therefore, we decide upon a multidisciplinary and integrated approach that involved identifying and analyzing different determinants that might influence the level of EA in particular countries. As many studies focus on only a single determinant (Bjørnskov & Foss, 2008; Díaz-Casero et al., 2012; McMullen, Bagby, & Palich, 2008), obtaining a more complex picture of the determinants and their relationship to each other seems to be a promising endeavour, and is a necessary precondition to identifying the possible combinations leading to EA.

First, we concentrate on the main sociological determinant that is connected to the cultural phenomena of a country (Hechavarria & Reynolds, 2009; OECD, 2013c). National culture reflects a multifaceted concept with several dimensions of a society and plays an important role in relation to the phenomenon of entrepreneurship (Hayton, George, & Zahra, 2002). Furthermore, as psychological aspects are closely related to entrepreneurship (Hisrich et al., 2007), we consider this perspective by including the level of well-being, which reflects status, attitude, and the mood of individuals in a particular society. Finally, we focus on an economic determinant: economic freedom is determined by political decisions and political institutions in a given country and has been suggested to be a major determinant of EA as well (Bjørnskov & Foss, 2008; Díaz-Casero et al., 2012; McMullen et al., 2008; Nyström, 2008).

In the following paragraphs, we will therefore explain these determinants in greater detail and illustrate how they relate to EA.

Culture

Analysis of the relationship between culture and EA on a transnational level has not yet produced definite conclusions (Hechavarria & Reynolds, 2009), which is largely due to the several different conceptualizations of culture available (Turró, Urbano, & Peris-Ortiz, 2014). However, many studies (Mitchell, Smith, Seawright, & Morse, 2000; Mueller & Thomas, 2001; Shane, 1995; Simón-Moya et al., 2014) utilize the concept of Hofstede's (1980, p. 43) cultural dimensions, which defines culture as 'the collective mental programming of the people in an environment', and is built on the assumption that culture is not related to the individual but to a group of people.

Examining international comparisons in OECD publications (2013c), which apply a set of determinants of entrepreneurial performance, makes it clear that culture does indeed affect EA. Culture is a major determinant in this study and is explained by the attitude of people all over the world to topics such as attitude to risk in society, attitudes toward entrepreneurs, desire for business ownership, or entrepreneurship education (mindset). Results show that the attitude of people toward EA differs enormously from country to country. Mueller and Thomas (2001) empirically confirm that some cultures are more supportive of EA than others, and the authors call for further research investigating such questions. The OECD concludes that appropriate indicators are yet to be identified 'especially on topics such as the relationship between culture and entrepreneurship' (OECD, 2013c, p. 96).

In addition, Lee and Peterson (2000) develop a cultural model of entrepreneurship and suggest that entrepreneurs depend on their cultural foundation, because culture influences entrepreneurial orientation via environmental factors like the economy or political regulations. Furthermore, they conclude that only countries with specific cultural tendencies, in other words, particular variations of Hofstede's cultural dimensions, will generate a strong entrepreneurial orientation that subsequently leads to more entrepreneurship and global competitiveness.

Given that culture is a complex phenomenon, it is worthwhile considering Hofstede's original four cultural dimensions—power distance, individualism, uncertainty avoidance, and masculinity—separately, to illustrate the specific impact of each on EA (Hofstede, 2001).[8] Later extensions, such as an additional dimension termed long term orientation, are not considered, as they have not been incorporated in enough studies to permit a reasonable comparison of results. Long term orientation specifically is not examined because it is based on Asian value systems and Asian countries (Srite & Karahanna, 2006) that form only a minor proportion of innovation-driven economies.

Prior research based on Hofstede's approach found that entrepreneurship is fostered by cultures 'that are high in individualism, low in uncertainty avoidance, low in power distance, and high in masculinity' (Hayton et al., 2002, p. 34). However, other studies suggest that the relationship between the cultural dimensions and EA might not be as straightforward as suggested by Hayton et al. (2002). Wennekers, Thurik, van Stel, and Noorderhaven (2007, p. 156), for instance, report a 'positive direct influence of uncertainty avoidance on business ownership rates' and 'a negative indirect influence of uncertainty avoidance through a moderating effect on the influence of per capita income on business ownership'. It can be assumed that high uncertainty avoidance pushes individuals toward NDE and draws them away from ODE. Looking at another cultural dimension, individualism, Morris, Avila, & Alien (1993) suggest a relationship between individualism and firm level entrepreneurship. It seems that the level of entrepreneurship increases when there is a balance of individualism and collectivism, and could decline in more collectivistic or highly individualistic environments. There seems to be consensus that culture has an impact on EA, but exactly how the specific dimensions of culture exert their influence is not yet fully understood and appears to depend on the context, such as the other cultural dimensions or even further determinants.

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[8] Power distance is usually defined as the degree of tolerance for hierarchical or unequal relationships within a specific culture; uncertainty avoidance describes the degree of acceptance of uncertainty or willingness to take risk; individualism relates to the degree of emphasis placed on individual accomplishment; and masculinity relates to the emphasis on materialism.

Well-being

Obtaining a clearer understanding of the determinants that drive entrepreneurship requires the scholar to consider several perspectives. Beyond cultural determinants, research suggests that EA is related to the level of well-being in a particular society as well (Noorderhaven, Thurik, Wennekers, & van Stel, 2004). The majority of studies analyzing the relationship between EA and society do so by using indicators such as economic growth or GDP per capita. However, such economic indicators alone fail to adequately describe a society, as they neglect the level of satisfaction in that society. For this reason, recent research has suggested alternative measures for a better and more fine-grained comparison of social issues in societies are required (Naudé et al., 2014). The OECD has demonstrated its awareness of the issue and recently introduced the Better Life Index (BLI) (OECD, 2013b) to illustrate how satisfied people actually are with their lives from an objective and subjective perspective.

However, we need to ask what is understood by the term well-being. The concept of well-being is often used interchangeably with the terms quality of life, happiness, and life satisfaction (OECD, 2013d). Morris and Lewis (1991) define quality of life as the general state of well-being experienced by the members of society. It comprises objective (material conditions of life) and subjective (perceptions/evaluations of well-being) components. The ESRC Research Group on Wellbeing in Developing Countries, on the other hand, describes well-being as 'a state of being with others, where human needs are met, where one can act meaningfully to pursue one's goals, and where one enjoys a satisfactory quality of life' (OECD, 2013d, p. 26). In addition, happiness in society can be defined as 'the degree to which an individual judges the overall quality of his or her life as favourable' (Blanchflower & Oswald, 2004, p. 1360). Naudé et al. (2014) conclude that happiness is a component of subjective well-being. Moreover, subjective well-being is one of several dimensions of objective well-being conceptualized by the OECD (2013b). In other words, well-being can be understood as an all-inclusive concept describing people's satisfaction with life.

Some transnational comparisons revealed the connections between entrepreneurship and well-being. Noorderhaven et al. (2004) find that dissatisfaction with life and society are positively related to high self-employment rates.

Naudé et al. (2014) provide empirical evidence for higher levels of well-being increasing ODE, while finding no effect on NDE. Obviously, both low levels and high levels of well-being can influence EA, and accordingly we will consider this concept in the models that we analyze.

Economic freedom

In our study, the last determinant of EA considered is economic freedom. Economic freedom is a broad concept spanning many different areas and there is a variety of ways to define and measure it. For instance, Gwartney, Lawson, and Block (1996, p. 12) state that 'individuals have economic freedom when property they acquire without the use of force, fraud, or theft is protected from physical invasions by others and they are free to use, exchange, or give their property as long as their actions do not violate the identical rights of others'. In its most basic form, economic freedom thus refers to the fundamental rights of everyone to decide the fate of their own property and labor (Miller et al., 2013). The fundamental function of government is the protection of private property and the enforcement of contracts to support an economically free society.

Taking entrepreneurship into account there is still a missing link between economic freedom and entrepreneurial activities (Bjørnskov & Foss, 2008; McMullen et al., 2008) and a neglected analysis of how institutions and economic policy affect different types of entrepreneurship (Bjørnskov & Foss, 2008). Economic policy can greatly influence the level of EA in a country. For instance, EA seems to be negatively affected by too much regulation as these increase market entry costs of entrepreneurs (Djankov, La Porta, Lopez-De-Silanes, & Shleifer, 2002: Fonseca, Lopez-Garcia, & Pissarides, 2001; Klapper, Laeven, & Rajan, 2004).

However, other previous studies (e.g. Bjørnskov & Foss, 2008; Díaz-Casero et al., 2012; McMullen et al., 2008; Nyström, 2008) have provided indeterminate empirical findings on whether regulations predominantly foster or hinder EA in comparison to different countries. Three studies chose to use data from the GEM but applied different economic freedom indices. Bjørnskov and Foss (2008) find that the size of government is negatively correlated with EA and sound money, i.e. the consistency of monetary politics, is positively correlated with EA, but find no other measures of economic freedom to be significantly correlated with EA. In addition, the empirical findings of Nyström (2008) support the results of Bjørnskov and Foss

(2008) regarding the impact of government size. Furthermore, better legal structure and security of property rights, less regulation of credit, labor, and business tend to increase EA. Scrutinizing not only EA per se but also its different types, McMullen et al. (2008) conclude that both NDE and ODE are negatively associated with GDP per capita and positively associated with labor freedom. They also find ODE to be positively associated with increasing economic freedom within the meaning of property rights while NDE is positively related to increasing economic freedom in terms of fiscal freedom and monetary freedom. ODE and NDE are both positively associated with increasing economic freedom in terms of labor freedom.

In summary, the literature on the determinants of entrepreneurship at the national level identifies a number of potential factors, but not yet a convincing overall solution. This might be due to many studies not differentiating between the different types of entrepreneurial activity, i.e. ODE and NDE. Furthermore, the different stages of economic development are quite often ignored, which brings a risk of comparing essentially incomparable entities. Technically speaking, the standard econometric procedures tend to paint an oversimplified picture of the phenomenon as well. However, phenomena like the sociologically related aspect of culture, psychological issues like people's well-being, or the economic issue of economic freedom, are quite complex and require an analytical approach to deliver potentially meaningful results on cross-cultural differences and other influencing determinants. Hence, in the remainder of this paper we adopt a configurational approach that potentially mitigates these issues.

3.3. Method

3.3.1. Data

The current research relies on secondary data drawn from four different sources to identify configurations influencing the level of entrepreneurship in innovation-driven economies. These are the GEM (GEM Consortium, 2013), Hofstede's cultural four dimensions (Hofstede, 2001) the OECD BLI (OECD, 2013b) and the Index of Economic Freedom (Miller et al., 2013). We analyzed 23 different countries that were all classified as innovation-driven countries by Schwab (2012) and for which complete information is available in the four databases.

The GEM Consortium (2013) has been gathering data annually since 1999, using the information to assess the level of entrepreneurship in a range of countries. The current study utilized the dataset from 2013. Hofstede's cultural dimensions are a widely recognized attempt to quantify cultural aspects. The values are based on surveys conducted among IBM's international employees and have been employed in various research studies ever since Hofstede first collated them (Hofstede, 2001). Well-being is covered in the 11 dimensions of the BLI (OECD, 2013b). We used the BLI dataset from the year 2012. Last, a comprehensive description of the economic freedom in a particular economy can be drawn from the Index of Economic Freedom provided by The Heritage Foundation (Miller et al., 2013). The index is calculated by averaging the ten quantitative and qualitative factors with equal weight. This data covers the second half of 2011 through to the first half of 2012.

3.3.2. Analytical strategy

We choose a configurational approach to analyze data from innovation-driven economies in order to identify configurations explaining the level of ODE and NDE. We decided fuzzy-set qualitative comparative analysis (fsQCA) is an appropriate method in this study, as opposed to the linear causal additivity that conventional variable-oriented methods are based upon, QCA captures the notion that combinations of factors are capable of explaining a certain outcome (Aus, 2009). This method was developed by Ragin (1987, 2008) and enables a case-oriented analysis that is particularly appropriate for scrutinizing macro-comparative and small sample data (Ragin, 2000). Three particular features of the method make it interesting and set it apart from other approaches that analyze macro data. These features are fsQCA's ability to consider conjunctural causation, to identify equifinal configurations, and to calibrate measures based on theoretical considerations.

A central aspect of fsQCA is that cases (in this study national economies) are understood to exhibit an outcome because of certain inherent features. Those features are referred to as conditions. However, because of the causal complexity of the outcome, each case consists of combinations of conditions, known as configurations. In fact, it is to be expected that different configurations will each be capable of explaining the same outcome, that is, they are equifinal (Ragin, 2006). Each configuration is thus sufficient to explain an outcome (e.g. the level of

entrepreneurship), but equifinality means there might be other configurations explaining exactly the same phenomenon, which is why the configuration is not a *necessary* one. If there is one condition involved in every configuration explaining the outcome, this might indicate a necessary condition; however, it might not be a *sufficient* condition, as other conditions might be integral to the configuration that fully explains the outcome (Mackie, 1965). Solutions can be assessed in terms of consistency and coverage (Ragin, 2006). Consistency evaluates the extent to which the subset relates to the outcome, or in other words whether the cases with the same characteristics (i.e. combinations of conditions) produce the same outcome (0.8 is a commonly accepted cut-off value); whereas set-theoretic coverage gauges what share of the outcome is explained by one configuration or by all configurations taken together, and hence is a measure for the relevance of a solution. Those quality measures enable researchers to interpret the empirical importance of the solution set (Ragin, 2006, 2008).

A so-called truth table comprises all cases, for which empirical evidence is provided. In order to construct the truth table, data must be transformed into sets. To do so calibrated measures are assigned values in the interval between 0 and 1, applying the direct method introduced by Ragin (2008). The calibration is based on qualitative anchors setting thresholds for what can be considered full membership (e.g. high levels of EA) and non-membership of a set (e.g. low levels of EA) and what value marks the point of maximum ambiguity (e.g. neither high or low levels of EA). Not all conditions and outcomes allow us to base the membership criteria for calibration on case knowledge. Apart from checking the distribution of the data to track obvious value breaks marking possible thresholds, we also adopted the approach introduced by Hudson and Kühner (2013) drawing on arithmetical statistics. Accordingly, thresholds were developed by first computing box plots and excluding the outliers from the data, allowing us to gauge the adjusted means and standard deviations. In the calibration of the entire dataset, the adjusted mean determines the crossover point, whereas the addition/subtraction of one adjusted standard deviation gives the values for full- and non-membership. In the next step, all combinations of conditions, which fall short of the defined consistency cut-off of 0.8, are dropped. The comparison of cases in the truth table then permits the logical reduction of the set of configurations through the application of Boolean algebra and algorithms. To action the reduction, likely or easy counterfactuals (i.e. configurations for which no empirical evidence is available, but which are possible based on case knowledge) are allowed to further reduce the

solution resulting in a so-called intermediate solution. Neglecting counterfactuals generates solutions that are more complex, whereas including all theoretical possible counterfactuals produces a parsimonious solution (Ragin, 1987, 2008). In the following sections, we describe the conditions and the outcomes, and detail the arguments for the chosen membership criteria.

3.3.3. Outcomes and calibration

We explore two different outcomes regarding the level of early-stage entrepreneurship in a particular society, that is, the share of ODE and NDE compared to total EA. Total early-stage entrepreneurship is defined as the proportion of the population aged 18–64 belonging to the set of entrepreneurs ranging from those entrepreneurs who are about to set up a business to those start-ups that have been established for up to 42 months. According to the GEM Consortium (2013), ODE refers to the proportion of individuals that have commenced EA for two reasons: First, they claim to be motivated by an opportunity rather than because they could not find other job opportunities, and second, part of the motivation to pursue the opportunity was a desire to be independent and increase their income, as opposed to sustaining the same level of income. In order to determine the qualitative anchors for calibration, we apply the method introduced by Hudson and Kühner (2013). Accordingly and consistent with the value breaks evident from the data distribution, countries featuring more than 64.02 % ODE of all EA are considered full members in the set of high ODE economies. In contrast, economies with less than 38.32 % of entrepreneurs setting up a business for reasons of opportunity are definitely non-members in the set of high ODE economies.

NDE is the second outcome observed. As reported by the GEM Consortium (2013), the measure for necessity entrepreneurs refers to the proportion of early-stage entrepreneurs who decided to set up a business because of a lack of other job opportunities. Relying again on the approach introduced by Hudson and Kühner (2013), a country is defined as a full member in the set of high NDE economies if more than 23.8 % of the total early-stage EA is motivated by having no other job opportunities, and as a definite non-member of this set, if merely 10.11 % of early-stage entrepreneurship is triggered by the absence of an alternative income.

3.3.4. Conditions and calibration

We examine six different conditions explaining the two outcomes. Four of the conditions refer to the cultural dimensions, the other two being economic freedom and well-being.

The two conditions well-being and economic freedom are aggregated to two separate meta-measures representing a country's overall score by averaging every single dimension of the respective condition with equal weights. In contrast, we apply the multidimensional approach to the national culture and measure each dimension separately. Working on the assumption that national, territorial boundaries represent cultural differences, we utilize Hofstede's (2001) scores for the four classic dimensions—power distance, individualism, uncertainty avoidance, and masculinity— and include each as a condition in our models. In line with the study by Hsu, Woodside, and Marshall (2013), we have chosen the same membership criteria for all cultural dimensions as they are all based on the same interval scale. Accordingly, the dimensions are assigned to the membership set if their values exceed 80 and to the non-membership set if their values are below 20.

The study utilizes data from the OECD BLI (2013b) to examine well-being as a condition affecting entrepreneurship. The OECD BLI employs 11 different dimensions to describe a particular society. These are housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance. We include an equally-weighted aggregation of the 11 separate indicators. To date, the OECD has provided no indication of how to assess the scores, which were established on an interval between 0 and 10. In the absence of other concepts that might help do so, we again apply the arithmetical shortcut for calibration (Hudson & Kühner, 2013). Consequently, a society scoring 7.75 or above can be considered a full member in the set marked by high levels of well-being and one scoring 5.77 or below would be designated a non-member.

To assess economic freedom, we utilize the Index of Economic Freedom compiled by The Heritage Foundation (Miller et al., 2013). This index consists of ten quantitative and qualitative factors that can be grouped into four categories. These are the rule of law (including property rights and freedom from corruption), limited government (including fiscal freedom and government spending), regulatory efficiency (including business freedom, labor freedom and

monetary freedom), and open markets (trade freedom, investment freedom and financial freedom). We employ the overall index that has all determinants weighted equally. The Heritage Foundation also provides a guide as to which index scores indicate free economies (>80) and those that point to repressed economies (<50) (Miller et al., 2013). We have adopted those indications as thresholds for calibration.

3.4. Results

3.4.1. Descriptive analysis

Table 3-1 displays the descriptive statistics of the uncalibrated outcomes and conditions together with the membership criteria for the calibration of the data.

Table 3-1 *Descriptive statistics and membership criteria*

	Descriptive statistics [a]		Membership criteria		
	Mean	St. Dev.	Full membership	Crossover point	Full non-membership
ODE	51.04	13.13	64.02 %	52.00 %	38.32 %
NDE	18.57	8.44	23.80 %	16.95 %	10.11 %
PDI	45.96	21.73	80	50	20
IDV	58.52	21.52	80	50	20
MAS	49.22	27.55	80	50	20
UAI	67.22	24.56	80	50	20
WB	6.58	1.28	7.75	6.76	5.77
EcoFree	70.06	5.95	80	60	50

n=23. ODE: Opportunity-driven Entrepreneurship; NDE: Necessity-driven Entrepreneurship; PDI: Power Distance; IDV: Individualism; MAS: Masculinity; UAI: Uncertainty Avoidance; WB: Well-being; EcoFree: Economic Freedom.
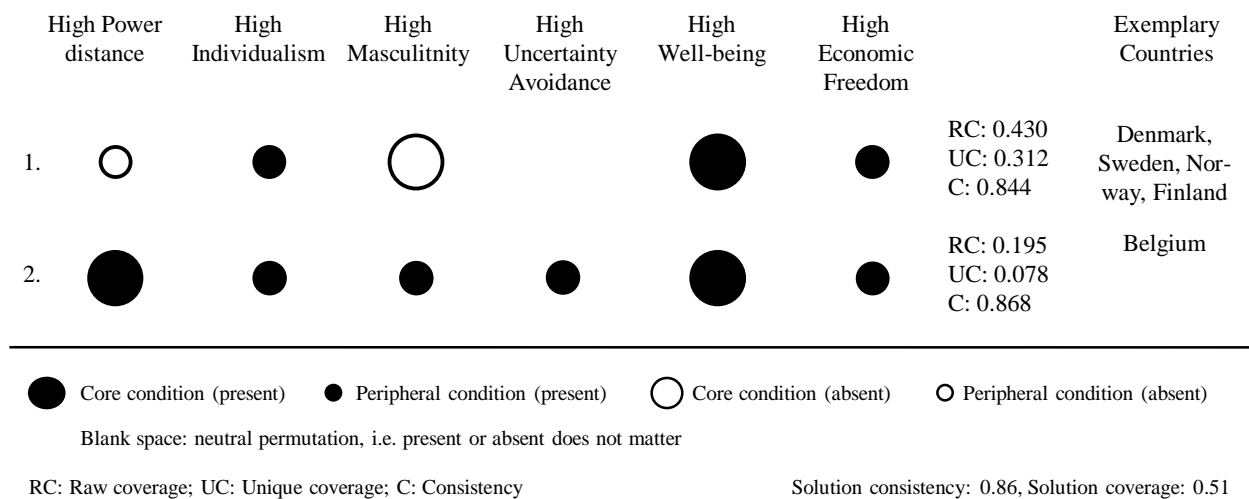
[a] Non-calibrated values

Our sample consists of 23 different countries, the majority of them European (see the fuzzy-set data matrix reported in Appendix 1). All countries were categorized as innovation-driven economies by Schwab (2012).

3.4.2. Configurations predicting opportunity entrepreneurship

The fsQCA run for ODE produces two configurations with a high consistency level (0.86) and a satisfying coverage level of 0.51, both of which are depicted in Figure 3-1. Filled and empty circles indicate whether the conditions are required to be present or absent (Ragin, 2008), whereas blank spaces indicate the outcome is irrelevant; in that whether the condition is present or absent does not matter in this context. The size of the circle distinguishes between core conditions (large circles), in other words, the condition is at the heart of the solution, and peripheral conditions (small circles). This demarcation was introduced by Fiss (2011), who also weighed the relevance of the conditions within a configuration according to the strength of evidence. In other words, those conditions that are part of only the intermediate solution are peripheral. Conditions that are part of the intermediate and the parsimonious solutions are core to the configuration; that means these conditions have not been logically reduced even when all theoretically possible counterfactuals are included. Nevertheless, all of the conditions are sufficient, and do not warrant being dropped based on the core and peripheral distinction.

Figure 3-1 *Solution set high opportunity-driven entrepreneurship*

	High Power distance	High Individualism	High Masculitnity	High Uncertainty Avoidance	High Well-being	High Economic Freedom		Exemplary Countries
1.	○	●	◯		⬤	●	RC: 0.430 UC: 0.312 C: 0.844	Denmark, Sweden, Norway, Finland
2.	⬤	●	●	●	⬤	●	RC: 0.195 UC: 0.078 C: 0.868	Belgium

⬤ Core condition (present)   ● Peripheral condition (present)   ◯ Core condition (absent)   ○ Peripheral condition (absent)

Blank space: neutral permutation, i.e. present or absent does not matter

RC: Raw coverage; UC: Unique coverage; C: Consistency   Solution consistency: 0.86, Solution coverage: 0.51

For each configuration, the consistency and coverage levels are disclosed. The raw and unique coverage enables us to identify the more relevant configurations, although configurations with low coverage measures may also be theoretically relevant. In addition, Figure 3-1 shows the countries best characterized by that configuration. Although both configurations share a high individualism rating, high levels of well-being, and economic freedom, none of those conditions qualifies as a necessary condition. The more relevant of the two empirically is the first configuration as it can explain high ODE in four Nordic countries (Denmark, Sweden, Norway, Finland), and therefore displays high unique and raw coverage levels. In contrast to the second configuration, it requires low power distance and low masculinity. High ODE in Belgium can in contrast be explained by high power distance, masculinity, and uncertainty avoidance.
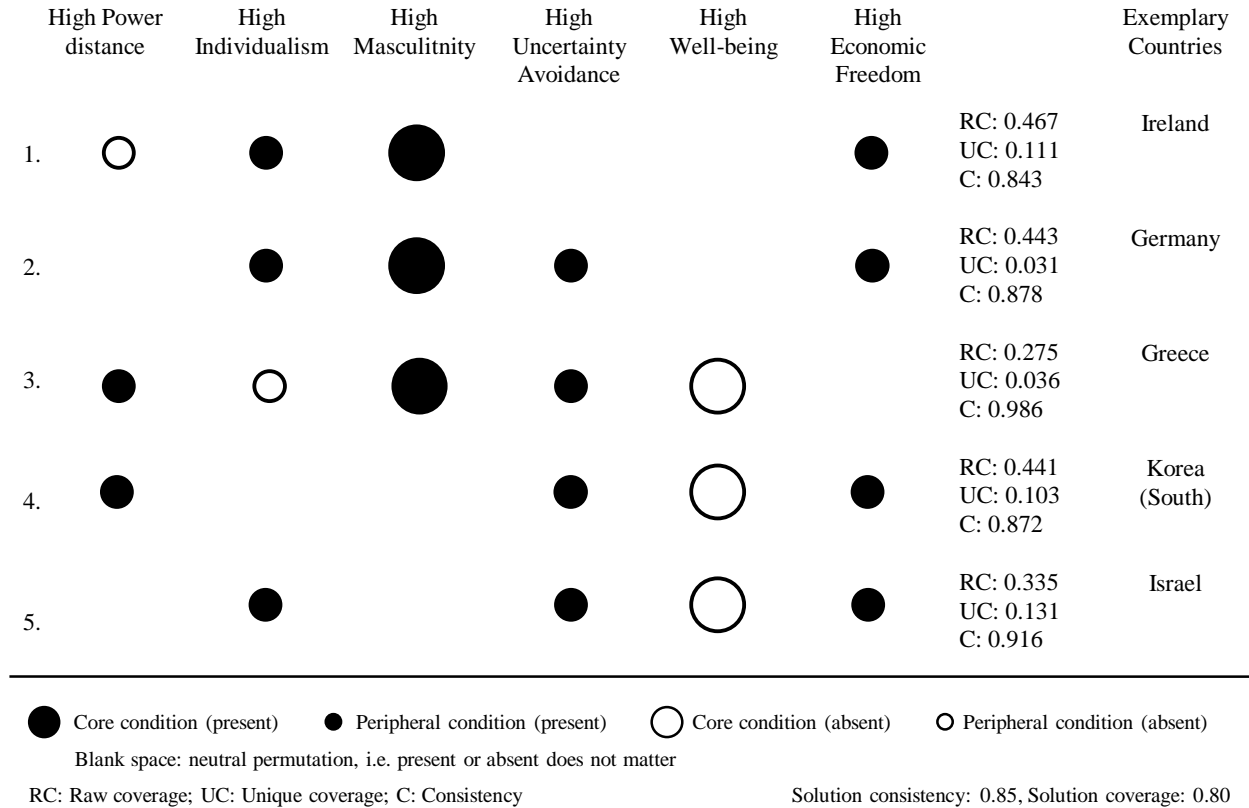
3.4.3. Configurations predicting necessity entrepreneurship

The results of the fsQCA testing for high levels of NDE are presented in Figure 3-2. This solution set displays a high consistency (0.85) and coverage level (0.80). There are no compelling similarities across the five configurations within the solution set. Hence, the separate necessity analysis did not expose any necessary conditions.

Nevertheless, for all configurations it is true that neither the absence of uncertainty avoidance nor of economic freedom, nor the presence of high well-being are integral to the path to high NDE.

The first and second configuration are rather similar, but suggest that high uncertainty avoidance and low power distance are in a way interchangeable when trying to explore the outcome, all else being equal, again resulting in a low unique coverage of the second configuration. In addition, the third configuration largely complies with all the other configurations. The only respect in which it differs is in the presence of a high individualism rating, a possible indication of a way to compensate for a low degree of economic freedom, as in Greece, for instance. The fourth and fifth configuration are again rather similar, suggesting interchangeability between high power distance and individualism, while uncertainty avoidance and economic freedom are high, and a low level of well-being is prominent.

Figure 3-2 *Solution set high necessity-driven entrepreneurship*

	High Power distance	High Individualism	High Masculitnity	High Uncertainty Avoidance	High Well-being	High Economic Freedom		Exemplary Countries
1.	○ (peripheral absent)	● (peripheral present)	● (core present)			● (peripheral present)	RC: 0.467 UC: 0.111 C: 0.843	Ireland
2.		●	● (core)	●		●	RC: 0.443 UC: 0.031 C: 0.878	Germany
3.	●	○ (peripheral absent)	● (core)	●	○ (core absent)		RC: 0.275 UC: 0.036 C: 0.986	Greece
4.	●			●	○ (core absent)	●	RC: 0.441 UC: 0.103 C: 0.872	Korea (South)
5.		●		●	○ (core absent)	●	RC: 0.335 UC: 0.131 C: 0.916	Israel

● Core condition (present)   ● Peripheral condition (present)   ○ Core condition (absent)   ○ Peripheral condition (absent)

Blank space: neutral permutation, i.e. present or absent does not matter

RC: Raw coverage; UC: Unique coverage; C: Consistency   Solution consistency: 0.85, Solution coverage: 0.80

3.5. Discussion

3.5.1. Configurations of drivers of EA in innovation-driven economies

We analyzed the set–subset relation of two forms of EA and the sociological determinant culture, the psychological determinant well-being and the economic determinant, economic freedom. Two configurations explained the high levels of ODE relative to overall early-stage EA, one of them pointing to a possible role model for driving ODE, which involves high well-being and low masculinity. Drivers of high proportions of NDE are more complex in the sample of innovation-based countries as the solution comprises five configurations. Two configurations describe the path including high masculinity as one of the main conditions; another two show low well-being at the core of the solution, and the fifth embraces both high

masculinity and low well-being as a subset of NDE. Economic freedom misses the cut-off for necessary conditions in both analyses, but is close to being a trivial aspect, as its consistency is extremely high (just below 0.9) for both the outcome and non-outcome. Consequently, the average economic freedom can only be assigned a minor explanatory power and will thus be omitted from the following discussion of the results.

Engelen, Heinemann, and Brettel (2009) state that cross-cultural entrepreneurship research needs to progress from straightforward research models focusing on only one construct to capturing the complexity of EA by embracing a number of societal issues inherent to culture (both objective and subjective well-being and economic issues) in an exploratory manner, which we achieve by applying fsQCA. In past research, small sample sizes and causal approaches forced researchers to focus on just one or two determinants of EA. A configurational approach and the QCA method help to address this problem. Rather than oversimplifying the complexity leading to reductionist proposals such as simply recommending the highest possible level of well-being to reach high levels of entrepreneurship, fsQCA enables us to identify equifinal configurations expressing the context in which the countries with high EA are embedded.

Of the two configurations explaining high levels of ODE, the first is of greater empirical relevance owing to its greater coverage. The configuration explains the setting for a large proportion of ODE in four Nordic countries, possibly pointing to a Nordic role model for ODE. We have challenged this result by analyzing further models in order to check whether this comes down to cultural similarities alone, but have found no support for that explanation.[9] High well-being as a core condition is in line with prior research by Naudé et al. (2014), who find high subjective satisfaction with life drives ODE. Turning to the cultural conditions, femininity lies at the core of the solution. Accordingly, a cooperative society might be beneficial and more supportive of nascent, opportunity-driven entrepreneurs than other types would. This is in line with findings from Steensma, Marino, and Weaver (2000), who find that feminine cultures valued cooperative strategies more than other cultures did. Furthermore, the configuration is marked by a high level of individualism. This might be related to the

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[9] Available from the authors upon request.

characteristics of the entrepreneurs, as Shane (1992) finds individualistic societies to be more productive than other types. A striking aspect is the neutral permutation for high uncertainty avoidance, indicating that the more risk-taking behavior frequently called for in prior research is not relevant to the outcome in this context. At first sight, the combination of determinants causing ODE might appear controversial in light of other study results, such as those of Hayton et al. (2002) who find, for instance, high masculinity supports EA. However, the Nordic role model paints a far more holistic picture as it describes a combination of determinants for ODE, in a context that produces entrepreneurs on the one hand and on the other hand provides a nutrient-rich medium in which nascent entrepreneurship to flourish. Therefore, the determinants in accordance with Hayton et al. (2002) might refer to the conditions favourring entrepreneurial intent, whereas the differences, such as high femininity could explain the characteristics of a community supportive of entrepreneurship.

Although a Nordic role model can be identified, configuration two serves as an interesting addition, showing that the presence of uncertainty avoidance can nevertheless result in a greater proportion of ODE relative to the overall early-stage EA. One possible explanation is that a high score for well-being, or the subjective well-being aspect of it, has been shown to positively influence creativity and work performance (Naudé et al., 2014). This implies that well-being has a positive impact on the ability to recognize opportunities and possibly to manage uncertainty. Accordingly, well-being might be able to compensate for the high uncertainty avoidance we have found in the configuration explaining high ODE in Belgium.

Despite having identified five configurations explaining high levels of NDE in innovation-based countries, they can be narrowed down to two main paths, one being characterized by high masculinity (configurations 1–3) and the other by low well-being (configurations 3–5): configuration three representing the interface of both core conditions. Owing to the lack of research addressing the link between masculinity and EA, those findings cannot be compared to prior research. Nevertheless, our result is in line with the theoretical argumentation of Lee and Peterson (2000) suggesting that high masculinity would be associated with higher entrepreneurial orientation and ultimately with higher EA. In terms of well-being, our results support the findings by Noorderhaven et al. (2004) who suggest dissatisfaction with society and life triggers self-employment in 15 European, innovation-based countries.

We can further clarify the link between low levels of well-being and EA, as configurations three to five suggest that low well-being and other societal issues combine to form a more specific trigger for NDE.

Our results show that drivers of high levels of ODE and NDE should not be considered antagonistic concepts. Only configuration three, explaining high NDE in for example, Greece, could possibly be read as the opposite of the Nordic role model for ODE; however, the remaining and empirically more important configurations suggest that such a reading would be a simplistic interpretation of a complex phenomenon. Furthermore, we have provided empirical evidence that both high and low levels of well-being can trigger EA; higher values are therefore part of explaining ODE, whereas low well-being is among the conditions driving NDE.

In line with Wennekers et al. (2007), we provide empirical evidence for the ambiguous impact of uncertainty avoidance on EA, where low uncertainty avoidance in combination with other conditions can explain ODE, and higher values of uncertainty avoidance tend to increase NDE. However, the configurations of both ODE and NDE also include neutral permutations for uncertainty avoidance, emphasizing that this cultural condition is not a necessary one and that there are other paths to high ODE and NDE, regardless of the level of uncertainty avoidance within a nation.

3.5.2. Implications

The implications of this analysis for researchers and policy makers are numerous. They may guide the development of the desired form of EA, in that they could help entrepreneurs establish businesses for the right reason, as ODE promises more a sustainable influence on economic development. The striking parallels between the Nordic countries in the sample justify distinguishing a Nordic role model that might be useful to enhance the share of ODE relative to other less attractive forms of entrepreneurship. Admittedly, culture is a relatively stable concept and not easy to adjust; however, following the model of the Nordic countries would for instance involve abandoning the focus on measures to change the perception of risk in a particular society, and instead suggest considering measures encouraging more cooperation among nascent entrepreneurs and their stakeholders, for instance.

In terms of research implications, the analysis reveals that it is extremely important to differentiate between the levels of ODE and NDE. Explanations focusing on EA as such are close to meaningless, given the dramatic differences between both concepts and their drivers. Furthermore, while numerous studies have provided empirical evidence for the impact of different cultural dimensions on EA, our study succeeds in embracing all cultural dimensions simultaneously, while considering how they might be related, and providing the first empirical evidence for the impact of the masculinity dimension on EA.

Methodologically, a configurational approach seems to be most appropriate for future cross-cultural comparisons in entrepreneurship research, as it works with a higher level of complexity than other methods, accounts for cultural interdependencies, and offers an exploratory approach to phenomena that remain beyond hypothesizing. Our study thus goes some way to addressing an important issue already recognized by researchers interested in cross-cultural comparisons in entrepreneurship (Engelen et al., 2009; Simón-Moya et al., 2014).

3.5.3. Limitations and future research

Nonetheless, the results of this study should be interpreted in light of their limitations. Our study is based on secondary data derived from GEM (GEM Consortium, 2013), Hofstede's cultural dimensions (Hofstede, 2001), the OECD BLI (OECD, 2013b), and the Index of Economic Freedom (Miller et al., 2013). Hofstede's data in particular have been strongly criticized because the sample might not be representative of the whole population of a country. Nevertheless, the data retain their status as a standard in the academic discussion around cultural issues, and thus permit comparison of the results of a wide range of studies (Mitchell et al., 2000; Mueller & Thomas, 2001; Shane, 1995; Simón-Moya, Revuelto-Taboada, & Guerrero, 2014). Future research on cultural determinants might nonetheless benefit from employing different conceptualizations and operationalizations.

GEM data also have their particular shortcomings: in the context of the present study, it should be noted that GEM only focuses on very early-stage EA and ignores a large volume of other EA. In addition, the GEM data tends to report significantly higher levels of early-stage entrepreneurship in developing economies and significantly lower levels in developed

countries compared to other datasets (Acs, Desai, & Klapper, 2008). This issue results from the operationalization of EA: GEM data represent more the potential than the actual rate of entrepreneurship and do not consider the number of formal business registrations. However, GEM data have also become a standard reference, consequently bringing the benefit of comparability despite their shortcomings.

In terms of method, the set calibration of the membership criteria could possibly lead to one country being both ODE and NDE oriented. Furthermore, the specific thresholds of a particular calibration require substantial theoretical reasoning to justify themselves. Compared to uncalibrated variables in econometric analyses, the procedure adds an interesting dimension to the analysis, doing justice to the complexity of the phenomenon under investigation. Configurational analysis thus seems to be a promising approach to analyzing the determinants of EA on other levels of analysis as well. Those levels might include the regional or local level of entrepreneurial ecosystems, for example (Feld, 2012; Isenberg, 2010; Mason & Brown, 2013; Vogel, 2013). It is, however, important to conduct such analyses with longitudinal data, as in the present study especially the link from well-being to EA might be causally reversed.

Finally, the phenomenon of economic freedom proved to be an almost trivial condition in the models, and despite its complexity, demonstrated only low explanatory power. This finding might be due to our focus on innovation-driven economies, which are generally characterized by low variability in terms of economic freedom. We therefore recommend future studies include a greater breadth of types of economies and more detailed measures of economic freedom to elaborate on this complex phenomenon.

3.6. Conclusion

This study has shed light on the complex phenomenon of EA in innovation-driven economies. The analysis revealed that questions on how particular modes of entrepreneurship (ODE vs. NDE) are actually influenced by societal determinants such as culture, well-being, or economic freedom are not easily answered. Nevertheless, we were able to extract some straightforward recommendations from our analysis. A particularly promising finding seems to be the Nordic role model that fosters a higher share of ODE relative to the overall EA of an economy, as it incontrovertibly demonstrates the importance of having entrepreneurs motivated by opportunity, especially for economies that rely heavily on innovation.

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Appendix 3-1 Fuzzy-Set Data Matrix[a]

	ODE	NDE	PDI	IDV	MAS	UAI	WB	EcoFree
Austria	0.04	0.07	0.02	0.62	0.95	0.88	0.86	0.85
Belgium	0.92	0.61	0.82	0.92	0.6	0.99	0.8	0.8
Denmark	0.99	0.02	0.04	0.92	0.03	0.06	0.94	0.92
Finland	0.88	0.51	0.15	0.79	0.08	0.71	0.89	0.89
France	0.85	0.61	0.86	0.89	0.33	0.97	0.49	0.65
Germany	0.45	0.9	0.18	0.85	0.83	0.82	0.73	0.87
Greece	0.01	1	0.73	0.18	0.67	1	0	0.2
Ireland	0.08	0.99	0.1	0.88	0.86	0.18	0.85	0.91
Israel	0.21	0.71	0.02	0.6	0.43	0.96	0.03	0.74
Italy	0	0.4	0.5	0.93	0.88	0.92	0.07	0.52
Japan	0.97	0.85	0.6	0.4	0.99	0.99	0.17	0.85
Korea (South)	0.21	1	0.73	0.04	0.25	0.97	0.02	0.82
Netherlands	0.97	0.02	0.23	0.95	0.03	0.57	0.93	0.88
Norway	0.99	0.01	0.13	0.87	0.01	0.5	0.97	0.83
Portugal	0.56	0.61	0.79	0.09	0.13	1	0.01	0.61
Slovakia	0.12	1	1	0.55	1	0.52	0.02	0.79
Slovenia	0.95	0.01	0.89	0.09	0.04	0.98	0.24	0.56
Spain	0.02	0.98	0.67	0.52	0.31	0.97	0.21	0.77
Sweden	0.34	0.01	0.13	0.89	0.01	0.11	0.97	0.87
Switzerland	0.78	0.61	0.17	0.86	0.88	0.69	0.96	0.96
Taiwan	0.12	0.61	0.69	0.04	0.38	0.87	0	0.87
UK	0.12	0.61	0.18	0.98	0.83	0.18	0.92	0.9
USA	0.85	0.85	0.27	0.98	0.77	0.4	0.94	0.92

ODE: Opportunity-driven Entrepreneurship; NDE: Necessity-driven Entrepreneurship; PDI: Power Distance; IDV: Individualism; MAS: Masculinity; UAI: Uncertainty Avoidance; WB: Well-being; EcoFree: Economic Freedom [a] Calibrated data

4. The more the merrier? Economic freedom and entrepreneurial activity[10]

Abstract

The current research addresses the question of how policymakers might design specific components of economic freedom (EF) to most effectively encourage high levels of entrepreneurial activity (EA). Given that entrepreneurship is a multifaceted phenomenon, the study analyzes the effects of four components of EF on EA, and relies on fuzzy-set qualitative comparative analysis (fsQCA) to do so. The research collates data from 63 different countries and analyzes EA as it applies to factor-driven, efficiency-driven, and innovation-driven economies. The current research also differentiates between opportunity-driven entrepreneurship and necessity-driven entrepreneurship. The results suggest that the effects of EF vary according to the developmental stage of an economy and the type of EA in question. The results reveal that simplistic explanations implying that high levels of EF trigger high levels of EA regardless of a country's developmental stage are inadequate.

4.1. Introduction

Policymakers worldwide seek a platform that can increase levels of entrepreneurship because economists associate entrepreneurship with innovation, employment, and overall economic growth (Wennekers & Thurik, 1999). Hence, institutional influences on the level of entrepreneurship in societies and economies attract the interest of academics and policymakers alike. However, the relationship between those factors and entrepreneurial activity (EA) in a particular country is far from simple. Scholars offer a plethora of explanations with regard to the cognitive and normative pillars of institutions, including concepts that revolve around

cultural or societal influences (Kuckertz, Berger, & Allmendinger, 2015; Simón-Moya, Revuelto-Taboada, & Lorenzo, 2014). The third pillar according to Scott's (1995) typology is the regulative form.

While acknowledging the relevance of EA, the research community offers little information on how to design regulatory frameworks for economic freedom (EF), or on which component to prioritize to foster EA. The issue is particularly apposite in times of economic crisis when governments are under pressure to introduce reforms to stimulate long-term growth. Some research is noteworthy including that of Kreft and Sobel (2005), who provide empirical evidence by comparing the different levels of EF in US states, and describe entrepreneurship as the "missing link" between EF and economic growth. Kreft and Sobel's findings suggest entrepreneurship helps to translate the positive effects of EF into successful economic development. On the cross-country level, Nyström (2008) identifies a small government sector, better legal structure, established property rights, and little regulation as components of EF that help increase EA. While the results of Bjørnskov and Foss (2008) support those findings in the context of a small government sector, they cannot identify significant relationships between other forms of EF and EA, an outcome that may relate to the specific form of EA investigated. McMullen, Bagby, and Palich (2008) assert that understanding the impact of EF on EA requires researchers to differentiate between opportunity-driven entrepreneurship (ODE) and necessity-driven entrepreneurship (NDE).

The above mentioned background gives rise to an interesting puzzle: Why does a clear theoretical rationale seem to exist for the positive impact of EF on EA, an impact reinforced by several institutions offering a ranking of countries in terms of EF (and therefore suggesting that more freedom should be an unconditional aim of the state), while at the same time the results of the available empirical research are at best mixed? One reason for the theoretical rationale being empirically unsubstantiated may be the failure of researchers to differentiate between ODE and NDE (McMullen et al., 2008). Other reasons for the lack of empirical support might be single country study designs and relatively small sample sizes in cross-country research (Bruton, Ahlstrom, & Li, 2010), which often result in a low explanatory power and therefore demand the application of new methods (Woodside, 2013).

The present study addresses the research gap identified by investigating how economists might design particular components of EF to encourage high levels of EA. To do so, the current research applies a configurational approach, namely fuzzy-set qualitative comparative analysis (fsQCA), and incorporates the differentiation between ODE and NDE as well as the categorization of economies based on their developmental stage. The selected approach assumes EF will have very different consequences in the developed world and in less-developed countries. By analyzing data from the Global Entrepreneurship Monitor (Global Entrepreneurship Monitor Consortium, 2013) and the Index of Economic Freedom published by the Heritage Foundation (Miller, Holmes, & Feulner, 2013) the current study offers a unique perspective on the debate on EF and generates reliable results despite using a comparatively small sample.

To achieve its objective, the study proceeds as follows. First, the research examines the relationship between EA, EF, and economic development by reviewing prior literature. Second, the researchers introduce the data and method and illustrate why a configurational approach has the potential to generate novel insights. Next, the paper discusses models resulting from the fsQCA that help to address the research gap. Finally, the research presents the implications of its findings for both academics and policymakers interested in the relationship between EF and EA.

4.2. The relationship between entrepreneurship, economic freedom, and economic development

A high level of entrepreneurship is a worthy aim because new businesses prompt job creation, innovation, more efficient resource allocation, growth, and welfare. However, not every entrepreneurial action is innovative or very profitable from an economic perspective (Baumol, 1990). Accordingly, merely looking at *rates* of EA in a country teaches little about the innovative *power* of EA in that country. A more helpful method differentiates EA according to the motives of the entrepreneur in setting up a business, resulting in the designation of either necessity-driven (NDE) or opportunity-driven entrepreneurship (ODE) (GEM, 2013). The Global Entrepreneurship Monitor (GEM) defines necessity-driven entrepreneurs as people pushed into starting businesses by a lack of employment opportunities and limited sources of

income. ODE covers individuals starting a business primarily to pursue an opportunity, a form of entrepreneurship economists generally label innovative, and therefore more valuable than other forms of entrepreneurship (GEM, 2013).

The institutional environment can either foster or hinder the discovery and exploitation of EA, and as a result policymakers seek to create an environment that nurtures EA. According to institutional theory, cultural, societal, and regulative influences create the framework supporting the establishment and survival of organizations (North, 1990). Accordingly, policymakers shape the regulative pillar of institutions, for example, through legislation, incentives, and industrial standards. The regulative influences determine the rules of the game or the reward structure of the economy, which ultimately influence entrepreneurial activity and the allocation of resources. Economists refer to the resulting scenario as EF (Minniti, 2008).

In other words, EF can be a subset of the set EA. Institutions can thus provide the EF that can encourage EA. On the other hand, an environment that does not guarantee sufficient freedom of action can impede EA and hence growth (Bjørnskov & Foss, 2008). If institutions succeed in establishing an effective economic structure, the success of businesses depends primarily on the characteristics of the ventures themselves. Accordingly, the level of EF would have a larger explanatory power in terms of EA in countries in the earlier developmental stages, as institutional frameworks in such countries tend to be less efficient (Aidis, Estrin, & Mickiewicz, 2012). In other words, the current research presumes that the relevance of EF to EA decreases as economic development advances. Linking the above argument to the understanding of the developmental stage of a country influencing the type of entrepreneurship, the current research proposes:

> *The subset of EF explaining the set EA differs according to the type of EA, and the relationship is more pronounced in less-developed economies.*

Researchers should not assume EF alone clearly influences EA. Economists would be wise to treat EF as a composite describing the environment for EA that encompasses the rule of law, limited government, regulatory efficiency, and the openness of markets in a given economy (Miller et al., 2013), rather than as a single factor (Carlsson & Lundström, 2002; Kuckertz et al., 2015).

The r*ule of law* refers to the degree to which the law regulates the market. If the rule of law is strong, national law will protect property rights and doing business will be largely unaffected by corruption. The rule of law contrasts with the rule of man. The former ideally improves predictability and provides stability, thus facilitating EA, whereas the rule of man gives rise to an unstable and unreliable setting where the populace cannot rely on having legal redress if another person or institution breaches their rights. The latter situation is detrimental to entrepreneurial activity (McMullen et al., 2008).

Limited government encompasses the degree to which the government intervenes in the market mechanisms through taxation (fiscal freedom) and consumption and redistribution (government spending) (Bjørnskov & Foss, 2008). Economists associate a high level of fiscal freedom, associated with low government income and low consumption, with a high level of EF. Some arguments point toward a large government sector positively influencing EA, as the presence of EA can contribute to strengthening the rule of law and reducing vulnerability to corruption (Aidis et al., 2012). State support can also stimulate EA. A government might, for example, offer reduced business rates for newly founded ventures, or provide access to expertise, or to seed capital. However, the empirical evidence that as government size increases, EA seems to reduce dominates the discussion (e.g., Nyström, 2008). Accordingly, higher tax rates reduce ODE for two reasons: First, the individual's desire for wealth aggregation is lower, since the reward from EA is lower due to the higher tax rates; second, less private capital is available for ventures, and therefore individuals have fewer opportunities to develop their businesses. Limited government also influences NDE in that more government spending on a social security system eases the pressure on individuals to generate income from employment or self-employment (Aidis et al., 2012).

Regulatory efficiency is a component of EF that embraces the freedom to establish and run a business without excessive interference from the government in the form of regulation (business freedom); the freedom to work where, for as long, and under whatever conditions an individual is happy to accept (labor freedom); and a stable currency as a basis for exchange (monetary freedom). Low regulatory efficiency creates entry costs to entrepreneurship and increases the burden on all businesses, and especially on early-stage EA (Kanniainen & Vesala, 2005). However, even if two countries have the same regulations, the countries might enforce

those regulations differently and offer regulators opportunities to benefit from corruption (McMullen et al., 2008). Therefore, regulatory efficiency and the rule of law are closely linked.

Open Markets constitute the fourth component of EF as the open market condition affects the free flow of goods and services across borders (trade freedom), the availability of financial capital (financial freedom) and its free flow nationally and internationally (investment freedom) (Miller et al., 2013). Open markets have a positive impact on EA, as they create competitive pressure, which stimulates innovation and hence ODE. In addition, the ability to recognize and exploit opportunities internationally—in other words in a larger market—and to access the required capital stimulates ODE. Furthermore, open markets increase the availability of funds for ventures, which further supports EA (McMullen, et al., 2008).

Researchers should also differentiate EF components in order to understand that some components of EF can stimulate EA, while in certain contexts other components can hinder EA. EF does not always stimulate EA (Bjørnskov & Foss, 2008; Díaz-Casero, Díaz-Aunión, Sánchez-Escobedo, Coduras, & Hernández-Mogollón, 2012; McMullen et al., 2008). All the components of EF are closely connected and the level of one component may have an impact on another component of EF, or possibly on all the other components of EF (Miller et al., 2013).

The efficient supply and allocation of EA may vary significantly across nations depending on the level of development of their economies, in so far as EA declines in the more advanced stages of development (Porter & Schwab, 2008; Schwab, 2012). However, several studies offer examples of a U-shaped relationship, implying that countries in the middle stage have the lowest total EA, a fact that might relate to the differing shares of NDE and ODE (Minniti, Bygrave & Autio, 2005). In order to distinguish between the developmental stages Wennekers, van Steel, Thurik, and Reynolds (2005) identify three stages of economic progress: (1) a factor-driven economy (low-cost efficiencies in the production of commodities or products with low value-add), (2) an efficiency-driven economy (efficient production practices and economies of scale), and (3) an innovation-driven economy (a knowledge economy generating long-term growth through innovation). An important factor in an economy in the advanced developmental stages is the higher level of salaries available, which affects the decision to set

up a business instead of working for another firm because becoming self-employed is relatively more expensive. The rising opportunity costs when the rewards available from employment are high reduce both NDE and ODE. Countries in earlier developmental stages often report higher unemployment rates and less-developed social security mechanisms, and that combination can encourage entrepreneurialism. Unsurprisingly, individuals who work for firms in more developed economies are less likely to find themselves pushed into entrepreneurship (Nyström, 2008).

The same reasoning holds true for ODE. Individuals who identify a business opportunity have to weigh the opportunity costs when they decide whether to exploit the opportunity, hence higher-valued employment in later development stages reduces ODE (McMullen et al., 2008). Accordingly, Valliere and Peterson (2009) emphasize the importance of differentiating between the developmental stages of economies when analyzing cross-country EA to ensure results are comparable and generalizable.

Consequently, researchers seeking to identify net-effects should not study the components of EF in isolation but should also consider the developmental stages. Applying a configurational approach respects the multidimensionality of EF, which can explain EA in economies in different developmental stages (McMullen et al., 2008).

4.3. Methods

4.3.1. Data

The current research analyzes data on 63 different countries. Following Schwab (2012), the study classifies them into three groups based on their respective developmental stage. The study aims to determine the outcomes of opportunity and necessity entrepreneurship and accordingly relies on secondary data from the Global Entrepreneurship Monitor Consortium (2013) that collects data annually on an individual level and then aggregates them to the country level. For information regarding EF in the 63 countries, the researchers rely on the Index of Economic Freedom provided by the Heritage Foundation (Miller et al., 2013).

4.3.2. Fuzzy-set qualitative comparative analysis

The current study adopts a configurational approach, namely fuzzy-set qualitative comparative analysis (Ragin 1987, 2008) to explore the set–subset relationship between EA and EF. A configurational approach permits the application of case knowledge to address the small sample size issue and assumes conjunctural causation, implying that not only one component—or condition—of EF explains the outcome EA, but that combinations of several conditions jointly explain the outcome. Furthermore, focusing on the connections of conditions—referred to as configurations—increases the complexity of the study.

The current research analyzes two outcomes related to EA in an economy: the proportions of necessity-driven (NDE) and opportunity-driven entrepreneurship (ODE) in a country's total early-stage EA. The total early-stage EA describes the level of nascent and early-stage EA among the population aged 18–64. Nascent and early-stage EA covers setting up the business to being the owner-manager of a business less than 42-months old. In the sample of 63 countries, an average of 73% of the total early-stage EA is either opportunity or necessity-driven. The analysis expresses NDE and ODE as the proportion of total EA, making the values for any country easily comparable, regardless of its developmental stage. The concepts and empirical studies available do not offer an adequate base for the thresholds for opportunity and necessity entrepreneurship, and accordingly the current research adopts the arithmetical shortcut Hudson and Kühner (2013) suggest to determine the anchors for calibration (see Table 4-1 for the calibration criteria).

Table 4-1 *Descriptive Statistics (uncalibrated)*

		Factor-driven N=11		Efficiency-driven N=28		Innovation-driven N=24		Calibration Criteria		
		Mean	SD	Mean	SD	Mean	SD	Full Member	Cross-over	Non-Member
Outcome	Opportunity-entrepreneurship	43.8	13.0	45.2	12.3	51.2	12.9	64.0	52	38.3
	Necessity-driven entrepreneurship	35.9	9.2	28.0	11.6	18.4	8.3	26.7	17.9	10.1
Conditions	Rule of Law	33.3	12.4	43.5	14.6	74.6	16.4	80	60	50
	Limited Government	76.0	6.9	72.3	9.2	49.5	17.1	80	60	50
	Regulatory Efficiency	62.2	5.5	68.8	6.9	76.0	7.3	80	60	50
	Open Markets	51.1	15.5	66.0	11.6	77.3	6.9	80	60	50

The analysis considers four basic components of EF as conditions that could explain EA. Those components derive from the Index of Economic Freedom provided by the Heritage Foundation (Miller et al., 2013). The four components are the *rule of law* (comprising property rights and freedom from corruption), *limited government* (comprising fiscal freedom and government spending), *regulatory efficiency* (comprising business freedom, labor freedom, and monetary freedom), and *open markets* (comprising trade freedom, investment freedom and financial freedom). The Heritage Foundation provides ranges between 0 and 100 and thresholds to calibrate the indicators, and for the purposes of the current research, economies with a score of more than 80 are economically free and economies with scores of below 50 are economically unfree (Miller et al., 2013).

4.4. Results

4.4.1. Descriptive results

Table 4-1 shows the descriptive statistics for the uncalibrated outcomes and conditions, differentiating between the three developmental stages and also provides the calibration criteria.

4.4.2. Results for factor-driven economies

Analyzing high or low levels of ODE in factor-driven economies does not return meaningful results. Running the fsQCA for high levels of NDE returns the results presented in Figure 4-1.

Figure 4-1 *Results for factor-driven economies*

High Necessity-driven Entrepreneurship Solution consistency: 0.97, Solution coverage: 0.77

1	Limited Governement * ~Open Markets	RC: 0.661 UC: 0.491 C: 0.960	Countries: Pakistan, Iran, Ethiopia, Nigeria, Egypt, Malawi, Algeria, Uganda
2	Limited Government * Regulatory Efficiency * Open Markets	RC: 0.280 UC: 0.109 C: 1.000	Countries: Botswana, Ghana, Zambia

Boolean notation; RC: Raw coverage; UC: Unique coverage; C: Consistency

The necessity analysis first reveals a low level of the rule of law to be a necessary condition of EF in factor-driven economies to foster high levels of NDE. However, that particular condition also displays a high consistency with the opposite outcome (i.e., low NDE), and is therefore not relevant to the explanation of the outcome (Braumoeller & Goertz, 2000). The authors accordingly omit low level rule of law in factor-driven economies from the results. The sufficiency analysis returns two configurations, which have limited government in common.

Configuration 1 suggests high NDE is possible when government is limited even in the absence of open markets. Configuration 2 requires high levels of regulatory efficiency as well as limited government and open markets.

4.4.3. Results for efficiency-driven economies

Figure 4-2 shows the results for the fsQCA run for high NDE and low ODE. High rates of NDE in efficiency-driven economies are attributable to only one configuration—a weak application of the rule of law (configuration 3).

Figure 4-2 *Results efficiency-driven economies*

High Necessity-driven Entrepreneurship Solution consistency: 0.92, Solution coverage: 0.80

3 ~Rule of Law	RC: 0.920 UC: 0.920 C: 0.797	Countries: Colombia, Trinidad & Tabago, Mexico, Thailand, Peru, El Salvador, Romania

Low Opportunity-driven Entrepreneurship Solution consistency: 0.93, Solution coverage: 0.41

4 ~Rule of Law * ~Regulatory Efficiency* ~Open Markets	RC: 0.269 UC: 0.105 C: 0.898	Countries: Ecuador, Argentinia
5 ~Rule of Law * ~Limited Government	RC: 0.300 UC: 0.137 C: 0.946	Countries: Bosnia Herzegovinia, Hungary, Poland

Boolean Notation; RC: Raw coverage; UC: Unique coverage; C: Consistency

Although ODE is higher in efficiency-driven countries, the EF conditions in such countries are not sufficient to explain high ODE. However, the subset of EF can explain low levels of ODE. The separate necessity analysis identifies a low level of the rule of law to be a necessary, non-trivial condition: something that is also evident from the sufficiency analysis, as both configurations have low levels of the rule of law in common.

The first configuration (configuration 4) additionally has low regulatory efficiency at the core of its solution in combination with low levels of open markets.

The alternative (configuration 5) explains a different path to low ODE because it incorporates a low level of limited government.

4.4.4. Results for innovation-driven economies

Figure 4-3 presents the results of the analysis of sufficient conditions as they relate to innovation-driven economies. The necessity analysis identifies two conditions—high regulatory efficiency and open markets—as necessary but irrelevant, owing to their high consistency in both the high and low outcomes. The results therefore exclude those two conditions (Braumoeller & Goertz, 2000). The analysis of high NDE results in one single configuration, which consists of low levels of the rule of law and limited government (configuration 6). Again, the subsets of EF do not explain the high levels of ODE. Instead, the analysis of low rates of ODE shows that one configuration encompassing low levels of the rule of law can explain low rates of ODE in innovation-driven economies (configuration 7).

Figure 4-3 Results innovation-driven economies

High Necessity-driven Entrepreneurship Solution consistency: 1.0, Solution coverage: 0.16

6 ~Rule of Law * Government Size	RC: 0.157 UC: 0.157 C: 1.000	Country: Slovak Republic

Low Opportunity-driven Entrepreneurship Solution consistency: 0.89, Solution coverage: 0.42

7 ~Rule of Law	RC: 0.420 UC: 0.420 C: 0.888	Countries: Greece, Italy, Slovak Republic, Slovenia

Boolean notation; RC: Raw coverage; UC: Unique coverage; C: Consistency

4.5. Discussion

The present study set out to paint a detailed picture of the relationship between EF and EA. The analysis utilizes fsQCA, a largely neglected, but powerful method in management and economic research (Woodside, 2013). The study's results suggest a number of options for decision-makers wanting to shape regulative frameworks supporting entrepreneurship. The models for three different types of economies are roughly comparable to the model McMullen et al. (2008) present. However, the configurational approach and the different perspective on economies depending on their respective developmental stage might constitute a major step forward in the understanding of the relationship between EF and EA.

The configurational approach does not offer a straightforward answer on the impact of EF on EA. EF is not in itself a panacea to any economic problem because the set of EA is complex, but the components of EF can offer policymakers a set of interesting instruments if the users carefully tailor those components to the specific requirements of a particular country or economy.

Díaz-Casero et al. (2012) do not find a relationship between EF and EA in factor-driven economies, whereas the current analysis reveals two configurations that can explain a high proportion of NDE in countries at the earliest developmental stage. One configuration is that of limited government alongside the absence of open markets (e.g., the economies of Pakistan and Iran). Given the issues facing these economies, attempts to foster entrepreneurship in other countries through a combination of EA and limited government would probably ultimately fail.

The second configuration in factor-driven economies does seem promising, because that second configuration suggests that limited government, regulatory efficiency, and open markets drive entrepreneurship (specifically, NDE) which can easily transform into more ODE in the future, possibly because such a setting also offers the opportunity to enter the international market. The success of Botswana with respect to entrepreneurship and development is a case in point (Kuruba & Gilika, 2014).

The situation is markedly different in efficiency-driven economies. The low impact of the rule of law seems to cause high levels of NDE, which probably go along with a great deal of entrepreneurial behavior in the informal sector. The results suggest no clear way to nurture the more favorable form of entrepreneurship, ODE, through more EF, but do illustrate that removing EF can stifle EA. Innovation-driven economies offer an example of a form of economy where comparatively high levels of EF do not necessarily generate a positive effect on EA. However, two configurations that revolve around comparatively low application levels of the rule of law suggest that an absence of EF hinder economic development, and particularly ODE.

A configurational perspective can help to avoid the issues inherent in a *one-size-fits-all* approach—a strategy that economists criticize when the International Monetary Fund and the World Bank force economies that are still developing to adhere to standards better suited to more mature economies. An equally unsustainable assumption is that of the Heritage Foundation, which originally compiled the Index of Economic Freedom and argued that governments should promote every aspect of EF to the fullest to achieve superior economic results. That fact also highlights a challenge for research designs employing QCA: What is the maximum degree of complexity a condition should express? In studies that capture a large concept like EF using only one condition to explain EA (e.g., Kuckertz et al., 2015), EF contributes little to explaining EA. However, in focusing on only one concept to explain EA and thereby embracing its complexity, the present study can elicit richer conclusions.

The manner in which EF exerts an influence on EA depends on the stage of economic development and the different combinations of the components of EF. With respect to the suggested proposition, the study's results show that it is possible to explain a larger proportion of NDE in factor-driven and efficiency-driven economies. Furthermore, the configurations explaining high NDE and low ODE differ in the three developmental stages. In higher developmental stages, EF explains a lower proportion of both high NDE and low ODE.

Nevertheless, direct comparisons between the configurations reveal interesting insights. Efficiency-driven countries, for instance, record high NDE despite the low impact of the rule of law. Therefore, making great efforts to improve the rule of law in a country cannot guarantee

stronger economic development in factor-driven economies. Yet compared with innovation-driven economies, the weak influence of the rule of law explains a large part of the absence of ODE and hence directs policymakers toward viewing the absence of EF as hindering EA, and thus, growth.

4.6. Conclusion

The current study illustrates the potential of a configurational perspective on the relationship between EF and EA. Scholars wishing to understand that important relationship fully should certainly consider the potential configurations of the components of EF, as those configurations vary at different developmental stages and in different types of EA. The current study shows that the degree of EF has a greater explanatory power for economies in the earlier stages of development than for innovation-driven economies. Furthermore, although EF is a *conditio sine qua non* for EA as such, EF is more apt to explain the occurrence of NDE than ODE. Nevertheless, in more advanced economies, the absence of the components of EF serves to explain low levels of ODE. Future research should acknowledge these facts and could build on these results by establishing developmental paths to help factor-driven and efficiency-driven economies move toward the goal of becoming innovation-driven in the long-term.

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5. Overcoming the Matthew effect in status dominated environments – a configurational analysis of venture capital investments[11]

Abstract

Entering status dominated environments as new entrant is a difficult endeavor. Accumulated advantages go along with the tendency of incumbents to succeed, whereas entrants are likely to lose (Matthew effect). This study examines what combination of deal resources accumulated by venture capital partners lead to high deal performance in order to analyze if new entrants can nonetheless overcome the burden of being new, i.e. having a low status position and only weak ties with current actors in status dominated environments. Our configurational analysis of 1,072 venture capital investments reveals opportunities for entrants to succeed that go beyond joining forces with established actors. Our findings contribute to research on interorganizational network formation and the strategic actions new entrants may take to be successful. Furthermore, the study sheds light on the effect of syndicated opposed to single investor deals and suggests that successful syndicates require a certain degree of homogeneity among the investors.

5.1. Introduction

New entrants to an environment, such as new firms entering the market, suffer from the so-called liabilities of newness, which result from lacking a history or track record, and links to other players (Stinchcombe, 1965). This phenomenon of newness is often the reason why new entrants face challenges in identifying opportunities, getting access to resources, and ultimately becoming successful. At the same time, more established and connected actors in the

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environment acquire resources more easily and earn higher rewards for their actions, which results in *the rich getting richer, while the poor are getting poorer*, a vicious circle phenomenon Merton (1968) has termed the *Matthew effect*. Environments, where privileges are attributed above all to high status actors, may be ascribed as status-dominated.

Nevertheless, we do observe new entrants in a plethora of contexts (Morrison, 2002). This is also true for the venture capital (VC) industry, where new entrants occasionally become top players. Apart from benefiting from receiving money, start-ups in receipt of VC are assumed to perform better because the VC firms carefully select the target firms and provide added value by monitoring and coaching (Baum & Silverman 2004; Gompers & Learner 2001; Sapienza, Manigart, & Vermeir, 1996). The magnitude of those effects depends inter alia on the resources available to select and support the deal (Alexy, Block, Sandner, & Ter Wal, 2012; Fund, Pollock, Baker, & Wowak, 2008). In the VC industry syndication is a common means to increase the resources to pick the right deal and improve its performance. We investigate what combinations of VC resources lead to high deal performance. More specifically, we ask if having an established VC partner is a necessary condition for success and if a new VC firm might also be part of a configuration explaining high performance.

This is not only theoretically interesting, but important from a practical point of view as well, as in many economies policy makers call for a better availability of VC, which could among other means be achieved by an increase in the establishment of new VC firms (Lutz, Bender, Achleitner, & Kaserer, 2013).

We utilize a combination of Social Network Analysis (SNA) and fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 2008) to answer our research question. The application of fsQCA allows us to identify patterns of combinations of deal resources accumulated by participating VC firms leading to the success of a deal, including those of new entrants in the VC industry. FsQCA is especially suitable as it rests upon the notion that an outcome can be explained by set-theoretic relations. We base our analysis on a longitudinal dataset of 1,072 German VC-backed deals conducted between 2003 and 2009 to derive information about the network resources of the VC firms in our sample.

The performance of 333 deals closed in 2006 and 2007, evaluated from the VC firm's perspective, is then observed in 2013 and serves as the fundament to answer our research question.

The results of this study contribute to the literature in three ways: Firstly, we identify paths for new entrants to enter environments, which are shaped by the importance of network positions. Accordingly, we suggest concrete ways to structure strategic alliances that help new entrants to succeed in the long run. Furthermore, we shed light on the effect of syndication on deal performance and the compositions of deal resources leading to high performance

In the next section, we will discuss the influence of relevant resources, which VC firms contribute to a deal and their impact on the performance of investments by VC firms into seed and early stage ventures. We will then describe our study design. Subsequently, the results of the fsQCA are presented, followed by the discussion, and derivation of implications. We close by drawing conclusions from the findings, highlighting potential limitations.

5.2. Theoretical foundations

If new entrants are not in the position to identify and exploit opportunities because of the liabilities they face, there is a need to move into a better position to do so. There are generally two strategies how to proceed on the path to success: To try on one's own or to find a partner. The lone warrior might try to succeed by relying on past experience, externalized, accessible knowledge, or the trial and error approach, in case none of the above is available to the new entrant. Single investor deals are attractive as they can lead to maximum returns. This strategy might be especially interesting for established, experienced VC firms, as the resources for selection and post-investment support need to be available for single investor deals (Petkova, Wadhwa, Yao, & Jain, 2014). But also new entrants might choose this strategy in lack of suitable or available partners.

Forming alliances leads to the aggregation of expertise, experience, and network resources, and is widely agreed to grant a superior competitive advantage (De Clercq, Sapienza, & Zaheer, 2008; Gomes-Casseres, 1996). More than one VC firm investing in a portfolio company in the same financing round—termed *syndication*—is common in the VC industry

and naturally increases the competencies available for identifying and exploiting an opportunity and consequently improves the performance. For new entrants, finding a partner is especially important as apart from the benefits for the focal investment deal, the new firm will also profit for future deals, as the new entrant also needs to 'learn the ropes' in the VC industry in terms of organizational knowledge, task mastery, and role clarity (Morrison, 2002).

The syndicate partner can also be considered as an input to the production or in this case the investment deal and hence has the potential to improve the performance (Milanov & Shepherd, 2013). Accordingly, Hopp (2010) has provided empirical evidence, that the VC firms' characteristics primarily influence partner selection, and thus the composition of a syndicate. As in any cooperation, selecting partners, especially for long-term relationships such as co-investing VC firms, can be a difficult endeavor due to the altercentric uncertainty involved (Dimov & Milanov, 2010). This uncertainty concerns the quality of the VC firm's expertise to screen and add-value, its trustworthiness as well as common partnering norms (Milanov & Shepherd, 2013) and leads to the fear of the returns from the investment being reduced due to costs related to the cooperation with the VC firm partner. Those costs might involve effort or coordination costs, as well as unjust returns due to free-riding (Dimov & Milanov, 2010; Wright & Lockett, 2003). While some characteristics to assess a potential partner are observable other relevant aspects, are often difficult to observe and ascertain, such as quality or network resources (Castellucci & Ertug, 2010; Podolny, 1993).

More *established VC firms*, those that have been in the business for quite some time and have gone through the entire fund life cycle, are expected to have more experience and expertise. Furthermore, if more established VC firms participate in a deal, this sends a positive signal to other investors and to business partners of the start-up, which reduces uncertainty when engaging with the still new start-up (Ozmel, Reuer, & Gulati, 2012). On the other hand, ever since the seminal work by Gompers (1996) that empirically showed that younger VC firms might 'grandstand' more established ones, a deal not involving mature VC firms might be at least as successful. That might be explained by the liability of newness that can afflict even VC firms. A firm that is not yet established needs to build a track record, and to do so it may be less risk averse. The reward for a successful gamble could be a great exit, which would send out a positive signal to the field (Gompers, 1996). This is in line with the study by Shepherd,

Zacharakis, and Baron (2003) who found evidence indicating that more experience does not necessarily equate with greater success, because beyond a certain threshold, a VC firm's experience may even hamper the performance of the firms it invests in.

The traces of previous co-investments, in terms of links between VC firms, are understood to be forming a syndication network of VC firms and to capture the accessible social capital within the VC industry network (Sorenson & Stuart, 2001). The relationships of a VC firm in the syndication network can thus increase the resources available for the deal and provide signals with regards to the perceived quality of a potential partner. Podolny (1993) defines the perceived quality of producers' products, such as their quality as a partner in investments, as the producers' *status*. An actor's status expresses his social standing in his environment, in other words the centrality to alter in the network (Podolny, 1993; Washington & Zajac, 2005). Podolny (2001) underlines the paramount role and value of status especially in a setting marked by uncertainty, which is especially true for early stage financing in the VC market. The status of a VC firm is relevant to performance in different ways. First, status is associated with an extensive social network, access to information, tacit knowledge, and higher quality that can improve both the screening and the value-add effect (Hochberg, Ljungqvist, & Lu, 2007). Secondly, the status of a VC firm sends a signal to stakeholders outside the VC industry, such as suppliers or customers involved with the start-up, that serves to reduce uncertainty and hence can contribute to improved performance (Ozmel et al., 2012; Podolny, 2001). In sum, high status firms are privileged when operating on their own and also perceived as high-quality partners in syndicates (Dimov & Milanov, 2010).

Castelucci and Ertug (2010) argue that new entrants will have to compensate the lower status by contributing more effort to the partnership. The new entrant has immediate expenditure, but can profit from the high status partner. Furthermore, the additional effort can improve the overall performance of the deal, as the value-add effect of the VC firms will be higher. Ma, Rhee, and Yang (2013) show that status can also act as a mechanism to create social order. In syndicated deals, the participation of different status partners can then become a disadvantage, when the high-status partners are dominating decisions and not making full use of the potential of lower-status partners.

The *strength of ties* reveals further information about an actor. Frequently conducting joint investments with the same VC firm builds up strong ties (Bygrave, 1987). In a collaboration, strong ties facilitate and improve the exchange (Uzzi, 1997). Moreover, strong ties also reduce the costs associated with management risks. The lower costs occasioned when forming syndicates with known partners, increases the deal performance, especially since some aspects of the cooperation between syndicate partners are apparently based on informal agreements rather than contractual terms (Ma et al., 2013; Wright & Lockett, 2003). Having established strong ties through prior syndication hence signals attractiveness to partner up with that actor, as those strong ties will affect the performance of the investment. Information coming from strong ties might be more trustworthy and even more specific and hence increases the resources available for a deal. However, these information is likely to be less novel than those sourced from contacts that are more distant. In other words, VC firms tending to build strong relationships with the same VC firms without involving others, might have somewhat reduced access to new information and opportunities, so strong connections might not always be advantageous (Uzzi, 1997).

The demarcation of *VC firm types* (such as independent, corporate, governmental or bank-dependent VC firms) links ownership characteristics with the strategic positioning of the firms, which is closely connected to how much effort and what kind of effort they put into pre- and post-investment activities (Petkova et al., 2014). While several studies have compared the performance of different VC firm types (e.g. Croce, D'Adda, & Ughetto, 2015) there is insufficient clarity with regard to joint investment between different VC firm types. On the one hand, differing motives, governance structures, and expertise can combine to enrich the social capital available to start-ups, especially since the VC firms involved should have dissimilar links that provide access to a wide range of information and knowledge (Alexy et al., 2012). Consequently, deals involving different types of VC firms might have a positive effect on performance. On the other hand, those dissimilarities might also be a source of conflict, and so give rise to costs for the syndication partners.

As being established, having high status, and being able to rely on strong ties not only leads to better performance, but also increases the attractiveness to join an alliance, which will enable the actor to profit from opportunities others have identified, this might be described as a virtuous cycle. Now, the question arises of how new entrants can break into that cycle, even if they are by definition new in the industry.

With regards to our research question of how new entrants can succeed in the VC firm industry, we have identified two general approaches of VC firms conducting deals. The single investor approach seems to be more relevant for circumstances under which uncertainty can be reduced, for instance due to the VC firms accessible social capital and past experience. New entrants need to *learn the ropes* first, which they can do best from established partners (Morrison, 2002). Wuebker, Hampl, and Wüstenhagen (2015) refer to it as *piggybacking* on a more established or higher-status VC firm.

We have argued that the expertise and the access to social capital all affect the deal performance. All the characteristics seem to be interlinked and cannot be examined in isolation. However, not all characteristics can be clearly identified as contributing to the greater success of some deals than others, as a characteristic might be hindering or boosting performance. Whether the presence or absence of a characteristic is decisive depends on the context. In turn, the context could be partly explained by other deal characteristics or those of the VC firm. We therefore analyze what combinations of resources in a deal explain high performance.

5.3. Study design

5.3.1. Data

We base our analysis on a longitudinal dataset comprising 1,072 VC deals in the German market between 2003 and 2009. This figure includes target firms in different industries, with a majority operating in the life science and computer fields. The bulk of the firms were located in Germany, but some foreign start-ups with at least one German VC firm are involved. For the 333 investment deals in 2006 and 2007, we observed their performance in mid-2013. The point of observation for the outcome was six and seven years respectively after the investment, allowing for the development of the target firm and the value-add effect of the VC firm(s) to

kick in. In order to establish the network position of the VC firms involved in the deals in 2006 and 2007 prior to and subsequent to a deal, we considered all 1,072 investments between 2003 and 2009.

Financing stages differ in terms of motivations, strategies, and risk levels as well as resources put into the portfolio company (Hopp & Lukas, 2014; Lerner, 1994; Podolny, 2001; Sapienza et al., 1996; Sorenson & Stuart, 2008). To ensure the comparability of the studied VC deals, we hence focused on similar investments in terms of seed and early stages, as for instance, Sapienza et al. (1996) found that the VC firms' value-adding effort declines with the later stages of financing. Data was originally compiled by the German Private Equity and Venture Capital Association (BVK), which has been found to encompass the most comprehensive data set for Germany and is comparable to other data sets such as VentureSource (Lutz et al., 2013). The dataset was complemented with details on deal characteristics (e.g. the diversity of types of VC firm involved), the venture capitalists (type of VC firms, years in business at point of investment), and the target firms involved (performance in 2013) by accessing several national and international web-based sources.

5.3.2. Method

This study employs an explorative, configurational approach. Fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 1987, 2008) is increasingly employed by the management research community. Nevertheless, QCA offers a unique option for tracing patterns explaining outcomes of causal relationships while focusing on complex phenomena. QCA analyses different causal conditions explaining a defined outcome. Cases with high performance are characterized by different conditions. However, how conditions affect the performance may depend on the context, that is, on other deal resource conditions. Rather than looking for the single route to success, this method accounts for the realistic possibility that there are different combinations or configurations of VC firm and deal characteristics that might lead to the outcome, referred to as equifinality (Ragin, 2006). Another strength of this method is that configurations explaining the outcome are asymmetric in relation to configurations explaining the non-outcome. In other words, the combination of conditions leading to high performance cannot be reversed to describe non-performance, as to do so would

neglect the causal relationship (Mackie, 1965). Accordingly, the complexity of the VC firms' characteristics captured in a deal and their impact on performance is accounted for. The comparison of cases, applying Boolean algebra and algorithms, allows the logical reduction of the set of configurations and helps us to explore the question of how new entrants to the VC industry can become successful in the market.

5.3.3. Outcome description

The outcome is defined as the performance of the investment deal, implying that we look at the success of a deal from the VC firm perspective. The outcome ranges from full membership or high performance to non-membership, or low performance. According to Hochberg et al. (2007), the highest returns can be generated by an acquisition (trade sale) or an initial public offering and consequently can be considered an investment's success and we have therefore calibrated these exits as a success, that is, they are fully integrated into the set of strongly performing deals. Furthermore, Hochberg et al. (2007, p. 262) conclude that 'unsuccessful investments are typically shut down' implying that insolvent firms can be justifiably considered unsuccessful; a notion that provides the anchor for the bottom of the range of performance. The mere fact of survival can still qualify firms as part of the set representing well performing deals (see e.g. Baum and Silverman 2004 for a study employing survival as performance measure) and therefore needs to be above the point of maximum ambiguity.[12]

5.3.4. Conditions

The current study analyses eight conditions, one indicates the presence or absence of a syndicate and seven of them refer to the VC firm's particular and deal characteristics.

Syndication: the literature is not clear on whether syndication in isolation generates high performance, or whether it is an indication of especially risky investments. We include syndication as a binary condition indicating whether the current investment is made in unison with at least one other VC firm (1) or not (0) in the same financing round.

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[12] We have also tested different calibrations, such as dichotomous coding, which results in the same configurations with slightly lower consistency.

Two conditions capture the age of the VC firms, which we define as years since the founding until the year of the considered deal (cf., Manigart et al., 2002; Petkova et al., 2014; Sorenson & Stuart, 2001). Since the research question is directed toward the success of new entrants to a market, the condition *new VC firm* captures the age of the youngest VC firm participating in the deal. Milanov and Shepherd (2013) have emphasized that even if a new VC firm consists of individuals with former experience in the VC firm industry, the VC firm itself will still be regarded as new firm. On the other hand, we also gather the age of the most senior alliance partner participating in the deal, to indicate whether an *established VC firm* is involved. In order to calibrate these two conditions we draw to the average fund life cycle of 10 years (e.g. Hochberg et al., 2007). Accordingly, a new entrant is a full member being in business for less than a year and a non-member, when having been in business for 10 years. For the condition of established VC firms, 10 years mark full-membership as those are assumed to have completed an entire fund life cycle, but anything under two years of business is coded as definitely not established.

In order to assess the network resources associated with a deal, we consider the network created by joint syndications. Most studies focus on the network resources established in the past by observing the position of a VC firm within the syndication network prior to an investment (e.g. Hochberg et al., 2007; Ma et al., 2013; Podolny, 2001). Yet, the network resources acquired following the initial investment can also strongly influence the value-add effect, for example, by providing access to new, valuable information that benefits the portfolio company. The theoretical rationale for the post-deal network position's effect on performance is scant. In a way, scholars allude to this by stating that the structure of a syndication network at one point in time influences the formation of future ties (Hopp, 2010; Sorenson & Stuart, 2008). As there are motives for syndication, where the partner composition might benefit from network resources available pre-investment, such as the screening motive, and other motives, which might also profit from the network resources available post-investment, we differentiate the network resources between those two phases. Accordingly, the network position for each VC firm in the three-year window preceding the deal is determined, (that time period being referred to as pre-deal) and in the three years after the deal, starting in the very year of the deal (labelled post-deal).

From the SNA, we determine four network variables—degree centrality and average weight of ties pre and post to the deal—and convert them into *status* and *tie strength* conditions, in two further steps: First, as the network position was determined for every VC firm, syndicated deals can be attributed more than one value. Syndicated deals can be understood as cooperation, therefore the most valuable resources are relevant (Ozmel et al., 2012). Accordingly, we used the maximum of the degree centralities and average tie strength associated with an investment deal to determine the network conditions in the two points in time. Secondly, the network measures need to be calibrated. As there is scant research on what might be considered high or low degrees of centrality, or average strength per tie, these measures can only be interpreted following a comparison of the value of the VC firms. Therefore, we base the calibration on case knowledge (Ragin, 2008). For degree centrality, having established ten per cent or more of the theoretically possible connections to other VC firms has been identified as full membership of high status. In the period 2007–2009, for instance, this would mean having connections to at least 28 different VC firms. Non-membership is assigned to VC firms without any links, hence those who have only undertaken financing rounds alone. Concerning the tie strength, an average strength of two qualifies as the full membership threshold. VC firms attaching little importance to establishing strong links by repeatedly co-financing deals with different VC firms will display an average weight per edge of around one, which marks the threshold for non-membership.

Differences in motives and experience among dissimilar types of VC firms lead to different compositions of social capital within syndicated deals with unalike VC firm types. We refer to this characteristic as *diversity*. Diversity can affect high performance positively because the VC firms have a wider range of experience and differing social capital to call upon. Alternatively, diversity might have a negative effect resulting from the potential for conflicts between the VC firms (Wright & Lockett, 2003). The diversity condition is dichotomous, indicating whether dissimilar VC firm types are involved in the relevant deal coded with 1 (e.g. CVC and independent VC firm), or if the participating VC firms are of the same type, coded with 0.

5.4. Results

5.4.1. Descriptive statistics

The descriptive statistics and the set calibration for the conditions and the outcome are shown in Table 5-1. For the 333 investments conducted in 2006 and 2007, we observe the outcome in mid-2013. There are 146 observations for the diversity condition, as it can only be evident when there is more than one VC firm involved. Correspondingly, 146 out of the 333 deals are syndicated. This share is in line with the average rate of syndicated deals in the entire sample.

5.4.2. Configurations

The fsQCA solution is presented using filled and empty circles, indicating presence and absence of conditions explaining the outcome in Figure 5-1. Following Fiss (2011), we distinguish between core and peripheral conditions, which permits a relevance ranking of the conditions according to the strength of evidence in relation to the outcome. Core conditions (large circles) are at the heart of the solution set, occurring in the parsimonious and intermediate solution, whereas peripheral conditions (small circles) are evident only in the intermediate solutions.

The solution table presents the configurations that explain the outcome at a credible consistency level (≥0.8) and with unique cases dropped (frequency cut-off: 2) (Ragin, 2008). Overall the solution set displays a consistency level of 0.85 and a coverage level of 0.62. It contains eight configurations explaining high performance equifinally. Consistency evaluates the extent to which the subset relates to the outcome, whereas coverage gauges the share of the outcome explained by a configuration, or by all configurations taken together (Ragin, 2006).

Each configuration is sufficient to explain strongly performing deals but is not necessary to do so, as there are alternative paths to explain the outcome (Mackie, 1965). Based on the necessity analysis which separately precedes the analysis of sufficient conditions to explain an outcome, we identified syndication (consistency: 1.0; coverage: 0.63) and high status after the deal (consistency 0.94; coverage: 0.64) as necessary conditions.

Table 5-1 *Descriptive statistics and set calibration criteria*

	Descriptive Statistics			Membership criteria		
	N. Obs.	Mean	St. Dev.	Full membership	Crossover point	Full non-membership
Syndication [a)]	333	0.44	0.50	dichotomous (1;0)		
Established VC firm [a)]	333	15.64	18.42	10	4.5	2
New VC firm [a)]	333	7.20	7.87	0	4.5	10
Status pre-investment [a)]	333	0.07	0.06	0.1	0.02	0
Tie strength pre-investment [a)]	333	1.19	0.53	2	1.5	1
Status post-investment [a)]	333	0.10	0.07	0.1	0.02	0
Tie strength post-investment [a)]	333	1.62	0.68	2	1.5	1
Diversity [a)]	146	0.53	0.50	dichotomous (1;0)		
Performance [b)]	333	0.56	0.32	1	0.5	0

a) non-calibrated values b) qualitative, calibrated values

The result of the relevance check of the necessary conditions, shows that syndication and post-deal status are irrelevant, since also the opposite outcome of non-performance requires both characteristics as necessary condition. Consequently, we omit syndication and post deal status from the presentation in Figure 5-1, nevertheless the conditions were included in the sufficiency analysis (Braumoeller & Goertz, 2000).

Having an established VC firm involved in a deal is a common trait for seven configurations, however, configuration number eight explains the high performance under the absence of this

condition. The remaining conditions cannot clearly be defined as present, absent, or irrelevant in explaining the outcome, as they appear in all traits within the solution set and are thus context dependent. Which configurations are core to and which peripheral to the solution also differs. With regards to the research question, we group the eight configurations into four groups.

Configurations 1–3: Established VC firms without new VC firms. The first three configurations are marked by only established VC firms participating in the syndicate:

Whereas two of them seem to display a source of social capital from involving different VC firm types (No.1 and 2) and displaying high status in the pre-investment phase as well as strong ties as a core condition (No.1), the third configuration shows no indication of social capital maximizing approaches.

Configurations 4–5: Established VC firms. Configurations four and five also explain high performing deals of established VC firms, while the presence or absence of new VC firms is irrelevant. Also both configurations have absent tie strength post-investment at the core of the solution. Configuration four has high pre-investment status, in combination with the neutral permutation of the diversity condition. Furthermore, configuration four has the highest empirical importance due to the raw coverage level of 0.4. Configuration five on the other hand has the presence of different types of VC firms at the core of the solution.

Figure 5-1 Configurations for high performance

Conditions	Configurations							
	1	2	3	4	5	6	7	8
Established VC firm	●	●	●	●	●	●	●	◯ (core absent)
New VC firm	◯ (core absent)	○	○			⬤ (core present)	●	●
Status pre investment[b]	●			●		●	◯ (core absent)	●
Tie strength pre investment[c]	⬤ (core present)	○	○		○	⬤ (core present)	○	○
Tie strength post investment[d]		◯ (core absent)	◯ (core absent)	◯ (core absent)	◯ (core absent)		●	●
Diversity[a]	⬤ (core present)	⬤ (core present)			⬤ (core present)	◯ (core absent)	◯ (core absent)	◯ (core absent)
Consistency	0.827	0.874	0.885	0.880	0.870	0.837	0.873	0.837
Raw coverage	0.157	0.144	0.238	0.395	0.172	0.119	0.060	0.025
Unique coverage	0.056	0.013	0.016	0.098	0.024	0.048	0.034	0.016

Solution consistency   0.85
Solution coverage   0.62

⬤ Core condition (present)   ● Peripheral condition (present)

◯ Core condition (absent)   ○ Peripheral condition (absent)   Blank space: neutral permutation

a) Diversity of VC firm type b) Max. status of participating VC firms prior to investment c) Max. tie strength of participating VC firms prior to investment d) Max. tie strength of participating VC firms post investment

Configurations 6–7: Established VC firms in alliance with new VC firms. These two configurations represent successful syndicates between established and new VC firms, yet the involved VC firms are of the same type. Configuration 6 shows good network resources before the deal in terms of status and even more importantly tie strength. In contrast, the seventh configuration emphasizes that years in business do not necessarily accompany high status.

Here, neither the new nor the established VC firm display a high status position before the deal. This might point to an avenue of established players partnering up with new entrants when they do not have a high status position themselves. Yet, in this constellation strong ties are formed in the period after the deal, which might be in a way compensating the lack of status and tie strength before the deal.

Configuration 8: New entrants. The most striking characteristic of the deals described by configuration eight is the absence of established VC firms, while new firms are present. Core to those deals is also that comparable VC firm types are involved. At least one of the new entrants has however been active in the VC industry as the syndicate includes a high status player. While tie strength is absent prior to the deal, it is strong in the period after the deal.

5.5. Discussion and implications

5.5.1. Discussion of results

Our results suggest that understanding high performing investments in VC portfolio companies requires the analysis of complex patterns. The combination of VC firms' particular characteristics and the characteristics of the syndicate explain a large part (62 %) of high performance. The fsQCA approach enables us to analyze context dependencies between conditions and as a result to show the different paths to high performance as an outcome rather than evaluating the positive or negative effect of variables. The results suggest a complex solution of eight different configurations. All equifinally lead to high performance, yet differ in coverage, which hints toward empirical relevance, while the theoretical relevance is rooted in the outliers. However, those eight configurations can be sorted into three groups with respect to our research question: Group one explaining high performance of established VC firms (explicitly without new entrants or with an indifferent position toward new entrants), group two explaining the success of alliances between established VC firms and new entrants and group three showing a path for new entrants to be successful in alliance with other new entrants. Hence, there are substantial differences between the groups and more particularly between the configurations all describing high performance.

5.5.2. Implications

Our finding contribute to the interorganizational network formation, VC syndication literature in three ways.

Firstly, the results point toward a way how to overcome the Matthew effect. Although we consider an environment, which is dominated by status and strong ties, the analysis identifies combinations of characteristics, which indeed include new entrants in the recipe for high performance and reveal that the participation of an established VC firm is not a necessary condition. The three configurations involving new entrants suggest strategic alliance formation in order to demonstrate a successful entry into an environment. That is, new entrants might be able to overcome the burdens of being new, by first learning the ropes from more established players. Actors, which are not really in the center might be adequate points of first contact, because the high status players prefer especially in contexts of large uncertainty peers in terms of status (Lerner, 1994). The absence of a high status VC firm in this configurations is in line with Podolny's (1994) findings of actors preferring high status partners, but frequently they form links to others with similar (lower) status, as high status players are looking for peers in terms of status. This combination might be especially effective as those cases avoid the phenomenon of status shaping the social order within a syndicate, and therefore facilitate all partners being equally involved in the decision making (Ma et al., 2013). The second step would be joining a syndicate with higher status-partners, as the new entrant has more to contribute to a syndicate then. New entrants can probably best compensate their missing status and liabilities of newness by putting in more effort (Castellucci & Ertug, 2010). Yet, not all contexts or alliances provide the opportunity for compensation. Lastly, a new entrant can form alliances, maybe even as lead investor, even under the absence of established partners. With this suggestion we only partly agree with the conclusion Ozcan and Eisenhardt (2009) draw from their empirical study that new entrants should first collect achievements and then form ties with more established players. Our results show that indeed new entrants can create achievements by collaborating with more established VC firms, which later on enables them to succeed even without a more senior partner. This approach is also encouraged by Milanov and Shepherd (2013), who emphasize the positive impact of the first network partner.

Secondly, the results also add to the discussion surrounding the relevance of syndicated opposed to single investor deals. More than one VC firm investing in a portfolio company is a necessary condition for both the outcome high performance and low performance, this supports the argument of syndication being a strategy to deal with uncertainty and risk (Lerner, 1994) and even suggests that it might be the most relevant syndication motive. Consequently, we have found no indication of the success of single-investor deals regardless of the VC firms' characteristics. Another interpretation might be that syndication has become a standard in the VC industry, that it no longer aids the explanation of high performance. Yet, in our sample only 46 percent are syndicated deals, implying that syndicated deals tend to explain the distinct failures or successes, but not the more ambiguous performances. Consequently, our results provide support to the understanding of syndication leading to higher variety in the outcome (Brander, Amit, & Antweiler, 2002). However, we also underline that even when considering different deal resources, syndication cannot be attributed a strictly positive impact on the deal performance.

Thirdly, the results add to the discussion on syndicate compositions with regards to benefits from inhomogeneity. The configurations explaining high performance under the participation of new entrants require the simultaneous absence of the diversity condition and likewise, all configurations involving different types of VC firms require the absence of new VC firms or treat this condition as a neutral permutation. This is particularly interesting, as it allows us to speculate that there might be maximum degree of heterogeneity in a deal, that can lead to high performance. Coordination and management cost in alliances are higher if one partner has missing or weak organizational knowledge and role clarity as it might be the case with new entrants (Morrison, 2002) and if the alliance partners have differing strategic objectives, as it might be true when different VC firm types syndicate (Bertoni, Colombo, & Quas, 2015; Dushnitsky & Lenox, 2006). In consequence, different VC firm types might not be part of the same syndicate as new firms, as the expected costs might exceed the potential benefits from this combination (Brander et al., 2002). In the context of team formation in start-ups, a lower degree of heterogeneity can also be observed in earlier stages, and a higher degree in later stages (Kaiser & Müller, 2015). This could also be the case for VC syndicates, possibly accepting or being able to cope with a higher degree of heterogeneity only in later phases.

With regard to the application of fsQCA in the field of management, we have further contributed by applying fsQCA in a setting that has addressed recent fsQCA issues. First, mixing QCA with other methods seems likely to become a standard practice in the future, but is currently rare in QCA studies (Rihoux, Àlamos, Bol, & Rezsöhazy, 2013). Our study goes some way to addressing this issue by using SNA to define four of the conditions. As the study looks at both the network position before and after the investment deal, the challenge of combining QCA with time is also addressed. Finally, this study contributes by further establishing this methodology in management research.

Regarding practical implications, we recommend start-ups engaging with VC firms acknowledge that non-prestigious VC firms, in terms of status and age, can just as well forge successful deals. Instead of being guided by status and experience, start-ups might look at the future engagements a candidate VC firm targets. The right future engagements can not only boost the VC firm's performance, but also offer the start-up access to new information that can bolster the value-add effect. Having more than one VC firm involved in the same financing round, is on the other hand no guarantee for better value-adding, instead it opens up the avenue for possible free-riding problems (Dimov & De Clercq, 2006).

Another point concerns the syndication network of VC firms within the industry. Start-ups need to be aware of the connectedness between VC firms, as information such as that revealing a start-up has sought capital but been turned down by a VC firm is likely to be shared in the industry and to increase the likelihood of being denied again (Bygrave, 1987). As a result, start-ups should be well prepared and have carefully assessed which VC firm they wish to approach.

5.5.3. Limitations

FsQCA requires the calibration of sets. This process is based on the researcher's expertise, and owing to the lack of set calibration in comparable studies, there might be arguments for setting the threshold values differently. More studies in management applying fsQCA will enrich the basis for creating membership criteria by offering comparisons across studies. We limited our sample to seed and early stage investments in portfolio companies, but maybe the participation of VCs in later stages has a greater effect on performance. Also in terms of entry opportunities

for new actors into the status and strong ties environment later stages might reveal new insights, as it is especially the early stages where VC firms tend to syndicate with peer established firms (Lerner, 1994). Hopp (2010), for instance, argues that the involvement of new VC firms can help to bridge a competency gap, which might have stalled the progress stemming from an initial investment. Accordingly, the participation of new VC firms can have a significant impact on the portfolio firm's performance. Therefore, analyzing the deals considering subsequent investment phases could provide insights in which phase of the development of a portfolio company a VC firm has the greatest impact on performance. The generalizability of our findings might be limited with respect to varying screening and value-adding abilities across VC firms in different nations. Researchers such as Bertoni, D'Adda, and Grilli (2016) have found VC firms from the USA to have better screening abilities than in thin VC markets, such as Europe. Accordingly, in the USA, characteristics relevant to the screening effect, such as the network position before the deal and the composition of the syndicate, might be relatively more important than those related to the value-add effect, that is, the social capital acquired after the deal.

5.6. Conclusion

To sum up, our findings clearly show that new entrants can successfully overcome the burdens of being new and exhibiting low status positions and that an established VC firm is not a necessary condition for success. More specifically, by applying a fuzzy-set qualitative comparative analysis, we were able to explain a large part of the phenomenon of high performing VC deals with the deal resources accumulated by the participating VC firms. In other words, we have provided empirical evidence that being established and status are very relevant in the industry, but can be overcome. Tie strength on the other hand does not appear to be an obstacle for new entrants. These findings are relevant for future research in interorganizational alliance formation as well as in VC firm syndication research and lastly for the operations of VC firms.

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6. Discussion and conclusion

In this thesis I present four empirical studies, which show the potential of embracing complexity in entrepreneurship research by applying a configurational research method, namely Qualitative Comparative Analysis. In the following section, I summarize the results of the studies and highlight the contribution of the single studies as well as the contribution to research and practice as a whole. Based on the findings of these four studies, I will discuss potential avenues for future research in entrepreneurship with regard to QCA.

6.1. Summary and discussion of results

The goal of this dissertation was to show the potential of applying the QCA research method to relieve the complexity of certain phenomena in entrepreneurship justice. This dissertation is therefore a response to the increasing gap between entrepreneurship theory, which is increasingly defined by complexity and research designs based on key assumptions conflicting with complexity, such as linearity and causal symmetry.

Besides a structured literature review, which presents the state of the art of QCA applications in the field of business and management, three studies successfully illustrate QCA is an appropriate tool with which to study entrepreneurship phenomena at both macro and micro levels.

Chapter two presents a structured literature review of the application of QCA in the business and management research. I have identified 96 empirical papers in journals between 1995 and 2015, that apply QCA. Especially since 2011, the number of articles published in journals has increased. Based on the analysis of 5,141 unique citations I could show that apart from a further development of the research method by Charles Ragin (2000, 2008), key publications in top B&M journals such as those of Peer Fiss (2007, 2011) have paved the way for QCA becoming a popular research method. Despite the increasing recognition and sophistication of QCA applications, its popularity brings the risk of the method being applied mechanically or simply for the sake of following a trend.

However, QCA is inseparably linked to the configurational approach, therefore, applying QCA to phenomena that are theoretically not understood as complex (with all the associated underlying assumptions) could also lead to a mismatch between theory and research designs. In other words, the current research is a call to provide arguments for why the studied phenomena requires a configurational research design.

Although the literature review focused on the field of B&M more generally, there are a few findings specific to the field of entrepreneurship. Among the 96 articles applying QCA, I identified 10 articles as entrepreneurship studies after screening abstracts published between 2006 and 2015. Six of the studies apply csQCA, while the remaining articles apply fsQCA. All but one conduct the study at an organizational level and the sample sizes range from 5 to 131. What is also striking is the low proportion of studies (20 %) opting for mixed-methods research designs. In sum, the review reveals the lack of studies in entrepreneurship applying QCA at a country level, using larger samples and choosing mixed methods designs. This is not a call to apply QCA in this context just because it has not been done before. However, especially in political science for cross-country comparisons, QCA has proven to be a valuable research method to cope with the intertwined antecedents explaining an outcome (Rihoux, Álamos-Concha, Bol, Marx, & Rezsöhazy, 2013). Although several studies in entrepreneurship have shown it is appropriate to apply QCA at the company level (Krause, Achary, & Covin, 2014; Muñoz & Dimov, 2015), sample sizes applied in the available entrepreneurship studies are rather small compared to other studies in management at the organizational level (Greckhamer, Misangyi, Elms, & Lacey, 2008). Mello (2013) attributes to QCA a natural affinity to be combined with other research methods; yet, mixed methods in QCA entrepreneurship studies are as scarce as in the entrepreneurship field in general (Molina-Azorín, López-Gamero, Pereira-Moliner, & Pertusa-Ortega, 2012). Because of the interfaces of entrepreneurship with many other disciplines and its inherent complexity, the mixed-method approach is considered an adequate way to deal with "complexity, uniqueness and richness" (Molina-Azorín et al., 2012, p. 443). An explanation might be that QCA already addresses these challenges and therefore does not require a mixed-method approach on top of that. Alternatively, mixed methods including QCA in entrepreneurship might be a research design capable of embracing the rich theory. Either way, further applications of mixed methods with QCA will help reveal its potential.

Chapter 3 and chapter 4 present two studies at the macro level both comparing the antecedents of entrepreneurial activity across countries. In chapter three, my co-authors and I show how combinations of characteristics of the institutional framework can explain higher and lower levels of entrepreneurial activity in innovation-driven economies. Considering three dimensions (i.e., culture, well-being, and economic freedom) simultaneously offers a configurational perspective on entrepreneurial activity. By applying fsQCA for the cross-country comparison, we were able to move from focusing on one construct to embracing the complexity of all three dimensions. Apart from revealing the causal conjuncture between conditions explaining entrepreneurial activity, we also show that to support entrepreneurial activity, causation needs to be understood as equifinal and asymmetric. While we have identified a combination of conditions explaining high opportunity-driven entrepreneurship – which we called the Nordic model – there are other ways to enable a high level of entrepreneurial activity. This is even more evident for necessity-driven entrepreneurship, where six different combinations of culture, well-being and economic freedom explain the outcome. The comparison of the two sets of configurations points to another strength of QCA in capturing complexity, namely the causal asymmetry. Opportunity- and necessity-driven entrepreneurship are sometimes presented as antagonistic concepts. However, our results show, that the antecedents explaining the two phenomena are more complex than simply mirror images. The role of economic freedom in explaining entrepreneurial activity is somewhat puzzling since it is almost a trivial condition. Its high degree of complexity and heterogeneity as well as the focus on innovation-driven economies might explain its ambiguous role.

In chapter 4, I present a study that follows up on the ambiguous role of economic freedom and zeroes in on the impact of different elements of economic freedom on entrepreneurial activity. At the same time, this study broadens the spectrum of considered economies to include factor-, efficiency-, and innovation-driven economies. The results of the study contribute to the literature by confirming some findings from the previous study that analyzes the institutional framework as a whole such as the non-antagonism between opportunity and necessity-driven entrepreneurship. Furthermore, this study again illustrates the benefit of applying QCA in a cross-country setting. Despite small sample sizes, the current research identifies patterns of which configurations of economic freedom explain high or low levels of entrepreneurial activity. The results also stress the aspect of equifinality with regard to how to design elements

of economic freedom and thereby illustrate the questionable nature of rankings of economic freedom, provided by for instance the International Monetary Fund and the World Bank, which imply more economic freedom to be equivalent to a promise of greater growth and development. However, especially in light of the developmental stage of a country reducing the extent to which economic freedom can explain entrepreneurial activity (as our results suggest), it becomes obvious that those objectives disregard the context- and stage-specific requirements of an economy to prosper. This study constitutes a major step forward in understanding how politicians can shape the regulatory pillar of the institutional framework in order to foster or hinder entrepreneurial activity. Moreover, with regard to the previous study, this poses an interesting question of at what level of abstraction we ought to study the antecedents of entrepreneurial activity. Attempting to present a holistic picture, including all institutional framework factors for instance, can lead to complex systems being simplified too far and suggesting that economic freedom is of less importance. On the other hand, zooming in on one complex system could neglect the interaction with other subsets.

The fifth chapter then turns to the micro-perspective on entrepreneurship by studying the complex phenomenon of the high performance of Venture Capital (VC) deals. The plethora of studies analyzing deal performance and success factors of VC firms from different theoretical perspectives emphasizes the need to apply a configurational approach in order to embrace the resources provided by the VC firms to a deal. The results show that this phenomenon is truly complex as eight different configurations explain the outcome. One of the three main findings is the identification of a path that enables even new entrants to the status-dominated market to succeed. The most prevailing pattern involves the participation of established players, in other words, our research interest lies in an outlier phenomenon. Applying QCA in this context provides an alignment between theory and research design, as other research methods such as regression or cluster analysis suggest to eliminate outliers (Aguinis, Gottfredson, & Joo, 2013) and would have prevented us from identifying this rare path of how new entrants can overcome the Matthew effect. Secondly, the study contributes to the discussion on the increasing practice of syndicated deals as we find the syndication to be a necessary condition for high performance, but also for low performance. The results indicate syndicated deals lead to a greater variety in outcomes. The identified role of syndication as necessary but trivial is another strength of QCA and enhances our understanding of complex phenomena, as both necessary

and sufficient conditions are identified. Thirdly, the results suggest that it is possible to identify a maximum degree of heterogeneity with regards to VC resources in a deal that leads to high performance. This speculation is facilitated by the comparison of the different, equifinal configurations identified following the QCA. Again this relationship might have remained concealed if applying a research method that analyzes net-effects.

With regard to the doctoral thesis' objective to show the potential of the application of fsQCA in the field of entrepreneurship, I contribute to the literature in several ways.

First, I have identified the so far scarce application of QCA as a research method in entrepreneurship despite numerous calls for more configurational approaches to entrepreneurial phenomena (Harms, Kraus, & Reschke, 2007; Harms, Kraus, & Schwarz, 2009; Lichtenstein Carter, Dooley, & Gartner, 2007; McKelvey, 2004). More specifically, the application for cross-country comparison, in research designs with larger samples and mixed methods were identified as lacking but promising consideration for entrepreneurship studies applying QCA. Second, the two studies analyzing entrepreneurial activity across countries illustrated the potential of QCA at a macro level, which has not been applied in the entrepreneurship literature. The studies revealed distinct patterns where previous studies were not able to capture the complexity of the phenomenon, and consequently produced ambiguous results (Engelen, Heinemann, & Brettel, 2009; McMullen, Bagby, & Palich, 2008). Third, the macro-level studies raised an issue so far not discussed in the application of QCA but which might constitute a potential limitation in the application if not addressed: That issue is that of discerning the adequate level of complexity the research method can deal with.

Fourth, the micro-level study has addressed two further issues identified by the structured literature review by applying QCA to a larger sample and in combination with another research method. While this poses no entrepreneurship-specific challenges to the application of the method, it emphasizes the range of possibilities of how QCA might be modified and adopted to any research setting, as long as it deals with a complex phenomenon and is approached configurationally.

Finally, this thesis contributes to aligning the configurational understanding of complex phenomena in entrepreneurship and the research designs to study those by illustrating the potential of applying an adequate configurational research method such as QCA.

6.2. Avenue for future research

Although each individual study has triggered further questions and research potential, which I have pointed out in the respective chapters, there are avenues for future research that may be derived from the thesis as a whole.

Some researchers still claim, that "the world today is no more complex than before. There are only more people who talk the world to be complex"[13] (Simon, 2000, p. 123). Yet, the number of advocates that this complexity turn is real prevail (Urry, 2005). It is not just an observation that every generation makes in comparison to the prior generation. The increasing digitalization and the movement toward the internet of things and services contributes to rising levels of complexity, as the internet itself is a complex system (Park, 2005). This creates many problems and opportunities, which will and already are largely solved and exploited by entrepreneurs and consequently also create more complex entrepreneurial phenomena that ought to be studied by researchers. Therefore, I believe the configurational approach to entrepreneurship to become inevitable and to grow in popularity. We need research designs to be in alignment with the theory and QCA is currently one of the most promising research methods to achieve this compliance, yet by no means the only one. The recently published edited volume titled "Complexity in Entrepreneurship, Innovation and Technology Research – Applications of Emergent and Neglected Methods" (Berger & Kuckertz, 2016) examines the suitability of other promising and partly neglected research methods such as computer simulations, network analysis, or action research. Entrepreneurship research places particular demands on the research method, one of which is determining how dynamics can be handled. Entrepreneurship changes with time, not gradually but with quantum leaps (Bygrave, 1989). Although there are a few attempts to incorporate time into QCA (Caren & Panofsky, 2005) and in chapter 5 I have also offered one approach by employing two conditions which are measured at different points in time, true dynamics can only be considered imperfectly with QCA.

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[13] Loosely translated, original in German: "Die Welt ist heute nicht komplexer als früher. Es gibt nur mehr Leute, die sie komplex reden."

The two studies at a macro level have triggered an interesting question that remains unaddressed from a methodological perspective in the current thesis. Study 1, which considers three dimensions of the institutional framework to explore their impact on entrepreneurial activity, found economic freedom to be of limited use to explain different levels of entrepreneurship across countries. However, the second macro-level study, *the more the merrier*, focuses on the dimension of the institutional framework, that can be influenced directly by policymakers. Reducing the level of abstraction and focusing on economic freedom then shows that economic freedom can indeed help us understand the differences between levels of entrepreneurial activity across countries. This leads to the immediate question of what degree of complexity can be captured when applying QCA. Following Ragin (1987, 2008), the decision on what conditions to include at what level of detail must then be based on theory and case knowledge. However, the two macro studies in this thesis both provide good reasons for the design of the conditions. Researchers need to be aware of the possible trade-off between providing a very holistic picture of a phenomenon against finding the most appropriate level of detail when designing the conditions and outcome. Certainly, this is a necessary decision regardless of the research method used, however, as QCA is touted as capturing a high degree of complexity this is of particular relevance. Future researchers applying QCA regardless of their discipline need to take the appropriate degree of abstraction into consideration as it might otherwise turn in to a weakness of the QCA applications. Methodologists might even want to insert this "step" into the numerous instructions on how to apply QCA.

QCA is fundamentally different from the more established regression analysis, which results in reviewers and the community drawing comparisons to research methods they might be more familiar with. One of the challenges in applying QCA in entrepreneurship research, a discipline that is also more used to linear causality than to comparative studies, is to communicate the differences in vocabulary, calculations, tests, and result presentations. The literature review showed that in management there is for example a tendency to use less Boolean notation (compared to political science) to convey the results but also a greater tendency to resort to visualization. Future research on entrepreneurship might discover alternative modes to visualize results that could convey the particularities and benefits of applying QCA. While this thesis has focused on fuzzy-set QCA, there are further opportunities for application such as multi-value and crisp-set QCA. Crisp-set QCA relies on dichotomous conditions and outcomes

and does not differentiate between degrees of membership (see for instance Mandl, Berger, & Kuckertz (2016) for an application). The different variants and large range of other methods QCA might be mixed with reinforces the flexibility of this research method and hence its attractiveness to scholars.

However, I am not suggesting QCA is a panacea for analysis in entrepreneurship where traditional regression analysis has produced ambiguous results, or for any seemingly or truly complex phenomenon. Instead, I present QCA as one alternative with potential in the study of complex entrepreneurial phenomena. Ultimately it is more important to study the "central questions with appropriate tools, whether they are simple or complex" (Bygrave, 1989, p. 8). Among those central questions in entrepreneurship some are more prone to be tackled from a configurational perspective and hence suited to the application of QCA, and others will be less so. Referring to Sarasvathy (2004) who claims the most interesting part of entrepreneurship to be its interface with the inner and outer environment, the configurational approach and QCA as a research method might be especially promising for research designs that take both dimensions into account.

6.3. Conclusion

In conclusion, this doctoral thesis has provided illustrations of how Qualitative Comparative Analysis can lead to new insights when studying complex phenomena in entrepreneurship using a configurational approach and applying a research method aligned with this perspective. Nevertheless, the scope of the application of QCA in entrepreneurship is still manifold and will enable scholars not only to confront the increasingly complex reality of entrepreneurs and entrepreneurship research, but also to revisit established questions which have to date produced mixed results.

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Appendix I: Co-Author declarations

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Co-author declaration for article "What drives entrepreneurship? A configurational analysis of the determinants of entrepreneurship in innovation-driven economies"

As the co-authors of "What drives entrepreneurship? A configurational analysis of the determinants of entrepreneurship in innovation-driven economies" published in Die Betriebswirtschaft/ Business Administration Review, Vol. 75, Nr. 4, pp. 273-288, we herewith confirm Elisabeth Berger's individual contribution to the article to have consisted of:

- Major contribution towards the formulation in the concept phase of the basic scientific problem on the basis of theoretical questions which require clarification, including a summary of the general questions which it is assumed will be answerable via analyses
- Major contribution towards planning of experiments/analyses and formulation of investigative methodology in such a way that the questions asked can reasonably be expected to be answered, including choice of method and independent methodological development.
- The majority of the work independently regarding the analysis
- Major contribution towards the presentation, interpretation and discussion of the results obtained in article form

We can therefore testify, that Elisabeth Berger has made major contributions to the success of the paper and that this study would not have been conducted without her.

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- Major contribution towards the presentation, interpretation and discussion of the results obtained in article form

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Co-author declaration for article "Overcoming the Matthew effect in status dominated environments – a configurational analysis of venture capital investments"

As the co-author of the manuscript "Overcoming the Matthew effect in status dominated environments – a configurational analysis of venture capital investments" and the earlier version "Who you are and who you know - a configurational analysis of the performance effects of venture capital firms' characteristics and network resources" published in the Frontiers of Entrepreneurship Research (Full Paper), Wellesley, MA; Babson College, I herewith confirm Elisabeth Berger's individual contribution to the article to have consisted of:

- Major contribution towards the formulation in the concept phase of the basic scientific problem on the basis of theoretical questions which require clarification, including a summary of the general questions which it is assumed will be answerable via analyses
- The majority of the work independently regarding planning of experiments/analyses and formulation of investigative methodology in such a way that the questions asked can reasonably be expected to be answered, including choice of method and independent methodological development.
- The majority of the work independently regarding the analysis
- The majority of the work independently regarding the presentation, interpretation and discussion of the results obtained in article form

I can therefore testify, that Elisabeth Berger has made major contributions to the success of the paper and that this study would not have been conducted without her.

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