ISCTE Business School

Department of Management

Three Essays on National Culture and Organizational Learning

Eunah Lim

Thesis specially presented for the fulfillment of the degree of

Doctor in Management, Strategy and Entrepreneurship concentration

Supervisor:

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Management Department

April, 2018

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April, 2018

Abstract

This thesis is made up of three related empirical essays that collectively contribute to a common research objective. Specifically, each of these essays seeks *to further our understanding of how national culture might play into organizational learning behaviors and outcomes*. These essays are presented in the form of chapters and are bookended by an introduction chapter at the beginning of the thesis and a conclusions chapter at the end.

Essay 1 (presented in chapter 2) presents a meta-analysis using 44 existing studies conducted in single-nation contexts (k=44) to assess the potential moderating role of national culture on organizational ambidexterity-performance relationships. The results indicate an overall positive ambidexterity-performance link, which is stronger in countries with low levels of institutional collectivism, high levels of in-group collectivism, low levels of future orientation, low levels of performance orientation, and low levels of uncertainty avoidance. Additionally, the ambidexterity-performance relationship appears to be stronger in countries with high levels of power distance.

Essay 2 (presented in chapter 3) argues that both shortfalls between actual organizational performance and aspirational performance, and organizational slack, are positively associated with R&D investments, and a firm's home-country membership in either the Asian cultural cluster or western cultural cluster could moderate these relationships. Using an unbalanced panel of data on 85 firms in the global automotive industry between 2003 and 2015, with 613 firm-year observations, empirical results suggest positive relationships between shortfalls in aspirational performances, as well as absorbed organizational slack, and R&D investments in the subsequent year. A firm's status as being from an Asian culture also appears to negatively moderate both these positive relationships.

Essay 3 (presented in chapter 4) considers the roles of internationalization and home country language in the propensity of firms to protect IP through patenting. Results from negative binomial models, using an unbalanced panel (n=567 firm-year

observations) with data on 64 large automotive suppliers from 13 different countries between 2007 and 2016, support the notion that firms from countries with languages that strongly oblige speakers to grammatically mark the future engage in less patenting. Additionally, results suggest that there is a U-shaped relationship between internationalization and patenting, but only for firms from countries that do not always oblige speakers to grammatically mark the future.

Collectively, the three essays in this thesis contribute by illustrating that national culture may play different roles in different types of organizational learning behaviors and outcomes.

Keywords: Organizational Learning, R&D Intensity, Ambidexterity, Patenting, National Culture.

JEL Classification System: L29 Other-Firm objectives, organization, and behavior, O32 Management of technological innovation and R&D

Resumo

Esta tese é composta por três ensaios que se relacionam entre si e em conjunto contribuem para um objetivo comum de pesquisa. Cada um dos ensaios procura aprofundar o conhecimento sobre o modo como a cultura nacional influencia os comportamentos organizacionais de aprendizagem e os resultados. Estes ensaios são apresentados sobre a forma de capítulos e são apoiados por um capítulo introdutório, no início da tese e um outro capítulo com as conclusões, no final. O ensaio número 1 (apresentado no capítulo 2) descreve uma meta análise utilizando 44 estudos existentes analisando cada um deles um país (k=44) para avaliar o potencial moderador da cultura nacional na relação entre a ambidestria organizacional e a performance. Os resultados indicam uma ligação positiva entre ambidestria e a performance, que é maior em países com níveis baixos de coletivismo institucional, com níveis elevados de coletivismo grupal, com baixos níveis de orientação para o futuro e baixos níveis de fuga à incerteza. Adicionalmente, a relação ambidestria-performance parece ser maior em países com elevados níveis de distância ao poder. O ensaio número 2 (apresentado no capítulo 3) argumenta que, quer os défices entre a performance atual da organização e a performance pretendida, quer as folgas organizacionais, estão positivamente associados com os investimentos em Pesquisa & Desenvolvimento, e a pertença da empresa a um cluster cultural asiático ou a um cluster cultural ocidental pode moderar esta relação. Utilizando um painel desequilibrado de dados de 85 empresas da indústria automóvel entre 2003 e 2015, com 613 observações das empresas por ano, os dados empíricos sugerem uma relação positiva entre os défices dos desempenhos pretendidos, assim como das folgas organizacionais absorvidas, e os investimentos em Pesquisa & Desenvolvimento no ano subsequente. O facto de uma empresa pertencer a uma cultura asiática parece moderar negativamente estas relações positivas. O ensaio número 3 (apresentado no capítulo 4) estuda o papel da internacionalização e da língua do país na predisposição das empresas para proteger a propriedade intelectual através do patenteamento. Os resultados de modelos binomiais negativos, utilizando um painel desequilibrado (n=567 observações empresa/ano) com dados de 64 fornecedores da indústria

automóvel de 13 países diferentes, entre 2007 e 2016, suportam a ideia que as empresas de países com línguas que obrigam fortemente os seus falantes a acentuar gramaticalmente o futuro envolvem-se menos no patenteamento. Adicionalmente, os resultados sugerem que existe uma relação com a forma U entre a internacionalização e o patenteamento, mas somente para países que nem sempre obrigam os seus falantes a acentuar o futuro. Em conjunto, estes três ensaios contribuem para mostrar que a cultura nacional pode ter diferentes papéis em diferentes tipos de comportamentos de aprendizagem.

Palavras-chave: Aprendizagem Organizacional, Intensidade de P&D, Ambidestria, Patenteamento, Cultura Nacional.

Classificação JEL: L29, O32

Acknowledgements

I would like to offer my sincerest gratitude to a number of people, who made this thesis possible. First, I would like to thank professor Nelson José dos Santos António for agreeing to be my supervisor, and for providing guidance during this journey. Your help has truly made all the difference. I would also like to offer my sincerest thanks to professors Marjan Sara Fonseca Jalali, Renato Jorge Lopes de Costa, and Fernando Alberto Freitas Ferreira, for offering valuable feedback during each of my annual thesis progress presentations. I took all their suggestions to heart as I revised and went forward in this research, and I will be forever grateful. Of course, I would also like to thank each of the ISCTE-IUL professors who taught during the course stage of this doctoral program, as their lectures were exceptionally informative and helped me to develop a clearer foundation upon which to write this thesis.

I would also like to thank my family and co-workers at Western Washington University, who have been exceptionally patient and generous with me over the last three years. Thank you to my husband and two sons for always encouraging me. I love you all. Thank you to members of the Western Washington University faculty who have offered "friendly review" feedback on each of the three essays in this thesis, as well as proofreading feedback. I will always be thankful.

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Abbreviations

BTF	Behavioral Theory of the Firm
CEO	Chief Executive Officer
EPO	European Patent Office
FDI	Foreign Direct Investment
FSTS	Foreign Sales to Total Sales
GLOBE	Global Leadership and Organizational Behavior Effectiveness
IH	International Harvester
IP	Intellectual Property
JPO	Japanese Patent Office
LRH	Linguistic Relativity Hypothesis
OLS	Ordinary Least Squares
PFM	Performance Feedback Model
R&D	Research and Development
ROA	Return on Assets
Strong-FTR	Strong-Future-Time-Reference Language
USPTO	United States Patent and Trademark Office
VIF	Variance Inflation Factor
Weak-FTR	Weak-Future-Time-Reference Language
WIPO	World Intellectual Property Organization

Chapter 1. Introduction

Research has contributed greatly to our understanding of organizational learning behaviors and outcomes over the past half century (e.g., Cyert & March, 1963; Duncan, 1976; Greve, 2003a; Levitt & March, 1988; Tushman & O'Reilly, 1996; Zollo & Winter, 2002), but there are still gaps in our understanding of relevant boundary conditions and moderators of organizational learning relationships (Birkinshaw & Gupta, 2013). Additionally, research has made great strides in advancing our understanding of national cultural differences (e.g., Chen, 2013; Hall, 1960; Hofstede, 1980; House et al., 2002; Nisbett & Masuda, 2003), and has identified culture as one factor that can relate to strategic decisions (Freytag & Thurik, 2007; Hennart & Larimo, 1998; Newman & Nollen, 1996; Schneider, 1989). This thesis argues that if national culture can be related to strategic decisions, then national culture should be prioritized as one of the potential factors acting as a moderator, or boundary condition, for organizational learning behaviors and outcomes. Hence, to partially fill this gap, the overarching research question addressed in this thesis is, "*what role(s) does national culture play in organizational learning behaviors and outcomes?*" Therefore, it is useful to begin this introduction with brief descriptions of selected and relevant literature on organizational learning behaviors and outcomes, as well as national culture in organizational studies, before describing the structure of this thesis and more specific research objectives and questions for each of the three essays.

1.1 Introduction to the relevant areas of study

1.1.1 Research on organizational learning behaviors and outcomes

Organizational learning theory (e.g., Argote, 1999; Levinthal & March, 1993; Levitt & March, 1988) has been heavily influenced by early work on the *Behavioral Theory of the Firm* (BTF) in the 1950's and 1960's (Argote & Greve, 2007), which offered a counter argument to the assumption that organizations, and decision makers within

organizations, always seek to make optimal decisions to maximize firm performance (e.g., Cyert & March, 1963; March & Simon, 1958). Instead, this early work offered that organizational decisions are often made through a process of bargaining amongst various coalitions of boundedly rational individuals within organizations, who may have competing interests (Cyert & March, 1963). As a result, the various coalitions may satisfice to agree upon imperfectly rationalized goals, framed in simple terms as aspirations that are more easily agreed upon (Greve, 2003a).

In terms of organizational learning theory, the most influential elements of the BTF come from how these organizations respond to performance. Specifically, the BTF focuses on the development of "*process-oriented models of the firm*" (Cyert & March, 1963 p.2), and these processes often center around organizational routines. Routines are repeated as "*standard operating procedure*" (Argote & Greve, 2007), are inertial, and represent the knowledge stocks of an organization (Argote, 1999; Zollo & Winter, 2002). However, when organizations experience low performance relative to aspirations, this may trigger a search process during which organizations examine their existing routines to identify solutions to improve performance. They may also try new activities if they cannot find solutions in their existing routines (Levitt & March, 1988). This behavioral response to poor performance that seeks to identify solutions to problems has been called *problemistic search* (Cyert & March, 1963). Alternatively, when performance has been positive, and organizations have excess resources, decision makers may perceive a cushion from failure and may seek to explore new routines and opportunities for their own interests (Greve, 2003b). This behavioral response to excess resources has been called *slack search* (Cyert & March, 1963). In either case, problemistic search and slack search can lead to the development or adoption of new organizational routines, so these search behaviors result in organizational learning.

Drawing upon the BTF notion that routines represent both the knowledge stocks of organizations, as well as the forum for changes to knowledge stocks (i.e., the forum for learning), organizational learning theorists began to form a nomological net that includes qualitatively different types of learning, as well as organizational outcomes related to learning behaviors (March, 1991). Specifically, these researchers

have offered that search and learning activities that result in repetition and only minor changes to existing routines can lead to positive quality and performance outcomes in the short- to medium-term (Argote, 1999; Cyert & March, 1963; Zollo & Winter, 1982). This type of learning activity has been called *exploitation* (Greve, 2007; Levitt & March, 1988). Alternatively, organizational search and learning activities can entail experimentation with routines and opportunities that are new and distant from existing activities, which can result in realizing new opportunities that positively relate to long-term outcomes (Greve, 2007; Zollo & Winter, 2002). This type of learning behavior has been called *exploration* (March, 1991). The second wave of ideas from this core body of organizational learning theory notes that a myopic focus on either exploitation or exploration can have negative implications for organizational outcomes (March, 1991; Tushman & O'Reilly, 1996). An alternative is for organizations to focus on both exploitation and exploration, to ensure short-term efficient performance and long-term survival (Duncan, 1976; March, 1991; Tushman & O'Reilly, 1996). This dual focus on exploitation and exploration has been called *ambidexterity* (Tushman & O'Reilly, 1996).

In addition to the core organizational learning literature on exploitation, exploration, and ambidexterity, another more recent descendent of the BTF that can be placed under the organizational learning theory umbrella is the *Performance Feedback Model* (PFM) (e.g., Audia & Greve, 2006; Greve, 1998, 2003b). The PFM literature stream builds upon the BTF's notions of problemistic search and slack search by arguing that organizational performance relative to aspirations will also relate to managerial risk tolerance (Greve, 2003b). Specifically, the PFM draws upon *Prospect Theory* (Kahneman & Tversky, 1979) to argue that performance shortfalls will increase managerial tolerance for risk, making organizations more likely to pursue new solutions identified through problemistic search, even if they are perceived as uncertain. In addition, the PFM includes a feedback loop, so that search and learning activities influence subsequent performance, subsequent assessments of performance relative to aspirations, and so forth. Given the central importance of organizational routines as a venue for search and learning in the PFM, it is fair to

include this model in the broader category of organizational learning theory (Greve, 2003b).

The BTF played a central role in the emergence of both organizational learning theory and the related PFM, both of which are offered as theoretical models that can be applied to various contexts. And indeed, both frameworks are being actively explored in different empirical contexts, and with specific phenomenological focuses. Perhaps most notably, this broader literature stream has been applied to the study of intellectual property (IP). For example, research based upon organizational learning theory, and the related PFM, has focused on IP generating activities in the form of research and development (R&D) (e.g., Chen, 2008; Greve, 2003a), IP protection activities in the form of patenting (Geerts, Leten, Belderbos, & Van Looy, 2017; Thakur-Wernz & Samant, 2017), and performance implications of IP utilization (Meyer & Subramaniam, 2014; Vagnani, 2015). This juxtaposition of organizational learning theory and the PFM onto the IP value chain is not the only point of intersection between these literature streams and other literature streams. Notably, there are also many common elements between the organizational learning literature and various frameworks within the *knowledge management* literature stream (e.g., De Long & Fahey, 2000; Ichijo & Nonaka, 2007; Ruggles, 1998). The knowledge management literature places greater emphasis on the competitive implications of knowledge, conceptualized as a strategic asset and facilitator of organizational learning. One knowledge management framework (Hayes & Walshman, 2003), tracks especially consistently with the organizational learning literature, by arguing that knowledge management can be viewed in terms of efforts to either share and spread existing knowledge within an organization, or to create new knowledge. Descriptions of efforts to spread knowledge within organizations are consistent with the exploitation construct in organizational learning theory (March, 1991), while efforts to create new knowledge appear to be consistent with exploration (March, 1991), slack search (Cyert & March, 1963), and problemistic search to identify new solutions to problems (Cyert & March, 1963; Greve, 2003a). However, literature on IP and knowledge management differ in that they more explicitly highlight the potential for

codifiable learning and knowledge stocks (Bogner & Bansal, 2007), in addition to tacit knowledge that is embedded in organizational routines.

It is important to acknowledge that these related streams of literature have contributed greatly to our understanding of organizational learning behaviors and relationships (e.g., Duncan, 1976; Greve, 2003a; Levinthal & March, 1993; Levitt & March, 1988; March, 1991; O'Brien & David, 2014; Tushman & O'Reilly, 1996; He & Wong, 2004). Additionally, research has begun to explore relationships in different empirical context, as well as with specific phenomenological outcomes (e.g., Alessandri & Pattit, 2014; Chrisman & Patel, 2012; Patel & Chrisman, 2014; Reitzig & Puranam, 2009). However, there is still an unfilled gap in our understanding of the boundary conditions and contextual moderators of key organizational learning constructs and relationships (Birkinshaw & Gupta, 2013; Junni et al., 2013). As I will argue in this thesis, there is a need to better understand the potential effects of national culture in this broader collection of constructs and relationships in the organizational learning literature.

1.1.2 Research on national culture in organizational studies

Researchers have observed that studies focusing on organizational learning behaviors and outcomes are being conducted in an increasingly diverse mix of national contexts, and are also being conducted using samples with firms from multiple home countries (Junni et al., 2013). This trend is important, because macro-level culture (i.e., not just organizational culture) may influence strategic activities (Hennart & Larimo, 1998; Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991), or may moderate relationships (e.g., Freytag & Thurik, 2007; Rauch et al., 2010; Saeed, Yousafzai, & Engelen, 2014). Hence, given the growing multinational nature of organizational learning research contexts, coupled with the existence of global industries with competitors originating from different national cultural contexts, it is important to develop a better understanding of the potential role(s) for national culture.

National culture has been defined in various ways, yet most definitions emphasize that culture entails a system of beliefs, assumptions, and values that are shared among the members of the cultural group (e.g., Deresky, 2011; Hill, 2011; Browaeys & Price, 2008), including cultural groups at the national level (Hofstede, 1980/1991). These shared, or collective, systems of beliefs, assumptions, and values are transferred from the group to individuals, and from one generation to the next, through socialization (Hofstede, 1980; Tylor, 1871). The notion that *shared* ideas about the way things are, and what is important, can be culturally specific, highlights the potential for many different frameworks and perspectives to be used to understand and study national culture. The idea that differences in time orientation, individualism and collectivism, and high- versus low-context communication among culturally different national groups could have organizational implications has been long understood (e.g., Hall, 1959/1960). However, the academic literature linking national culture to business-related phenomena really became mainstream in the 1980's and 1990's with the introduction of measures of national cultural dimensions by Hofstede (1980). As the number of studies linking national culture to business-related phenomena has grown, there have also been several studies that introduce alternative cultural dimensions to the Hofstede dimensions (e.g., Meyer, 2014; Schwartz, 1992; Trompenaars & Hampden-Turner, 1997), and many of these alternatives build upon and refine the Hostede dimensions, such as the popular "Global Leadership and Organizational Behavior Effectiveness" (GLOBE) dimensions (House, Hanges, Javidan, & Dorfman, 2004).

While cultural dimensions remain the dominant framework or tool through which to study relationships between national culture and business-related phenomena, there have recently been some attempts to move away from cultural dimensions, in favor of cultural descriptions or categories that capture a nexus of cultural characteristics (e.g., Berman, Mudambi, & Shoham, 2017; Chen, 2013; Nisbett & Masuda, 2003). This trend seems logical given the early observations of Hofstede (1980/1991), who noted that national cultures existed in clusters based upon similar profiles using multiple cultural dimensions. This observation indicated that there may be some advantage to using cluster-membership as a typology of national

cultures, which is an idea that is especially attractive in studies that involve firms from *multiple* home-nations where multicollinearity between individual cultural dimensions becomes a conceptual and empirical problem. This observation highlights one of the advantages of studying relationships between national culture, conceptualized in terms of cultural descriptions or categories that capture a nexus of cultural characteristics, and business-related phenomena. One such approach that has gained considerable attention comes from the cross-cultural psychology literature (e.g., Masuda & Nisbett, 2006; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005), and classifies national cultures as either emphasizing a holistic thought process that directs attention to contexts, or emphasizing an analytic thought process that directs attention to focal objects and issues. Holistic thought processes are most closely associated with east-Asian national cultures, while analytic thought processes are often associated with western national cultures. A second approach that uses cultural descriptions or categories to capture a nexus of cultural characteristics is also gaining popularity in the business literature, and this approach uses language to differentiate between national cultures (e.g., Berman, Mudambi, & Shoham, 2017; Brannen, Piekkari, & Tietze, 2014; Santacreu-Vasut, Shenkar, & Shoham, 2014; Tenzer & Pudelko, 2017). This literature is partially based upon the Linguistic Relativity Hypothesis (LRH), which argues that the languages spoken by people in a nation can affect their thought processes and decision making in a systematic way (Chen, 2013; Mavisakalyan & Weber, 2017; Tenzer, Terjesen, & Harzing, 2017).

Table 1.1 The two roles of culture, mechanisms, and relevant research contexts

Role of National Culture	Theoretical Mechanism	Relevant Research Contexts	Relevant references
Moderator of strategy-performance relationships	Culture may act as a barrier to successfully implementing strategies if there is not a good "culture-strategy fit."	Contexts with firms from a *single* national cultural context, because strategies will not vary systematically by culture (i.e., all the firms come from the same national culture)	Freytag & Thurik, 2007; Marino et al., 2002; Rauch et al., 2010; Saeed et al., 2014
Antecedent to strategies	National culture will influence the ways that decision makers scan, interpret, and select strategies.	Contexts with firms from *multiple* national cultural contexts, because strategies will vary systematically (i.e., they will be endogenous and variances will not be random)	Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991

Beyond discussing the various ways that studies of organizations have understood and measured or represented national culture, it is also important to, very broadly, introduce the ways in which organizational scholars have argued that national culture can influence organizational activities. Past research has highlighted two potential roles for national culture when it comes to strategic decision-making, *processes* and outcomes, as summarized in table 1.1. In the first case, researchers have identified a potential 'moderating' role for national culture in strategy-performance relationships (Freytag & Thurik, 2007; Marino et al., 2002; Rauch et al., 2010; Saeed et al., 2014). That is, some researchers suggest that performance consequences will be better when there is a proper 'fit' between strategic behaviors and the overall national culture in which an organization is embedded (e.g., Rauch et al., 2010). For example, risk averse cultures may seek strategies and situations that are more certain and unambiguous (Hofstede, 1980/1991; House et al., 2002/2004). As a result, these cultures may face more barriers in engaging in organizational learning behaviors to explore uncertain and new opportunities. For academic research, this issue may be especially relevant in contexts where all the firms are from the same national culture. If the firms are all from the same culture, then culture should influence their strategies in the same way. Hence, any variance in strategies selected

among firms from the same national culture would not be systematically determined by differences in national culture, because there are no differences in national culture. In this case, it is possible to explore how culture might *moderate* relationships between organizational learning activities and outcomes. In addition, this may be an important line of inquiry, as most research up until this point has simply tested theoretical assumptions that organizational learning activities will influence outcomes such as performance in specific ways. If culture does turn out to be a contextual moderator, then this will be an important contribution to efforts to better understand the boundary conditions and contextual moderators of organizational learning activities and outcomes (e.g., Birkinshaw & Gupta, 2013; Junni et al., 2013).

The second potential role that authors have identified for national culture suggests that culture can be an antecedent to strategies selected and pursued (Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991). More specifically, national culture may affect the ways that decision makers scan their environments, interpret threats and opportunities, and choose strategic options (Schneider, 1989). In this case, national culture is exogenous and strategies are endogenous. For empirical research on organizational learning, this issue should be especially relevant in contexts involving firms from multiple home nations, with different national cultures. If strategies are endogenous to culture, and samples contain firms from multiple countries, then strategies should vary in a systematic way related to cultural differences of decision makers. Hence, the assumption that differences in strategies are random would be false. For example, if a study assesses the relationship between organizational ambidexterity and performance in a global industry, with firms from multiple countries, then the assumption that the independent variable is random would be false. Methodologically violating the assumption that an independent variable varies randomly is problematic, but this is also theoretically problematic because it means that we have not developed a clear and complete nomological net around organizational learning and associated outcomes.

So far, this chapter has offered *very* brief overviews of selected and relevant literature on organizational learning behaviors and outcomes, as well as national culture. These overviews are high level overviews in the sense that they certainly do

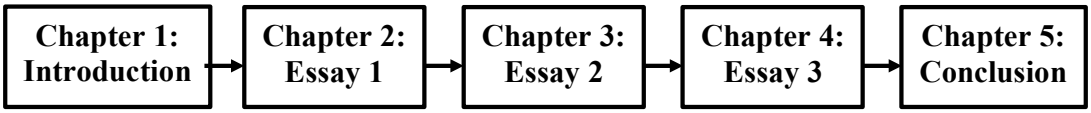
not offer comprehensive reviews of these streams of literature and theory. Indeed, it may not be possible to accomplish such a task in the limited form of a doctoral thesis. However, these brief overviews are meant to offer sufficient information so that readers understand where, within these broader literature streams, this thesis is contributing. Additionally, these areas of focus will be more fully described in the section on objectives and scope in this chapter, as well as in chapters 2 through 4. However, before describing the objectives of this thesis, it will be useful to first describe the structure of this thesis.

1.2 Structure of this thesis

As discussed earlier in this chapter, given the growing multinational nature of organizational learning research contexts, coupled with the existence of global industries with competitors originating from different national cultural contexts, it is important to develop a better understanding of the potential role(s) for national culture. In an effort to partially fill this gap in our understanding of the role(s) of national culture in organizational learning, this thesis adopts a three-essay format. Each of the three essays has its own specific research objective, but collectively they are meant to form a coherent contribution to the aim of this thesis. That is, each essay in this thesis contributes to the overarching research question, "*what role(s) does national culture play in organizational learning behaviors and outcomes?*" The motivation for adopting the three-essay format is to offer three separate chapters that form a larger body of work, while also representing separate contributions to theory and research that can be presented as individual journal articles that do not substantially overlap. Or, stated another way, the three-essay format offers a path towards academic economies of scale and scope.

In addition to this introduction chapter, and the three chapters that contain the three essays, this thesis also includes a conclusion chapter that summarizes key findings, describes contributions to theory and practice, and identifies key limitations and areas for future research. This overall thesis structure is depicted in figure 1.1.

Figure 1.1 Thesis structure



1.3 Objectives, scopes, and brief overviews of results

The challenge in defining the scope of this thesis is that if it is too broad, analyses will not be practical. On the other hand, if the scope is too narrow, analyses will not offer enough new insight, and the research will not be impactful. For example, each of the constructs, and their relationships, mentioned in the research question could potentially be explored through multiple theoretical frameworks and perspectives, or in relation to myriad phenomena. If these constructs are analyzed through the broadest or most abstract definitions and understanding, it may be impractical or impossible to fully complete an analysis. In addition, it may be difficult to derive relevant implications from any resulting insights. Alternatively, if these constructs, and their relationships, are defined and understood through the narrowest possible definitions of understanding, any resulting insights may lack external validity or may not contribute to the overall research in a meaningful way. Hence, it is necessary to define the objectives and scope of each of the three essays in this thesis in a way that attempts to balance the competing pressures for breadth and focus.

1.3.1 Essay 1 (Chapter 2)

The first essay in this thesis, "*National culture as a moderator in ambidexterity-performance relationships: A meta-analysis*," is presented in chapter 2. The objective of this essay is to assess "*whether national culture has moderated relationships between ambidexterity and performance within existing research.*" Or, stated in the form of a research question, "*has national culture moderated relationships between*

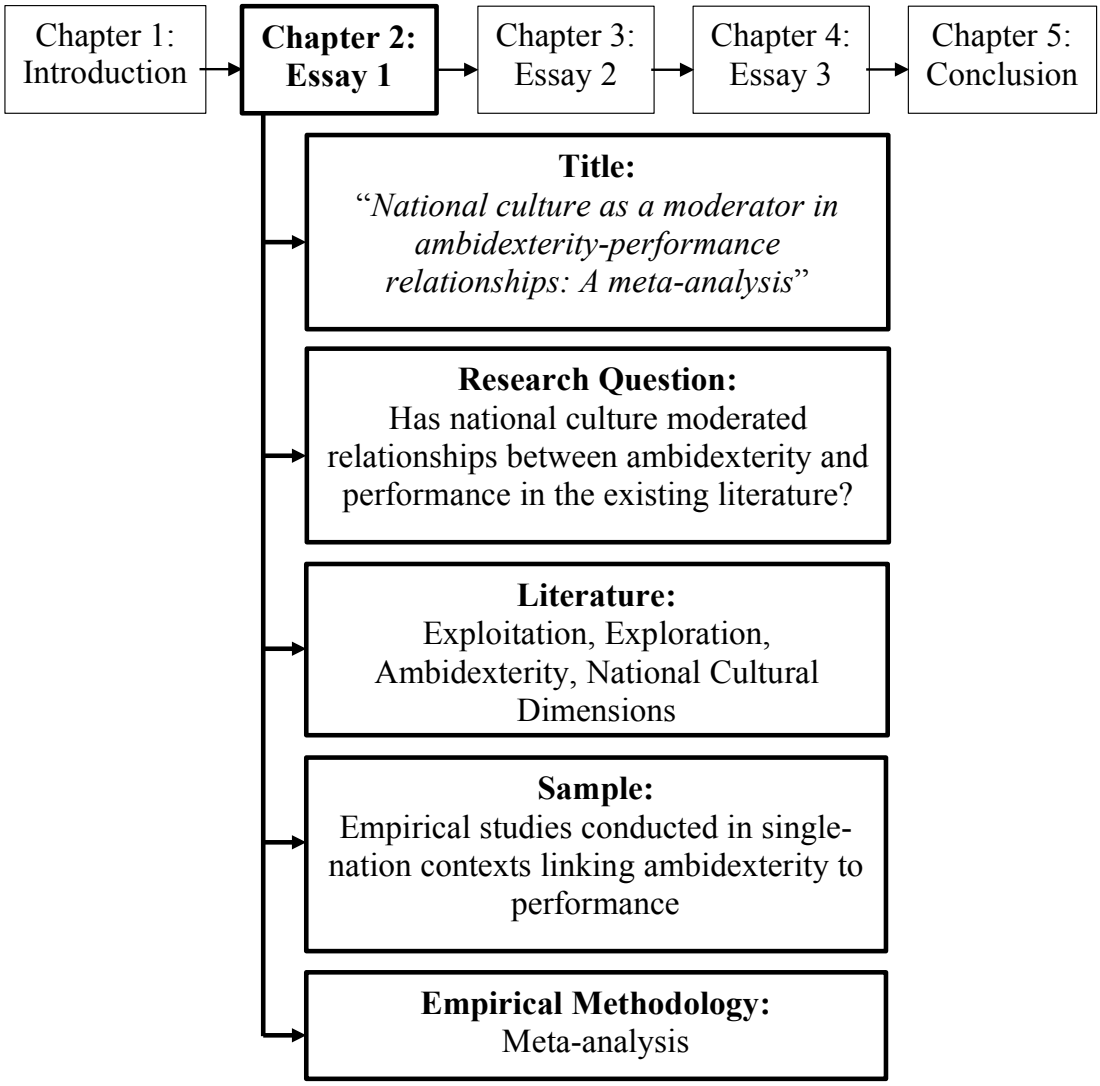
ambidexterity and performance in the existing literature?" The motive behind this objective and question is to test the argument that performance outcomes of strategic activities will be better when there is a proper 'fit' between national culture and strategies employed (Rauch et al., 2010), in the context of organizational learning activities. Ambidexterity was selected as a key exogenous construct because research has typically predicted a positive relationship with performance (e.g., Duncan, 1976; He & Wong, 2004; Tushman & O'Reilly, 1996), whereas myopic pursuit of either exploration or exploitation alone can have different relationships with performance over time (Levinthal & March, 1993; Greve, 2007).

Elements of culture that might create preferences for one type of learning activity over another, or elements of culture that may create barriers to the simultaneous pursuit of exploitation and exploration, may offer a framework for testing the fit argument. In line with past research (e.g., Freytag & Thurik, 2007; Saeed et al., 2014), essay 1 examines this potential moderating role using cultural dimension because some dimensions offer clear and intuitive expectations on whether they would create preferences or barriers that would determine a fit with an ambidexterity strategy. Specifically, essay 1 adopts selected and relevant dimensions from the GLOBE project (House et al., 2004). Also, as noted above, questions relating to a moderating role for national culture on strategy-performance relationships are most relevant in empirical contexts with firms from a single national cultural context. Hence, the nature of this research objective informed a decision to pursue this question using a meta-analytic approach using existing studies conducted in single-market contexts.

As a visual summary of the key elements of essay 1, figure 1.2 highlights the research question, as well as the relevant literature reviewed, the sample used, and the empirical methodology employed. More specifically, the objective of essay 1 is to assess whether national culture has moderated ambidexterity and performance relationships within existing research, and the research scope of this essay is limited in its focus on the moderating effects of GLOBE dimensions on ambidexterity-performance relationships in the context of single nation studies. And finally, the key findings in essay 1 suggest that overall there is a positive relationship between

ambidexterity and performance, and this positive relationship is stronger in single-market studies conducted in nations that score lower on institutional collectivism, future orientation, performance orientation, and uncertainty avoidance. This overall positive relationship was also stronger in single-market studies conducted in nations that score higher on in-group collectivism, as well as power distance.

Figure 1.2 Key elements of essay 1



1.3.2 Essay 2 (Chapter 3)

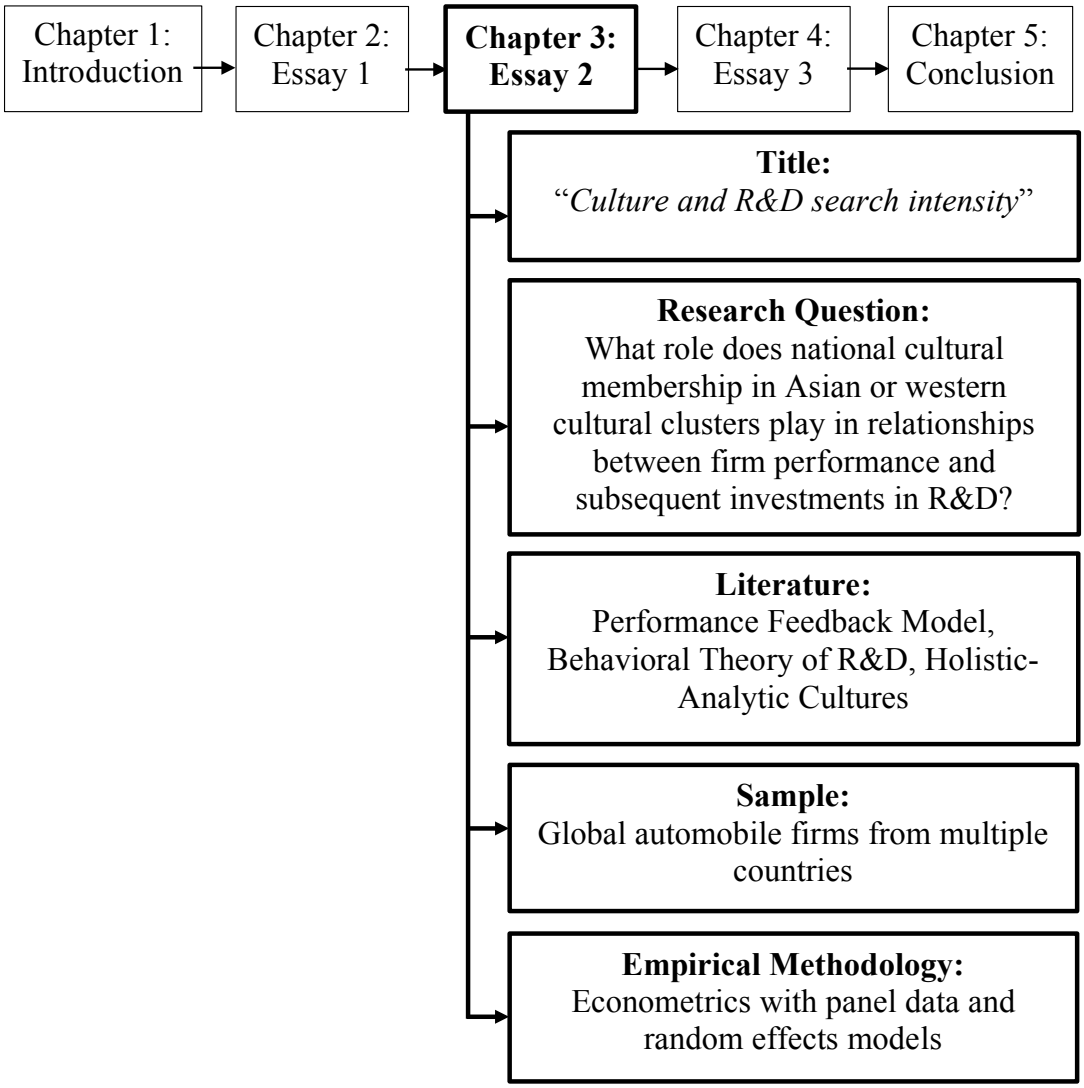
The second essay in this thesis, "*Culture and R&D search intensity*," is presented in chapter 3. The objective of this analysis is "*to develop a more nuanced understanding of how macro-level culture relates to research and R&D investments*," which represents an organizational learning activity. Or, stated as a more specific research question, "*what role does national culture membership in Asian or western cultural clusters play in relationships between firm performance and subsequent investments in R&D?*" The motive behind this objective, and the more specific research question, is to test the argument that culture can be an antecedent to strategic organizational learning-related decisions and activities, and to do so in the context of R&D investments, which has been identified as an important outcome in the literature (Chen, 2008).

While the PFM has offered insights into how ideas from the BTF and organizational learning theory relate to R&D investments (e.g., Chen, 2008; Greve, 2003a), there is still a need to better understand the potential factors that could affect these relationships, including a potential role for culture. In particular, the PFM focuses on problemistic search and slack search as organizational learning activities in response to performance of the focal organization. Hence, the degree to which decision makers direct their attention to the focal firm's performance, versus the context surrounding the firm, may relate to how they respond to performance. As a result, essay 2 adopts a holistic-analytic, or Asian-Western, categorization framework for national cultures (e.g., Miyamoto & Nisbett, 2005; Nisbett & Masuda, 2003). And finally, to pursue the research objective in essay 2, data on global automotive manufacturers was collected, because these firms tend to operate globally, while still maintaining strong home-country identities.

As a visual summary of the key elements of essay 2, figure 1.3 highlights the research question, as well as the relevant literature reviewed, the sample used, and the empirical methodology employed. As noted above, the objective of essay 2 is to develop a more nuanced understanding of how macro-level culture relates to research and R&D investments, and the scope of this essay is limited in its focus on national

culture using an Asian-Western framework for culture, as well as its focus on the empirical context of global automotive manufacturers. The key findings in essay 2 suggest that both poor performance relative to aspirations, and organizational slack, are positively related to increases in R&D investment in this context, as expected. However, both relationships appear to be weakened in cases where a firm's home-nation is categorized as an Asian nation, with a holistic thought process.

Figure 1.3 Key elements of essay 2



1.3.3 Essay 3 (Chapter 4)

The third essay in this thesis, "*Internationalization, strong future-time reference languages, and IP protection: evidence from global automotive suppliers*," is presented in chapter 4. The objective of this essay is "*to assess how national culture, and other factors, might be associated with the propensity of organizations to protect their IP through patents*." Or, stated in the form of a specific research question, essay 3 asks, "*how does language relate to firms' propensity to protect IP through patenting?*" An additional research question that is asked in essay 3 is also rooted in organizational learning theory, but does not directly include national culture. Specifically, "*what is the relationship between internationalization and the propensity of firms to protect IP through patenting?*"

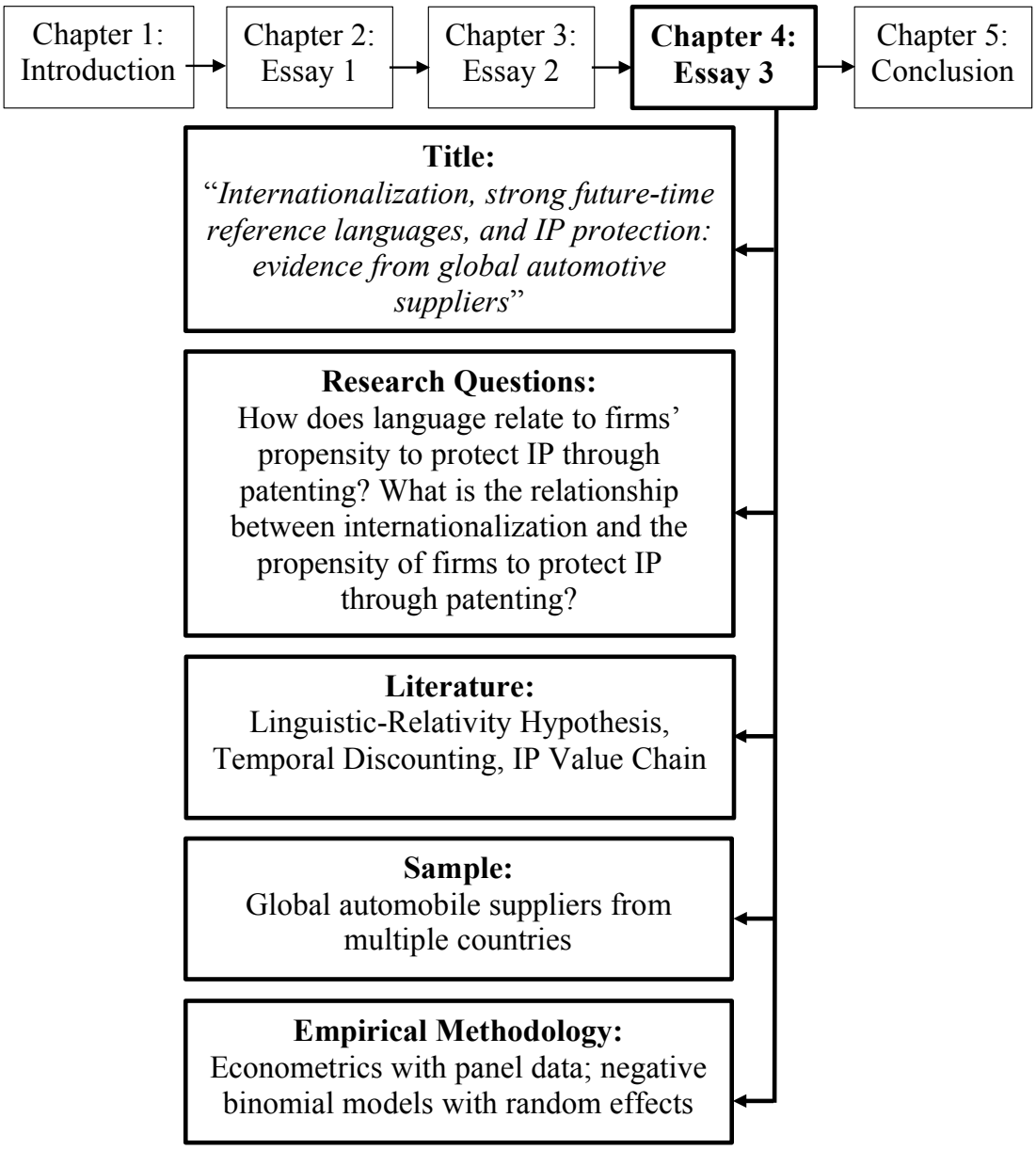
While organizational learning theory tends to focus on learning that is embedded in routines, research in this area has also been applied to R&D to *generate* potentially codifiable knowledge in the form of IP (e.g., Chen & Miller, 2007; Chrisman & Patel, 2012; O'Brien & David, 2014), and the performance implications of utilizing R&D (Meyer & Subramaniam, 2014; Vagnani, 2015). This focus on IP represents a phenomenologically-focused stream within the literature, which can be divided into stages that include IP generation, IP protection, and IP utilization (Ernst, Conley, & Omland, 2016; Reitzig & Puranam, 2009).

While IP generation and utilization have received considerable attention, IP protection has been relatively understudied (Reitzig & Puranam, 2009). In most cases, research has looked at IP protection in the form of patenting as an outcome of organizational learning activities such as experiential learning through international experience (e.g., Geerts, Leten, Belderbos, & Van Looy, 2017; Thakur-Wernz & Samant, 2017). However, in essay 3, I argue that the tendency to protect IP may also depend upon the perceived future returns from protecting IP. Confidence in the future value of IP may relate to changes in confidence related to learning that occurs during different stages of internationalization, and perceived future value of IP may also be influenced by language.

Language is an important element of culture, and languages spoken may affect thought processes and decision making in systematic ways (Mavisakalyan & Weber, 2017). One idea that has caught on and has been tested in an increasing number of empirical contexts is the notion that individuals and firms in nations with languages that oblige speakers to grammatically indicate future events when stating predictions, or strong-future-time-reference languages (strong-FTR), will discount the future value of returns to a greater extent than speakers of other languages (Chen, 2013; Chen, Cronqvist, Ni, & Zhang, 2017; Winters & Chen, 2015). As a result, essay 3 adopts a strong-FTR versus weak-future-time-reference language (weak-FTR) framework for categorizing national cultures (e.g., Chen, 2013; Winters & Chen, 2015). And finally, data on global automotive parts manufacturers was collected to pursue essay 3, because these firms tend to serve multiple customers who also engage in manufacturing, which makes IP protection important.

As a visual representation of the key elements of essay 3, figure 1.4 highlights the research question, as well as the relevant literature reviewed, the sample used, and the empirical methodology employed. In summary, the objective of essay 3 is to assess how national culture, and other factors, might be associated with the propensity of organizations to protect their IP through patents, and the scope of this essay is limited in its focus on national culture using a strong-FTR versus weak-FTR framework, and the use of global automotive parts manufacturers as an empirical context. The key findings of essay 3 suggest that automotive parts manufacturers from strong-FTR language countries engage in less patenting, and there is a U-shaped relationship between internationalization and the rate of patenting for firms from weak-FTR language countries, but this U-shaped relationship disappears in the case of firms from strong-FTR language countries.

Figure 1.4 Key elements of essay 3



1.4 Theoretical contributions: three unique studies linked together

As discussed above, the three essays in this thesis are unique, yet they are linked together in that, at a higher level of abstraction, they all seek to assess how national culture might play into organizational learning behaviors and outcomes. However,

each of the three essays approach this common objective in unique ways. It follows that, while the theoretical contributions of each essay are consistent in that they identify roles for national culture in organizational learning behaviors and outcomes, the specific relationships and consequences of national culture are different.

The first theoretical contribution comes from essay 1, which is presented in chapter 2. Specifically, this essay offers that relationships between organizational ambidexterity and performance may be moderated by the national cultural contexts in which organizations are embedded. This moderating role for the national culture construct lends credence to the nation that the ability to convert strategic organizational learning behaviors and activities into positive performance may partially depend upon how well those activities 'fit' with the national cultural context of the firms. While research has identified organizational culture as one factor that might moderate these relationships (e.g., De Long & Fahey, 2000; Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013), the results of essay 1 expand the nomological net of theoretical constructs surrounding ambidexterity and performance relationships to include culture at a higher level of analysis.

The second theoretical contribution comes from essay 2, which is presented in chapter 3. This essay suggests that relationships between performance relative to aspirations and problemistic search activities, as described in the PFM, may be moderated by national culture. More specifically, national cultural differences in attention to focal objects, as seen in analytic western national cultures, versus attention to contexts, as seen in holistic east-Asian national cultures, may moderate these relationships. This theoretical contribution is illustrated using R&D as an outcome, so it represents a theoretical contribution to both the PFM and the Behavioral Theory of R&D (Greve, 2003a). Additionally, essay 2 illustrates that these national cultural differences may also moderate relationships between organizational slack and search behaviors, further expanding our understanding of theoretical constructs that can moderate relationships in the PFM and the Behavioral Theory of R&D.

And finally, the third theoretical contribution comes from essay 3, which is presented in chapter 4. This essay illustrates that the languages spoken within an

organization's home nation may relate to how the organizations perceive and protect the codifiable knowledge that they generate. Specifically, this essay illustrates that organizations from countries where the spoken languages oblige speakers to strongly distinguish between the present and the future may engage in less patenting to protect their intellectual property, even after controlling for resources devoted towards knowledge generation in the form of R&D intensity. This result suggests that language may relate to how much managers within an organization discount the future value of the knowledge, or IP, that they generate. Hence, language may be one theoretical construct that moderates relationships between knowledge generation and protection. This insight represents a theoretical contribution to the organizational learning literature because the perceived (future) value of knowledge may influence strategic decisions related to learning activities and behaviors. In addition, by studying this issue in the context of IP protection through patenting, this idea also represents a theoretical contribution to the literature streams on the IP value chain and knowledge management.

Chapter 2. National culture as a moderator in ambidexterity-performance relationships: A meta-analysis

2.1 Abstract

This meta-analysis uses 44 existing studies conducted in single-nation contexts (k=44) to assess the potential moderating role of national culture on organizational ambidexterity-performance relationships. The results indicate an overall positive ambidexterity-performance link, which is stronger in countries with low levels of institutional collectivism, high levels of in-group collectivism, low levels of future orientation, low levels of performance orientation, and low levels of uncertainty avoidance. Additionally, counter to expectation, results suggest that the ambidexterity-performance relationship is stronger in countries with high levels of power distance. As a matter of interest, moderated meta-analyses on exploitation-performance (k=76) and exploration-performance (k=78) relationships were also conducted. The results suggest that empirical research has identified overall positive exploitation- and exploration-performance relationships. However, national culture does not appear to moderate these relationships, with the exception of performance orientation. The positive exploration-performance relationship appears to be weaker in high performance orientation cultures within the existing empirical research.

2.2 Introduction

Researchers have been interested in the performance consequences of organizational learning behaviors for more than half a century (e.g., Cyert & March, 1963; Duncan, 1976; Levitt & March, 1988; March, 1991; Tushman & O'Reilly, 1996; Zollo & Winter, 1982). In addition, researchers have posited that *organizational* culture can play a role in successfully pursuing more than one organizational learning behavior to realize positive performance outcomes (Tushman & O'Reilly, 1996). 'Organizational culture' refers to a shared pattern of basic assumptions about how members of an organization should perceive, think, and feel in relation to their workplace and the challenges faced in their work (Schein, 1990: 111), and the notion that variance in organizational cultures could have a relationship with variance in strategic activities makes intuitive sense.

However, more recent research has focused upon *national* culture, or shared patterns of basic assumptions, values, and beliefs at the national level, which we can think of as a shared "software of the mind" within a nation (Hofstede, 1991). This more recent research has asked two interesting questions. First, this literature has asked whether national culture can influence the types of strategic activities that firms pursue (e.g., Hennart & Larimo, 1998; Newman & Nollen, 1996; Schneider & De Meyer, 1991). And second, researchers have asked whether national culture moderates links between strategic activities and performance (e.g., Rauch et al., 2010; Saeed, Yousafzai, & Engelen, 2014). Both of these possibilities should be of significant interest to organizational learning scholars, but these questions will be relevant in different research contexts. To begin with, the former possibility, where national culture is an antecedent to strategic activities, will be most relevant in contexts with firms from multiple national cultural contexts. In contexts with firms from multiple countries, national cultural differences may result in systematic differences in the types of activities pursued. On the other hand, question two should be most relevant in single-nation contexts (i.e., in research contexts where all the firms are from the same country). In single national-culture contexts, national culture should influence all firms in the same way. Hence, in single national-culture contexts,

the potential role for a 'fit' between national culture and organizational learning activities on resulting performance will be more relevant.

This analysis focuses on the latter question and asks, how national culture has moderated relationships between organizational learning activities and firm performance in the existing literature? It follows that the objective of this study is to assess whether dimensions of the national cultures in which firms are embedded have moderated relationships between one type of organizational learning behavior, organizational ambidexterity involving the simultaneous pursuit of new opportunities while exploiting existing activities, and performance within the existing research. This analysis will follow the emerging academic argument that an appropriate 'fit' between firm activities and national culture can have positive performance consequences (e.g., Freytag & Thurik, 2007; Saeed et al., 2014). Additionally, by pursuing this research question, this analysis aspires to answer calls to fill gaps in our knowledge of the boundary conditions of organizational ambidexterity (Birkinshaw & Gupta, 2013) and the potential moderating role of environmental factors on ambidexterity-performance relationships (e.g., Junni et al., 2013).

2.3 Background

2.3.1 Approaches to national culture in management research

In order to pursue the objectives of this analysis, it is first necessary to offer an overview of the national culture construct and the diverse body of work that has sought to unpack its subcomponents and create operational definitions that have been applied in business or management research. This discussion is necessary to inform the selection of appropriate operational definitions of national cultural dimensions at a later point in the current study. In the above introduction, national culture is defined in the broadest sense, as shared patterns of basic assumptions, values, and beliefs at the national level (Schein, 1990: 111). This construct has been defined by many scholars, in many different ways, as illustrated in table 2.1. However, the key elements of most definitions of national culture suggest that it is a shared construct, at

the national level, and it involves acceptance of deep level assumptions about what is valued and how social interactions should be governed.

Table 2.1 Selected definitions of culture used in past research

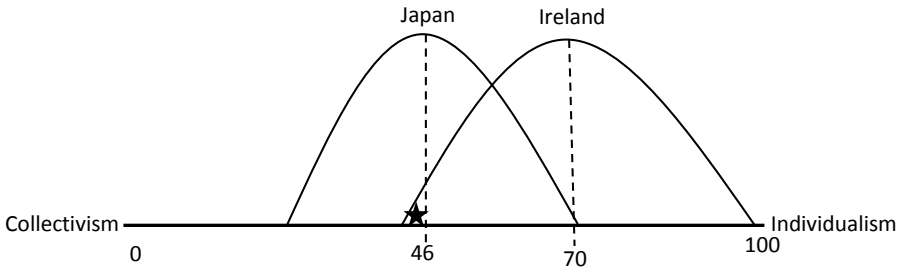
Author(s)	Year	Definition
Deresky	2011	*"…the shared values, understandings, assumptions, and goals that are learned from earlier generations, imposed by present members of a society, and passed on to succeeding generations."*
Hill	2011	*"…a system of values and norms that are shared among a group of people and that when taken together constitute a design for living."*
Browaeys & Price	2008	*"…way of thinking shared by individuals in a particular society…"*
Hofstede	1980	"The collective programming of the mind…"
Tylor	1871	*"…complex whole which includes knowledge, belief, art, morals, law, custom, and other capabilities acquired by man as a member of society."*

Beyond defining national culture, it also worth noting that this construct has some limitations in strategy and management research. To begin with, culture can be observed at different levels of social grouping (e.g., global region, nation, national region, city, organization, team, etc.), and thus, there are limits associated with the use of *national* culture as a key construct and variable in strategy research (Graham, 2003). For example, in an empirical analysis, Hofstede and colleagues (2010) demonstrated that there are differing scores for cultural dimensions among Brazil's various regions, Brazil being a very diverse country.

An additional limitation of using national culture as a key construct or variable in strategy research is that it can quickly lead to inappropriate assumptions about the values or behaviors of individuals (i.e., at the micro level of analysis). This issue has been referred to as a problem of "ecological fallacy" (Brewer & Venaik, 2014). The problem with applying what we understand from empirical research on cultures at the

level of an ecology (i.e., the national level) to an individual is that national culture is measured through the aggregation and averaging of individual responses to questionnaires, which presumably will involve a distribution of answers to scale items. The resulting national cultural dimension scores cannot be confidently applied to an individual because an individual could fall anywhere within the distribution of the aggregated culture scores (Brewer & Venaik, 2014). For example, figure 2.1 presents the scores for Japan and Ireland on the well-known cultural dimension score indicating levels of individualism (vs. collectivism) offered by Hofstede (2001). Additionally, figure 2.1 includes hypothetical score distributions from samples used to calculate these dimensions. An example of ecological fallacy is highlighted if we consider a scenario where a researcher compares a Chief Executive Officer (CEO) from Japan to a CEO from Ireland and assumes that the national cultural dimension scores for individualism-collectivism would apply to each of these individuals because of their country of origin. In fact, each CEO's individual score on this dimension could fall anywhere within the sample distribution for their country. There is a great deal of overlap on these distributions, making it difficult to justify an argument for applying national culture scores to the individuals. Moreover, if the Irish CEO's score was indicated by the star in figure 2.1, then he/she would be less individualistic than the average Japanese person sampled. This example clearly indicated that it is problematic to apply measures of national culture to individuals.

Figure 2.1 National culture variables and the risk of ecological fallacy



Despite the above-mentioned limitations associated with using national culture as a construct in strategy research, authors have argued that it is still a useful concept (Graham, 2003). For example, it is reasonable to acknowledge that organizations, and especially large organizations, can entail a large number of people, and decisions are often made through collective interactions, bargaining, and satisficing (Cyert & March, 1963). This aggregation of individuals within organizations reflects a sample of individuals from the larger population in which the organization is embedded. In other words, an organization should represent a larger sample of the national population than an individual, so at the organization level we may face fewer concerns about ecological fallacy.

So far, this discussion has offered that national culture is a limited but still useful construct which has many definitions, that often emphasize 'shared' norms, beliefs, and values. Now, it is also useful to offer a description of key research developments on the study of national culture, which have influenced management and strategy research, as summarized in table 2.2. Perhaps the earliest contributions that affected management research come from Edward T. Hall (Graham, 2003: 506). Hall was an anthropologist who grew up the son of an advertising executive for a multinational enterprise (Hall, 1992), so unlike many anthropologists in the 1950's and 1960's, Hall was comfortable applying insights from the anthropological study of the field to business interactions across cultures (Hall, 1992). In particular, Hall offered that most people are unaware of how profoundly they are affected by their own cultures, because cultures communicate through five sub-conscious silent languages: space, time, friendship, things, and agreements (1959). Hall offered descriptions of deep differences in how various cultures understand and communicate through these silent languages, and later introduced these concepts to management and business researchers in an influential *Harvard Business Review* article (Hall, 1960).

Table 2.2 Select research on culture that has been linked to management studies

Author(s)	Year	Discipline	Key ideas
Hall	1959/1960	Anthropology	Members are unaware of how profoundly they are affected by culture, because culture communicates through five **sub-conscious "silent" languages**: space, time, friendship, things, and agreements.
Kluckholn & Strodtbeck	1961	Sociology	Societies face universal problems, with a limited number of universally known **values-based solutions**. Cultures have differing preferences for values-based solutions.
Haire et al.	1966	Psychology & Management	There are (measurable) national differences in "**managerial thinking**" on several key areas, such as leadership and motives/objectives.
Triandis	1977/1978	Psychology	There are universal dimensions of **social behavior**, such as overtness-covertness, intimacy-formality, superordination-subordination, and association-disassociation. Cultures fall at different points upon these dimensions.
Hofstede	1980/1991	Psychology	There are universal **values** dimensions, such as individualism-collectivism, high-low uncertainty avoidance, high-low power distance, masculinity-femininity, and high-low long-term orientation. Cultures fall at different points upon these dimensions, and there are clusters of similar cultures.
Schwartz	1992	Psychology	There are 10 universal **values** across nations, and these can be collapsed into four groups, including universals falling under self-transcendence, conservation, self-enhancement, and openness to change headings. Cultures fall at different points upon these dimensions.
Trompenaars & Hampden-Turner	1997	Organizational Theory	There are universal **communication** dimensions, such as universalism-particularism, individualism-communitarianism, neutral-emotional, specific-diffuse, achievement-ascription, sequential-synchronic, and internal-external control. Cultures fall at different points upon these dimensions.
House et al.	2004	Management & Psychology	There are universal **leadership values** dimensions, such as high-low power distance, high-low uncertainty avoidance, high-low humane orientation, high-low institutional collectivism, high-low in-group collectivism, high-low assertiveness, high-low gender egalitarianism, high-low future orientation, and high-low performance orientation. Cultures fall at different points upon these dimensions based upon both what they **value** and their **actual practices**, and there are clusters of similar cultures based upon these differences.
Masuda & Nisbett	2001	Psychology	Eastern (e.g., Chinese, etc.) and Western (e.g., European, etc.) cultures have different thought processes. Easterners start from a macro-sensitivity to context and then specific ideas. Westerners start with an analytic focus on specifics, and tend not to be sensitive to macro context.

However, for management research, the descriptive nature of Hall's insights does not readily lend itself to empirical research. Hence, from the 1960's, a growing body of research introduced the notion that national cultures can be placed at different points along universal continuums (Kluckholn & Strodtbeck, 1961; Triandis, 1977/1978) and these differences can be measurable through the development and administration of questionnaires with Likert-type scales (Haire et al., 1966). Drawing upon these insights, and to some extent the ideas of Hall, Geert Hofstede (1980) introduced the first large-scale study that sought to compare national cultures based upon scores on various universal values dimensions. Initially, Hofstede introduced four universal values dimensions. The first dimension, *Power Distance*, measures the extent to which members in a society are willing to accept unequal power distribution. The second dimension, *Individualism* (vs. Collectivism), measures the extent to which national cultures prefer loosely coupled social frameworks where emphasis is narrowly placed upon caring for one's self and one's immediate relatives. Low scores on Individualism indicate *Collectivism*, where members' identities are tied to their in-group, and loyalty and duty go beyond immediate family. The third dimension, *Masculinity* (v. Femininity), measures the extent to which national cultures are competitive and value assertiveness and achievement. Low scores on Masculinity indicate *Femininity*, or a preference for modesty, empathy, and cooperation. The fourth dimension, *Uncertainty Avoidance*, measures the extent to which a national culture is comfortable with ambiguity or uncertainty. Later, Hofstede (2001) added a fifth dimension, *Long-term Orientation* (vs. Short-term Orientation), to measure the extent to which national cultures value pragmatic goal making for the future. Low scores on Long-term Orientation indicate *Short-term Orientation*, or a preference for normative practices and traditions that focus on the present or near term.

Hofstede's (1980/2001) introduction of a large-scale study offering individual scores on national culture based upon universal values dimensions, was an extremely important development for management scholarship, and inspired a great deal of empirical research (Beugelsdijk et al., 2016). However, the Hofstede dimensions are not without controversy. In particular, McSweeney (2002) noted that Hofstede only administered his survey in subsidiaries of IBM, which is problematic, because in

order to argue that a sample will likely be representative of a population (i.e. nation), respondents need to be selected at random from the population, or proper sampling procedures should be followed in an attempt to collect a representative sample. By only sampling IBM employees, Hofstede made it very difficult to argue that the samples were representative of national populations. Additionally, McSweeney pointed out that the sample sizes for some nations were "minuscule" (2002), and some of the surveys had been administered much earlier, in 1968. More recently, Ailon (2008) pointed out that Hosftede's study asked respondents about their individual perceptions, goals, and beliefs, and then inferred values based upon responses, and this author argued that perhaps Hofstede's instrument was not adequate to measure actual values.

In light of these criticisms of Hofstede's dimensions, a number of alternative frameworks have been adopted by management and strategy researchers (e.g., Masuda & Nisbett, 2001; Schwartz, 1992; Trompenaars & Hampden-Turner, 1997). In particular, House and colleagues (2002) drew heavily upon the research of Hofstede (1980/2001), Schwartz (1992), Triandis (1977/1978), and others to offer an improved version of, or alternative to, the Hofstede dimension measurements. This project was named the "Global Leadership and Organizational Behavior Effectiveness" project, or GLOBE for short (House et al., 2002). In particular, the GLOBE researchers sought to administer surveys in many nations, to respondent in a diverse range of companies and industries, to overcome the sampling problems in Hofstede's study as identified by McSweeney (2002). Additionally, the GLOBE researchers attempted to create scale items that asked respondents to indicate values as espoused in their national cultures, as well as actual practices, in an attempt to overcome the survey problems with Hofstede's study as identified by Ailon (2008). The resulting dimension scores were calculated using responses from 17,300 middle managers from 951 companies in various industries. The individual GLOBE dimensions are summarized in table 2.3.

Table 2.3 The GLOBE dimensions

Dimension	Description
Power distance	The extent to which people expect equal distribution of power
Uncertainty avoidance	The degree to which collectives use procedures, rules, and norms to cope with ambiguous future events
Humane orientation	The extent to which altruism, fairness, generosity, and kindness are valued and rewarded
Institutional collectivism	The extent to which collective action and resource distribution are encouraged in institutional practices
In-group collectivism	The extent to which cohesiveness, and pride in, or loyalty to, an individual's family or organization is expressed
Assertiveness	The extent to which individuals show assertiveness, aggression, and confrontation in their relationships
Gender egalitarianism	The extent to which gender equality is facilitated
Future orientation	The degree to which investing, planning, delaying gratification, and other future-oriented behaviors are engaged in
Performance orientation	The extent to which excellence and performance improvement are rewarded and encouraged

Source: Adapted from House et al. (2002)

2.3.2 Organizational learning activities and firm performance

The organizational learning literature traces its roots back to the behavioral theory of the firm (Cyert & March, 1963), and highlights a key role for organizational experiences and activities in learning and the creation of knowledge stocks (Levitt & March, 1988; March, 1991). In particular, the accumulation of experiences is the main mechanism through which organizations create knowledge stocks that are embedded in organizational routines (Argote, 1999; Zollo & Winter, 2002). Additionally, organizational activities that provide opportunities for learning that can enhance knowledge embedded in routines may have performance consequences (Levinthal & March, 1993). Broadly, these activities can be classified as either those that are

proximate to known and existing activities, or those that are more distant (March, 1993). The performance implications of both types of learning activities are different (March, 1993), as are the performance implications of how they are balanced (Duncan, 1976; Tushman & O'Reilly, 1996). This section of this analysis will discuss each of these learning activity types, and will also describe the performance consequences associated with each learning activity type.

2.3.3 Exploitation

In the organizational learning literature, 'exploitation' refers to repeated selection and use of what is already known to, and experienced by, an organization (Levitt & March, 1988). The advantage of exploitation in organizations is that it allows firms to benefit from learning effects to develop routines and rules that maximize performance (Argote, 1999; Cyert & March, 1963; Zollo & Winter, 1982). As firms gain more experience with the same activities, they are likely to improve their efficiency and may be able to incrementally improve the quality of the goods they create or the services that they provide (March, 1991). As a result, exploitation has been linked to efficient performance (Levitt & March, 1988).

One example of an organization that actively pursued exploitation, was International Harvester (IH), which was an America manufacturer of automobiles and farm equipment. In 1979, after being in business for 78 years, the CEO of IH, Archie McCardell, noted that the company had become inefficient, as costs had risen but revenues had not risen at the same rate (Haycraft, 2000; IH, 1980). In an effort to reduce costs and improve efficiency, the CEO cancelled new product development projects, discontinued newly introduced products that had not yet become profitable, and also discontinued established products which either had high production costs or were less profitable. As a result, within a year the company was able to achieve its highest level of profitability in a decade (IH, 1980). These efforts to focus on known activities illustrates an effort to pursue exploitation, where repetition of what is known allows organizations to capitalize on an experience curve to become more

efficient. In this case, the performance consequences of exploitation were illustrated by IH's profits.

However, a myopic pursuit of exploitation alone, or an exploitation bias, may only result in positive performance in stable environments (Levinthal & March, 1993). For example, a firm that benefits from exploitation in its products will only realize efficient performance benefits as long as the market for these products is stable. If there is revolutionary change within a market, and demand shifts away from these products, then the firm will no longer be able to benefit from exploitation of the same activities. This revolutionary change could result from new innovations that replace products, or it could result from macro-external shifts that change the nature of demand for products and services. In either case, a strict exploitation bias (Greve, 2007) could eventually result in poor performance.

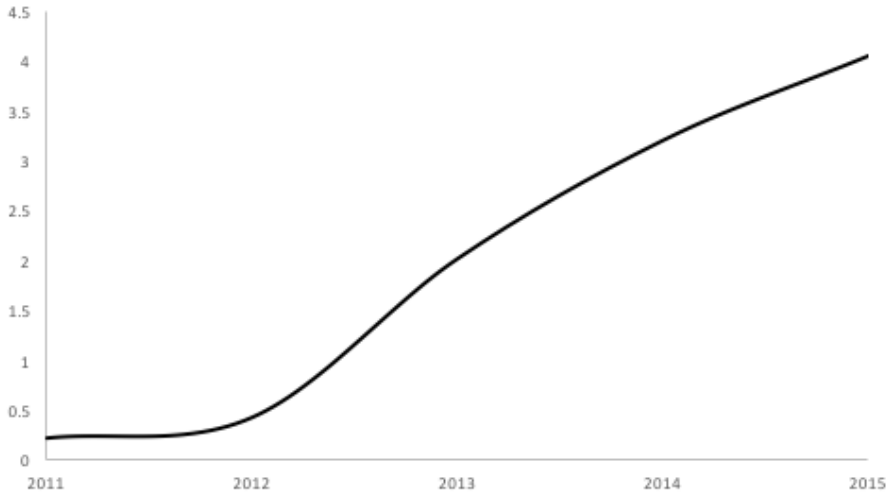
The potential hazard of a myopic pursuit of exploitation, or an exploitation bias, can also be seen in the example of IH. After creating a strict exploitation strategy for IH, the CEO was able to improve profitability, but as the 1970's turned into the 1980's the American economy experienced a downturn. This economic downturn represented a change in the macro-external environment surrounding IH, and one consequence was reduced demand for IH's products (IH, 1981). In the absence of a portfolio of products that might have diversified IH's revenue sources and reduced the negative impacts of the economic downturn, IH quickly began to lose money and in 1984 the company stopped operating and competitors bought some of its divisions and assets (Haycraft, 2000). The story of IH simultaneously highlights the positive performance benefits of exploitation, and the hazards of a myopic pursuit of exploitation in markets that can change.

2.3.4 Exploration

Unlike exploitation, 'exploration' in organizational learning refers to the pursuit of new opportunities that are more distant from a firm's existing opportunities and experiences (March, 1991). One advantage of exploration is that organizations experience various activities and contexts, which leads to an accumulation of diverse

knowledge stocks (Barkema & Vermeulen, 1998; Walsh, 1995; Zollo & Winter, 2002). This knowledge from exploratory activities is less routinized than learning from exploitation (Greve, 2007), but also results in one type of positive performance. Specifically, exploration may allow firms may identify new markets and sources of revenue or competitive advantage (Greve, 2007; March, 1991; Zollo & Winter, 2002). Hence, exploration has been associated with *effective* performance (March, 1991), such as revenue growth or new market share.

Figure 2.2 Tesla Motors' 2011-2015 revenues in billions (US dollars)



Source: Adapted based upon data from *Financial Times* (FT, 2017)

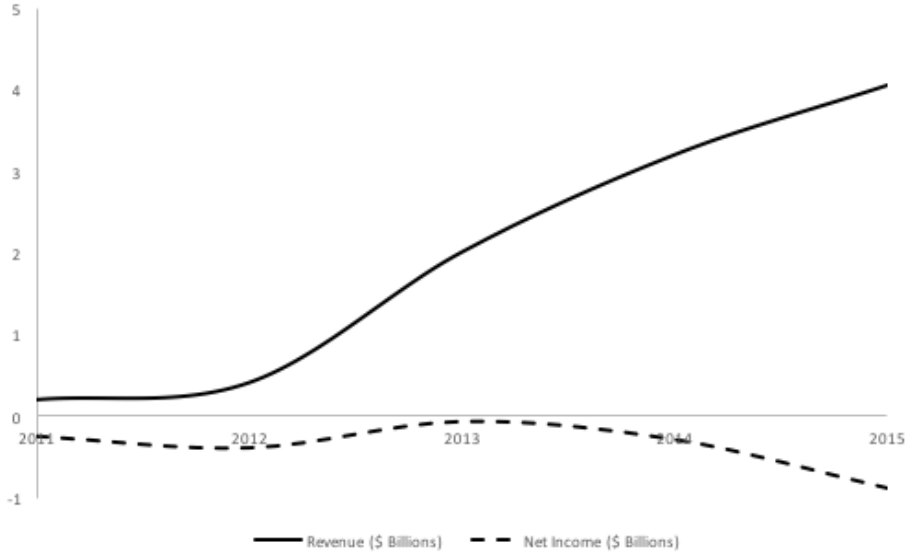
One example of an organization that has actively pursued exploration, is Tesla Motors Incorporated. This California-based automotive manufacturer builds and sells electric cars. However, the company has also aggressively pursued new product markets that are very different from the automobile market. For example, Tesla has recently begun to market power walls and power packs that are used as batteries to store energy for homes and commercial buildings (Sinha, 2016). At the same time the company is currently introducing new solar roofing panel products designed to capture energy for residential and commercial building use (Randall, 2016). While both new products build upon core technologies related to energy storage, they are

directed at very different markets than the automobile market, so they represent exploration-type organizational learning activities. As a consequence of constantly seeking new products and markets, Tesla has effectively realized consistent revenue growth and growth in market share, as illustrated in figure 2.2, which plots the company's revenues in billions of US dollars from 2011 through 2015.

However, a single-minded pursuit of exploration, or an exploration bias, may also have negative performance consequences (March, 1991). If firms are continuously pursuing new opportunities without eventually exploiting them to improve efficiency, profitability, and quality, then it may be difficult to reap financial benefits from these opportunities (March, 1991; Tushman & O'Reilly, 1996). Hence, the immediate performance benefits of exploration are likely to be related to effective performance, such as sales growth and market share, rather than efficient performance, such as return on assets and cost reduction.

The example of Tesla Motors Incorporated also illustrates the problems associated with a myopic pursuit of exploration, or an exploration bias. More specifically, while Tesla has constantly attempted to introduce innovative new products over its short history, the company has not been able to harness the benefits of learning curve effects to become more efficient and profitable in its existing businesses. This issue is illustrated in figure 2.3, which simultaneously graphs Tesla's revenues and net income in billions of US dollars between 2011 and 2015. This graph shows that while the company has consistently increased its revenues, it has never actually been able to turn a profit. In fact, 2015 the company reported losses of more than 888 million dollars, despite having its best year in terms of revenues, at 4.05 billion dollars. This suggests that the company is not efficiently managing costs, but is effectively growing its business in terms of revenues. This point is highlighted by the interesting detail that they lose 4,000 US dollars for each Model S that they sell (Kell, 2015). Certainly, Tesla may be attempting to build sales volume now, with a plan to focus on efficiency later, after consumer relationships have been formed, but this chart illustrates that a myopic pursuit of exploration can be dangerous for organizations in the long-term.

Figure 2.3 Tesla Motors' 2011-2015 net income and revenues in billions (US dollars)



Source: Adapted based upon data from *Financial Times* (FT, 2017)

2.3.5 Ambidexterity

The descriptions of exploitation and exploration in organizational learning suggest that both learning behaviors have potential performance benefits, but a single-minded pursuit of either can also result in negative performance consequences. Hence, authors have often concluded that there are potential benefits from pursuing both exploitation and exploration in organizations (e.g., Duncan, 1976; March, 1991; Tushman & O'Reilly, 1996). This pursuit of both exploitation and exploration is known as 'organizational ambidexterity' (Duncan, 1976; Tushman & O'Reilly, 1996). Notably, authors have differed in whether they view ambidexterity as the simultaneous pursuit of varying levels of exploitation and exploration as distinct dimensions (e.g., He & Wong, 2004; Tushman & O'Reilly, 1996), or an effort to balance exploitation and exploration as learning activities at the opposite ends of a continuum (e.g., March, 1991). In the first case, authors have argued that 'combining' (Junni et al., 2013) greater levels of both exploitation and exploration should

simultaneously allow firms to benefit from efficient performance resulting from exploitation and effective performance from exploration. Similarly, authors adopting the 'balancing' approach (March, 1991) to ambidexterity have argued that a balanced set of organizational learning behaviors may allow firms to avoid performance pitfalls that could come with a single-minded pursuit of one over the other. In both the combining and balancing approaches, there are theoretical arguments for a positive ambidexterity-performance relationship. Consistent with these ideas, a meta-analysis by Junni and colleagues (2013) identified a positive overall effect size for the relationship between ambidexterity and performance in existing research.

If International Harvester was an example of an organization with an exploitation bias, and Tesla is an example of an organization that currently has an exploration bias, then Toyota Motors can serve as an example of an organization that has pursued both types of learning activities simultaneously, to be ambidextrous. In particular, while Toyota typically invests a smaller percentage of its overall revenue into research and development than its competitors, they simultaneously direct these investments into efforts to improve current products (exploitation) and efforts to create entirely new products (exploration), such as fuel cell units (Parker, 2016). This simultaneous attention to exploitation and exploration can also be seen in the company's stated research and development objectives, including improvements to fuel economy in existing car models (exploitation) and the development of robotics and artificial intelligence technologies with many potential applications (Williams, 2015).

2.3.6 National culture and organizational learning-performance relationships

The current study seeks to assess the potential moderating role of national culture in organizational learning and performance relationships in the body of existing literature. Additionally, this research represents an effort to answer the call to consider the characteristics of the environments that firms are embedded within as moderators of organizational learning and performance relationships (Junni et al., 2013). As discussed above, culture is a shared construct that entails the collective

"programming" of a group of people (Hofstede, 1991), and it influences everything from underlying assumptions or beliefs to the way that we understand ourselves (Hall, 1959:23). Additionally, as discussed above, culture is a construct at different levels of analysis, applicable to collectives at the levels of teams all the way up to nations and regions (Graham, 2003), and there can be relationships between the different levels of culture (Erez & Gati, 2004).

Consistent with the idea that there may be relationships between cultures at different levels of analysis, a number of authors have offered that *national* culture can influence the strategic decisions and activities within organizations (e.g., Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991). In this view, culture is one possible antecedent to different strategic decisions and activities. However, other authors have offered that national culture might play a moderating role in relationships between strategic activities and performance (Freytag & Thurik, 2007; Marino et al., 2002; Rauch et al., 2010; Saeed et al., 2014). Specifically, these studies suggest that performance consequences will be better when there is a proper fit between strategic behaviors and the overall national culture in which an organization is embedded (Rauch et al., 2010), or the national culture of the management team (Brannen, 1991). In the introduction, this analysis has argued that these two views are not necessarily competing or at odds, but are complementary in that together they further our understanding of the role of culture in organizational strategy, and specifically organizational learning.

For example, in the context of global industries populated with firms from multiple national contexts, the notion that national culture will influence strategies will be especially relevant because one could anticipate that firm strategies will vary in a systematic way. That is, we could anticipate different strategies based upon the national cultures of different firms (Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991). However, in totally domestic, or single national culture, industries or competitive groups of firms, we can anticipate that the single national-cultural background would influence all the firms' strategic activities in the same way. Hence, any differences in strategic activities would be random, or at least they would not be systematically related to differences in national culture. As a result,

in single-country groups of firms, differences in strategic activities of firms may not be related to differences in national culture, but the relationship between these activities and performance outcomes may be moderated by national culture, or how well they fit with national culture. This analysis seeks to further explore this second possibility, that national culture can moderate relationships between strategic activities and performance, and more specifically relationships between organizational learning and performance.

Potentially, there are a number of different cultural characteristics that could be used to 'sort' national cultures to explore a moderating role of national culture on organizational learning and performance relationships. However, the clearest theoretical arguments within the existing literature tend to relate organizational learning behaviors to cultural-dimension constructs that have been empirically validated (e.g., Rauch et al., 2010; Saeed et al., 2014; Swierczek & Ha, 2003). In particular, the handful of studies that have discussed moderated relationships between learning-type behaviors and performance (e.g., Rauch et al., 2010; Saeed et al., 2014), have used constructs that are captured in Geert Hofstede's cultural dimensions (1980), or the GLOBE cultural dimensions (House et al., 2002). This analysis, acknowledges the key role of Hofstede's work in advancing empirical research on national culture in strategy, but elects to use the GLOBE cultural dimensions (House et al., 2004) because the GLOBE sampling procedure may offer more representative measures, the scale items capture values as practiced, and the cultural dimension scores from this study are based upon more recent surveys, as discussed previously. In particular, the GLOBE study calculates dimensions based upon two separate sets of scales. One set of scales asks respondents to answer survey items based upon what their society *values*, while the second set of scales asks respondents to answer based upon the actual *practices* of the society. The following discussion of the potential moderating effects of national cultural dimensions assumes that the practices within a culture are what would actually moderate relationships. Hence, consistent with the approach adopted by Saeed and colleagues (2014) the hypotheses developed below discuss the implications of cultural practices, and in the actual moderator analysis that follows, relevant GLOBE dimensions as 'practices' are used. And finally, as noted above,

exploitation and exploration alone have been theoretically linked to both positive and negative performance outcomes (Levinthal & March, 1993; March, 1991; Tushman & O'Reilly, 1996), while the majority of theoretical development on ambidexterity suggests a positive relationship with performance (e.g., Duncan, 1976; He & Wong, 2004; Tushman & O'Reilly, 1996). Hence, the stated hypotheses in this analysis are limited to the moderating role of national culture on anticipate positive ambidexterity-performance relationships.

2.4 Hypotheses

2.4.1 Assertiveness

'Assertiveness' refers to how aggressive and confrontational the members of a society are (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). According to Hartog (2004), there may be a greater level of competition among the different members of organizations in highly assertive societies, resulting in contentious exchanges and rivalries. It follows that this sort of internal conflict can result in "turf" wars that slow down the implementation of strategic activities (Saeed et al., 2014). Additionally, according to Rauch and co-authors (2010), firms in societies high on assertiveness tend to be preoccupied with entering competitors' markets or defending their own markets from competitors, often through price competition, making exploitation difficult. And finally, trust between members of a society tends to be less pronounced in highly assertive cultures, potentially reducing the effectiveness of strategic activities requiring various members of an organization (Saeed, 2014). It follows that high levels of assertiveness may disrupt the different types of coordination required for effective ambidexterity. As a result, organizational ambidexterity may be a poor strategic match in countries that are more assertive. These ideas are captured in the following hypothesis.

> *Hypothesis 1: The ambidexterity-performance relationship is weaker in national cultures that have a high level of assertiveness than those that have a*

low level of assertiveness.

2.4.2 Institutional Collectivism

'Institutional collectivism' has also been referred to as "collectivism 1," and describes the degree to which members of a society emphasize collective action and distribution of resources (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). The emphasis on collective action in institutional collectivism goes counter to organizational ambidexterity notion that organizations should engage simultaneously in two very different types of action (March, 1991), and these actions may need to be structurally separate and may require different types of resources (Tushman & O'Reilly, 1996). Hence, organizations pursuing ambidexterity in countries that score high on institutional collectivism may find it difficult to realize the full performance potential of this approach because they will also need to overcome the miss-match between their learning behavior and the national culture in which they are embedded. As a result, the next hypothesis in this study is as follows.

> *Hypothesis 2: The ambidexterity-performance relationship is weaker in national cultures that have a high level of institutional collectivism than those that have a low level of institutional collectivism.*

2.4.3 In-group Collectivism

'In-group collectivism' has also been referred to as "collectivism 2," and describes the degree to which members of a society stress cohesion within organizations and families, and the degree to which they express loyalty and pride in these organizations and family units (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). Unlike institutional collectivism, which emphasizes collective action and resource

distribution, high levels of in-group collectivism suggests that members of a society can form tight-knit work groups and teams that are concerned with self-sacrifice and pride in the work activities. In this case, the collective action within an organization becomes less important than the actions and pride in separate in-groups, opening the door for cohesive exploitation in-groups and exploration in-groups. As a result, high-levels of in-group collectivism appears to be a match with the requirements of organizational ambidexterity. This idea is captured in the third hypothesis of this analysis.

> *Hypothesis 3: The ambidexterity-performance relationship is stronger in national cultures that have a high level of in-group collectivism than those that have a low level of in-group collectivism.*

2.4.4 Future Orientation

'Future orientation' captures the degree to which members of a society engage in future directed behaviors and delayed gratification, including investing and planning for the future (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). Importantly, low levels of future orientation do not necessarily entail a hedonistic pursuit of instant gratification, but rather a relative absence of future directed behaviors. It follows that members of a highly future-oriented society could potentially overemphasize the need to invest and plan for the future, at the expense of activities that result in more immediate performance. In this case, organizations embedded in highly future oriented cultures may struggle against an exploration bias when trying to pursue ambidexterity, and this may reduce the successfulness of ambidexterity. Hence, the fourth hypothesis of this analysis is as follows.

> *Hypothesis 4: The ambidexterity-performance relationship is weaker in national cultures that have a high level of future orientation than those that have a low level of future orientation.*

2.4.5 Performance Orientation

'Performance orientation' refers to the extent to which members of a society reward and promote improvements in performance and excellence (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). In the opposite way of future orientation, members of a highly performance oriented society could potentially overemphasize the need to improve upon what they already do, at the expense of activities that result future benefits and performance. In this case, organizations embedded in highly performance-oriented cultures may struggle against an exploitation bias when trying to pursue ambidexterity, and this may reduce the successfulness of ambidexterity. Hence, the fifth hypothesis of this analysis is as follows.

> *Hypothesis 5: The ambidexterity-performance relationship is weaker in national cultures that have a high level of performance orientation than those that have a low level of performance orientation.*

2.4.6 Power Distance

'Power distance' refers to the degree to which members of a society are accepting of unequally distributed power and authority (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). Members of high power distance societies may find it difficult to proactively communicate problems and opportunities from lower levels of a hierarchy up to higher levels of a hierarchy (Carl, Gupta, & Javidan, 2004; Saeed et al., 2014; Singh, 2006; van Everdingen & Waarts, 2003). Hence, organizations embedded in high power distance cultural contexts may face additional challenges to successfully utilize both exploration and exploitation activities. In the case of exploitation, individuals in high power distance societies may find it difficult to communicate problems or opportunities for improvement of existing activities, thereby slowing

down any learning effects. In the case of exploration, individuals in high power distant cultures may be less likely to communicate new opportunities that they perceive to superiors within an organization, and they may be less likely to be heard. Hence, organizations embedded in high power distance cultures should also face a miss-match between an ambidextrous strategy and the culture. It follows that the sixth hypothesis in this analysis is as follows.

> *Hypothesis 6: The ambidexterity-performance relationship is weaker in national cultures that have a high level of power distance than those that have a low level of power distance.*

2.4.7 Uncertainty Avoidance

'Uncertainty avoidance' refers to the degree to which members of a society seeks to minimize ambiguity, or unpredictability, of the future by relying upon established routines, rules, norms, or procedures (House et al., 2002; Terlutter, Diehl, & Mueller, 2006). The establishment and refinement of routines, rules, norms, and procedures is consistent with the concept of exploitation in organizational learning (Levinthal & March, 1993; Levitt & March, 1988). However, people in societies characterized by high levels of uncertainty avoidance may resist innovation (Bromiley, 1991), avoid the risks that are inherent in trying new things (Luque & Javidan, 2004), and may prefer not to pursue new and entrepreneurial opportunities (Rauch et al., 2010; Saeed et al., 2014). Hence, organizations embedded in high-uncertainty avoidance cultural contexts may face additional challenges in overcoming a tendency toward exploitation bias when using an ambidexterity approach. This idea is formalized in the seventh and final hypothesis of this analysis.

> *Hypothesis 7: The ambidexterity-performance relationship is weaker in national cultures that have a high level of uncertainty avoidance than those that have a low level of uncertainty avoidance.*

2.5 Methodology

2.5.1 Literature search

To begin collecting studies to include in this analysis, all of the studies used in an earlier meta-analysis by Junni et al. (2013) were collected. These authors ended their search of papers in the spring of 2012, so online searches of databases such as *Google Scholar*, *EBSCO*, and *JSTOR* were used to identify relevant studies conducted, published, or posted after February 2012. Additionally, these resources were searched to identify any studies that were potentially missed in the Junni et al. (2013) meta-analysis. In searching for additional studies, a predefined list of search terms, including exploitation, exploration, innovation, ambidexterity, ambidextrous, and performance was used. Various combinations of these search terms were also used to further identify studies. The process of gathering these studies began in early January of 2016 and ended at the beginning of April in the same year.

2.5.2 Inclusion criteria

The studies that were gathered were then evaluated with reference to a number of criteria to determine whether they should be included in this analysis. First, the studies had to include a relevant performance outcome. Second, the studies had to include a relevant exploitation, exploration, or ambidexterity independent variable. Third, the studies had to report the necessary quantitative information for meta-analysis, including sample size, an effect size reported as a Pearson's *r* value, or an effect size that could be converted to an *r* value given the information presented in the study. Fourth, the study needed to report relevant information about the research context, including the sample country or countries. In total, 112 studies were identified as includable in at least some of the relationships of interest. Of these, 96 studies (k=96) included direct effects between exploitation and performance, 102 studies (k=102) included direct effects between exploration and performance, and 56

studies (k=56) included relationships between ambidexterity and performance. However, to test the moderating effects of national culture, only studies using samples of organizations from a single nation could be used. Hence, a number of studies that did not explicitly identify the sample country or used samples from multiple countries were dropped. As a result, 44 studies (k=44) that included relationships between ambidexterity and performance were used to test hypotheses 1 through 7. Additionally, meta-analyses on the moderating effects of culture on exploitation-performance relationships (k=76), and exploration-performance relationships (k=78), were included as a matter of interest.

Table 2.4 offers country frequencies for the number of studies identified for analyses that assess culture as a moderator in organizational learning-performance relationships. It is worth noting that for all three relationships, studies conducted in the context of the United States have the greatest frequency. However, it is also worth noting that overall single-national context studies from 21 countries were identified, suggesting that the performance effects of ambidexterity, and exploitation and explorations separately, is an important area of interest to scholars around the world.

Table 2.4 Total number of studies by national context

Country	Exploitation	Exploration	Ambidexterity
Australia	7	7	4
Belgium	1	0	0
Canada	3	3	0
China	9	9	5
Columbia	2	2	0
Denmark	2	2	0
Finland	3	2	1
Germany	1	1	1
Greece	1	1	0
Japan	1	1	0
Korea (South)	1	1	0
Mexico	0	0	1
Netherlands	6	5	6
Portugal	2	2	0
Russia	0	0	1
Spain	4	4	3
Sweden	0	0	1
Switzerland	1	1	0
Taiwan	1	5	4
UK	2	2	2
USA	29	30	15
Total (k)	**76**	**78**	**44**

2.5.3 Coding

A coding matrix was developed to include authors' names, study year, the effect size, sample size, the industry context of the study, the firm sizes of the sample, the type of study design (e.g., archival, cross-sectional survey, or multi-method), the performance measure used (e.g., perceptual or objective), and the independent variable measure used (e.g., perceptual or objective). Next, all the identified studies were coded separately by two researchers, and the resulting assignments were compared and the two researchers discussed any differences to mutually determine the most appropriate categorizations.

Next, following the approach of Saeed and colleagues (2014), GLOBE dimension scores for cultural dimension 'practices' were entered for the sample

countries of each single-country sample study. For Germany, the average scores for "East" and "West Germany" were used. The median score among the studies for each dimension was calculated and countries with scores at or above the median were coded as scoring "high" on that dimension, and scores below the median were coded as "low" on that dimension. In addition, the middle of the *range* between the lowest value for a dimension among the studies and the highest value for a dimension among the studies was identified, and scores above the middle of the range were coded as "high" on the dimension, while scores below the middle of the range were coded as "low" on the dimension.

2.5.4 Meta-analyses

The 'MAc' package (Del Re & Hoyt, 2015) available in the 'R' statistical environment was used for all of the analyses in this study. To calculate overall effect sizes between exploitation, exploration, or ambidexterity and performance, random effects omnibus effect sizes for correlations were derived using the "omni" command in 'MAc.' Random effect's were used in all of the calculations for this study because the included studies sampled different populations. Bivariate and categorical moderator analyses were conducted using random effects models with the 'macat' command in 'MAc.'

2.6 Results

As a matter of interest, the overall effect sizes for exploitation-performance, exploration-performance, and ambidexterity-performance were calculated using all the studies identified during the literature search stage, even studies with samples from multiple countries. The resulting effect sizes are presented in table 2.5. Consistent with the findings of Junni et al (2013), all the effect sizes are positive and significant ($p<0.001$), suggesting that the overall body of literature linking organizational learning behaviors to performance has identified positive outcomes.

Table 2.5 Omnibus effect sizes between organizational learning activities and performance

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q
Exploitation	96	71,214	0.116	0.021	0.075	0.157	5.564***	***
Exploration	102	72,985	0.147	0.025	0.097	0.198	5.736***	***
Ambidexterity	56	20,886	0.134	0.042	0.050	0.218	3.134***	***

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies. Random effects method used to derive all three effect sizes.*

Next, a series of moderator analyses were conducted using differences among the industry and firm size contexts of existing research as moderators, as presented in table 2.6. Once again, all the resulting effect sizes were positive. However, not all the effect sizes were significant. Also, as a matter of interest, these moderator analyses were applied to exploitation-performance and exploration-performance relationships. In the case of industry as a moderator of exploitation-performance relationships, all the effect sizes were significant ($p<0.01\sim0.001$), and they were largest for mixed industry samples (0.145), followed by high-tech industry samples (0.141), and then manufacturing samples (0.127). All of the effect sizes were also significant for the industry moderator analysis on exploration-performance relationships ($p<0.001$), but they were largest in the case of manufacturing samples (0.220), followed by mixed industry samples (0.156), and finally by high-tech industry samples (0.151). However, for ambidexterity-performance relationships, the only effect size that was significant at 95 percent was from the body of research that utilized samples from mixed industries.

Table 2.6 Categorical moderator analyses on empirical contexts of studies

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q
Industry								
Exploitation:								
High-Tech	29	9,819	0.141	0.037	0.066	0.215	3.724***	***
Manufacturing	22	4,242	0.127	0.044	0.040	0.213	2.878**	***
Mixed	30	53,284	0.145	0.036	0.073	0.217	3.940***	***
Exploration								
High-Tech	32	10,094	0.151	0.044	0.064	0.238	3.421***	***
Manufacturing	22	4,363	0.220	0.053	0.116	0.325	4.141***	***
Mixed	31	53,482	0.156	0.044	0.068	0.243	3.502***	***
Ambidexterity:								
High-Tech	10	2,729	0.168	0.099	-0.026	0.363	1.691†	***
Manufacturing	6	1,577	0.206	0.127	-0.043	0.457	1.617	***
Mixed	26	49,369	0.147	0.061	0.026	0.267	2.398*	***
Firm Size								
Exploitation:								
Large	24	13,268	0.071	0.039	-0.004	0.148	1.840†	***
SME	21	5,465	0.155	0.041	0.073	0.237	3.731***	***
Mixed	48	51,899	0.122	0.027	0.068	0.176	4.446***	***
Exploration:								
Large	29	14,858	0.114	0.041	0.033	0.196	2.765**	***
SME	19	5,344	0.236	0.050	0.137	0.335	4.686***	***
Mixed	51	52,201	0.133	0.031	0.072	0.194	4.277***	***
Ambidexterity:								
Large	10	12,665	0.154	0.095	-0.032	0.342	1.616	***
SME	14	4,029	0.230	0.079	0.074	0.386	2.889**	***
Mixed	28	39,061	0.094	0.057	-0.017	0.206	1.662†	***

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies at the level of the moderator.*

In the case of firm size as a moderator, exploitation-performance relationships were only positive and significant (p<0.001) in the case of studies made up of SMEs (0.155) and samples with mixed firm sizes (0.122). On the other hand, for exploration-performance relationships, all of the effect sizes were positive and significant (p<0.001~0.001) for the various firm size possibilities. Once again, studies with SME samples had larger effect sizes (0.236), followed by mixed firm-size samples (0.133), and then studies that sampled large firms (0.114). And finally, for ambidexterity-performance relationships, only studies with SME samples resulted in a positive (0.230) and significant effect size at 95 percent.

In addition to running moderator analyses related to industries and firm size, table 2.7 also presents a series of moderator analyses related to elements of study design. In terms of exploitation-performance, exploration-performance, and ambidexterity-performance relationships, the use of archival data and multi-method approaches consistently failed to result in significant effect sizes. However, cross sectional survey based methodologies resulted in positive and significant exploitation-performance (0.143, $p<0.001$), exploration-performance (0.187, $p<0.001$), and ambidexterity-performance (0.156, $p<0.01$) relationships. Similarly, effect sizes were not significant across all learning behavior and performance relationships when objective measures of performance were used, but when perceptual measures of performance were used, exploitation-performance (0.149, $p<0.001$), exploration-performance (0.200, $p<0.001$), and ambidexterity-performance (0.168, $p<0.01$) relationships were all positive and significant. In terms of measures of independent variables in studies, the use of objective measures of learning behavior only resulted in a significant effect size (0.084, $p<0.05$) when the learning behavior was exploitation. Alternatively, perceptual measures of exploitation (0.128, $p<0.001$), exploration (0.177, $p<0.001$), and ambidexterity (0.153, $p<0.05$) all resulted in positive and significant effect sizes in studies assessing relationships with performance.

Table 2.7 Categorical moderator analyses on design of studies

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q
Study Design								
Exploitation:								
Archival	18	21,007	0.041	0.043	-0.044	0.126	0.935	***
Cross Sectional Survey	70	48,617	0.143	0.022	0.098	0.188	6.249***	***
Multi-Method	8	1,590	0.065	0.069	-0.069	0.200	0.947	***
Exploration:								
Archival	18	21,962	0.023	0.058	-0.091	0.137	0.396	***
Cross Sectional Survey	78	49,554	0.187	0.028	0.131	0.244	6.551***	***
Multi-Method	6	1,469	0.022	0.102	-0.179	0.223	0.215	
Ambidexterity:								
Archival	3	12,520	0.016	0.210	-0.395	0.429	0.080	
Cross Sectional Survey	46	42,038	0.156	0.054	0.048	0.263	2.851**	***
Multi-Method	7	1,731	0.047	0.139	-0.226	0.320	0.337	***
Performance Measure								
Exploitation:								
Objective	30	24,620	0.050	0.033	-0.016	0.116	1.476	***
Perceptual	66	46,594	0.149	0.023	0.102	0.195	6.325***	***
Exploration:								
Objective	31	25,679	0.032	0.044	-0.054	0.119	0.723	***
Perceptual	71	47,306	0.200	0.029	0.141	0.258	6.717***	***
Ambidexterity:								
Objective	15	16,055	0.044	0.090	-0.132	0.221	0.489	***
Perceptual	41	40,234	0.168	0.055	0.060	0.276	3.049**	***
Independent Variable Measure								
Exploitation:								
Objective	24	22,088	0.084	0.039	0.007	0.161	2.143*	***
Perceptual	72	49,126	0.128	0.023	0.082	0.173	5.508***	***
Exploration:								
Objective	22	22,877	0.043	0.053	-0.061	0.147	0.806	***
Perceptual	80	50,108	0.177	0.028	0.122	0.233	6.232***	***
Ambidexterity:								
Objective	7	14,744	0.003	0.133	-0.258	0.266	0.029	*
Perceptual	49	41,545	0.153	0.051	0.052	0.254	2.986**	***

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies at the level of the moderator.*

Up until this point, each of the sets of moderator analyses has involved distinctions between studies based upon qualitative or categorical differences. However, the GLOBE cultural dimension scores are continuous values. Hence, as described above, this study adopts the approach of past research (e.g., Brinckmann et al., 2010; Saeed et al., 2014) to identify countries with "high" scores on a dimension

or “low” scores on a dimension. In addition, because this set of analyses involves taking a continuous variable and converting it to a categorical variable, the level of significance for a Q-statistic between moderators (Q_B) was also included to assess whether these high/low moderators represent a significant difference in effect size estimates. If moderator analyses using the middle of the range of dimension scores resulted in a Q_B Statistic that was more significant, then results based upon the middle of the range high/low breaking point were presented. Otherwise, results based upon the median dimension score high/low breaking point were presented for consistency with past research (e.g., Saeed et al., 2014).

As a matter of interest, the moderating roles of the cultural dimensions are also explored for exploitation-performance relationships in table 2.8, and exploration-performance relationships in table 2.9, even though explicit hypotheses are not offered for these relationships. Interestingly, in table 2.8, there are many positive and significant effect sizes at high and low levels of various GLOBE cultural dimensions. However, none of the Q_B statistics is significant at 95 percent for any of these high/low pairs of moderators. This interesting result suggests that there is an overall positive relationship between exploitation and performance in the existing research, but it does not appear to be moderated by culture.

Table 2.8 Culture as a moderator in exploitation-performance relationships

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q	Q_B
Assertiveness									
High	43	16,195	0.126	0.034	0.059	0.192	3.719***	***	
Low	33	5,701	0.103	0.039	0.026	0.180	2.620**	***	
Institutional Collectivism									
High	65	18,176	0.102	0.026	0.049	0.154	3.834***	***	
Low	11	3,720	0.198	0.063	0.073	0.322	3.118**	***	
In-Group Collectivism									
High	57	17,859	0.110	0.029	0.051	0.168	3.709***	***	
Low	19	4,037	0.136	0.052	0.033	0.239	2.593**	***	
Future Orientation									
High	49	17,112	0.104	0.032	0.041	0.168	3.222**	***	
Low	27	4,784	0.137	0.044	0.051	0.223	3.116**	***	
Performance Orientation									
High	42	15,926	0.102	0.035	0.033	0.171	2.915**	***	
Low	34	5,970	0.133	0.039	0.056	0.211	3.400***	***	
Power Distance									
High	58	19,684	0.122	0.029	0.065	0.180	4.175***	***	
Low	18	2,212	0.094	0.054	-0.012	0.201	1.735†	***	
Uncertainty Avoidance									
High	64	19,545	0.110	0.028	0.054	0.166	3.891***	***	
Low	12	2,351	0.146	0.065	0.018	0.273	2.242*	***	

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies at the level of the moderator. "Q_B" indicates level of significance for an unreported Q-statistic between different moderator variables, to test whether moderator variables illustrate significant variance among effect sizes. Random effects method used in all moderator analyses. No differences exist between "Q_B" when the median value of a dimension is used as a high/low breaking point compared to "Q_B" when the middle of the range of dimension values is used as high/low breaking point, so the median value is used as the breaking point in all of the above cultural dimension moderator analyses.*

Similarly, in table 2.9, there are many positive and significant effect sizes at high and low levels of various GLOBE dimensions, but the only Q_B statistic that is significant at 95 percent or better is the Q_B statistic between high and low levels performance orientation. Additionally, the effect size for high performance orientation (0.113, p<0.01) is smaller than the effect size for low performance orientation (0.238, p<0.001), suggesting that the exploration-performance relationship is greater in cultures that score low on performance orientation. Potentially, this result could mean that when cultures place less emphasis on improved quality, excellence, and performance, organizations might find it easier to successfully pursue

exploration, which is concerned with pursuing new opportunities rather than improving existing capabilities. Overall, tables 2.8 and 2.9 suggest that, with the exception of performance orientation and exploration-performance, national culture does not appear to moderate exploitation-performance relationships or exploration-performance relationships in the existing literature.

Table 2.9 Culture as a moderator in exploration-performance relationships

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q	Q_B
Assertiveness									
High	42	16,342	0.120	0.040	0.041	0.199	2.999**	***	†
Low	36	6,048	0.232	0.043	0.146	0.318	5.797***	***	
Institutional Collectivism									
High	67	18,670	0.167	0.042	0.084	0.250	3.946***	***	
Low	11	3,720	0.197	0.103	-0.006	0.400	1.895†	**	
In-Group Collectivism									
High	60	18,452	0.178	0.044	0.091	0.265	4.031***	***	
Low	18	3,938	0.146	0.081	-0.012	0.306	1.803†	***	
Future Orientation									
High	47	17,205	0.137	0.049	0.039	0.235	2.761**	***	
Low	31	5,185	0.223	0.061	0.102	0.344	3.617***	***	
Performance Orientation									
High	41	16,073	0.113	0.040	0.033	0.192	2.782**	***	*
Low	37	6,317	0.238	0.043	0.153	0.322	5.527***	***	
Power Distance									
High	61	20,277	0.178	0.043	0.092	0.263	4.067***	***	
Low	17	2,113	0.147	0.083	-0.016	0.311	1.760†	***	
Uncertainty Avoidance									
High	62	19,638	0.162	0.038	0.086	0.238	4.174***	***	
Low	16	2,752	0.208	0.076	0.058	0.359	2.719**	***	

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies at the level of the moderator. "Q_B" indicates level of significance for an unreported Q-statistic between different moderator variables, to test whether moderator variables illustrate significant variance among effect sizes. Random effects method used in all moderator analyses. No improvement in "Q_B" when the middle range of dimension values is used as a high/low breaking compared to when the median dimension values are used, so the median value is used as the breaking point in all the above cultural dimension moderator analyses.*

However, national culture does appear to moderate ambidexterity-performance relationships in some cases, as illustrated in table 2.10, below. To begin with, assertiveness does not result in a significant Q_B. This result suggests that

assertiveness does not moderate ambidexterity-performance relationships in the existing research. Additionally, this result fails to support hypothesis 1 in this study. Next, the effect sizes for low levels of institutional collectivism (0.346, $p<0.001$) and high levels of institutional collectivism (0.117, $p<0.01$) are both positive and significant and the Q_B statistic is also significant at better than 95 percent. Additionally, the effect size for low levels of institutional collectivism is larger. These results suggest that the ambidexterity-performance relationship is weaker in national cultures that have a high level of institutional collectivism, and lends support for hypothesis 2 in this study. On the other hand, the effect size for high levels of in-group collectivism (0.273, $p<0.001$) is larger than the effect size for low levels of in-group collectivism (0.080, $p<0.05$), and both effect sizes are positive and significant. Additionally, the Q_B statistic between high and low levels of in-group collectivism is significant at better than 95 percent. These results suggest that the ambidexterity-performance relationship is stronger in national cultures that have a high level of in-group collectivism, and lends support for hypothesis 3 in this study. Next, the effect sizes for high future orientation (0.081, $p<0.05$) and low future orientation (0.231, $p<0.001$) are both positive and significant, but the effect size for low levels of future orientation is larger. Additionally, the Q_B statistic between high and low levels of future orientation is significant at 95 percent or better. These results suggest that the ambidexterity-performance relationship is weaker in national cultures that have a high level of future orientation, and lends support to hypothesis 4. In terms of performance orientation, low performance orientation results in a positive and significant effect size (0.209, $p<0.001$), but the effect size for high performance orientation is not significant and the Q_B statistic between high and low performance orientation is significant at 95 percent. This result suggests that the ambidexterity-performance relationship is weaker in national cultures that have high levels of performance orientation, because there is not a relationship between ambidexterity and performance within the overall body or research linking ambidexterity to performance in high performance orientation cultures, as indicated by a lack of statistical significance. On the other hand, there is a positive and significant effect size for low levels of performance orientation. Hence, these results lend support for hypothesis 5

of this analysis. Interestingly, high power distance results in a positive and significant effect size (0.253, $p<0.001$) but the effect size for low power distance is not significant at 95 percent or better. In addition, the Q_B statistic between high and low power distance is significant at better than 95 percent. These results suggest that there is a positive relationship in the overall research linking ambidexterity and performance in high power distance cultures, but no relationship assessing the same link in low power distance. In other words, it appears that ambidexterity-performance relationship is stronger in national cultures that have a high level of power distance. This result fails to support hypothesis 6, and instead finds support for a moderating relationship that is the opposite of hypothesis 6. And finally, the effect sizes for high uncertainty avoidance (0.100, $p<0.01$) and low uncertainty avoidance (0.300, $p<0.001$) are both positive and significant, and the Q_B statistic between the high and low uncertainty avoidance moderators is significant at better than 95 percent. Additionally, the effect size for low uncertainty avoidance is larger, suggesting that the ambidexterity-performance relationship is weaker in national cultures that have a high level of uncertainty avoidance. This result lends support to hypothesis 7 for this study.

Table 2.10 Culture as a moderator in ambidexterity-performance relationships

	K	N	ES	se	CI_{Lower}	CI_{Upper}	z	Q	Q_B
Assertiveness									
High	25	16,097	0.114	0.045	0.025	0.203	2.508*	***	
Low	19	4,789	0.179	0.051	0.078	0.281	3.463***	***	
Institutional Collectivism									
High	39	19,975	0.117	0.029	0.059	0.059	0.176**	***	**
Low	5	911	0.346	0.083	0.083	0.182	0.509***	***	
In-Group Collectivism									
High	14	3,885	0.273	0.053	0.168	0.377	5.117***	***	**
Low	30	17,001	0.080	0.037	0.008	0.153	2.175*	***	
Future Orientation									
High	26	16,346	0.081	0.040	0.001	0.160	1.997*	***	*
Low	18	4,540	0.231	0.048	0.136	0.326	4.769***	***	
Performance Orientation									
High	22	15,550	0.075	0.045	-0.012	0.164	1.678†	***	*
Low	22	5,336	0.209	0.044	0.121	0.296	4.684***	***	
Power Distance									
High	18	4,598	0.253	0.047	0.160	0.346	5.352***	***	**
Low	26	16,288	0.064	0.039	-0.013	0.143	1.623	***	
Uncertainty Avoidance									
High	35	17,767	0.100	0.034	0.032	0.168	2.910**	***	**
Low	9	3,119	0.300	0.066	0.169	0.430	4.521***	***	

*Notes: †, *, **, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. "K" is the total number of studies included. "N" is the aggregated sample size. "ES" is the weighted r effect size. "se" is the standard error of the estimate coefficient. "CI_{Lower}" is the lower 95% confidence interval. "CI_{Upper}" is the upper 95% confidence interval. "z" is the z-value. "Q" indicates the level of significance for an unreported Q-statistic, to assess the overall homogeneity among studies at the level of the moderator. "Q_B" indicates level of significance for a Q-statistic between different moderator variables, test whether moderator variables illustrate significant variance among effect sizes. Random effects method used in all moderator analyses. ES estimates are consistent in direction and significance (using p<0.05 as a threshold) using median dimension scores as high/low breaking point and middle of range dimension values, however middle of dimension range values result in improved "Q_B" in the cases of "In-Group Collectivism" and "Power Distance," so the above moderator analyses based upon these two dimensions use the middle of the range of the dimension as the high/low breaking point.*

2.7 Conclusions and Discussion

Researchers have suggested that culture can act as one antecedent to strategic decisions and strategies (e.g., Newman & Nollen, 1996; Schneider, 1989; Schneider & De Meyer, 1991). At the same time, other researchers have argued that culture may play a moderating role between strategic decision or activities and performance outcomes (e.g., Freytag & Thurik, 2007; Marin et al., 2002; Rauch et al., 2010; Saeed et al., 2014). The current study argues that both of these views may be correct, but the

research contexts in which they are most relevant will be different. Specifically, culture as an antecedent to strategic decisions and activities will be most relevant in contexts where firms come from multiple national cultural backgrounds, because these cultural differences will result in systematic differences between firms. However, the culture as a moderator of strategic activity-performance relationships may be more relevant in contexts where all of the firms are from the same national culture. In these contexts, strategic differences will be random, or at least not a systematic consequence of differences in national culture. In single national culture contexts, the strategies that 'fit' the national cultural contexts may be better suited for success (Rauch et al., 2010). Hence, in single national cultural contexts, we could view national culture context as a moderator of relationships between strategic activities and performance at the firm level. The current study has employed a meta-analytic approach to consider the moderating role of national culture in single-nation studies linking organizational ambidexterity to performance within the existing body of research in this area.

The findings suggest that the positive link between ambidexterity and performance is stronger in countries with low levels of institutional collectivism, high levels of in-group collectivism, low levels of future orientation, low levels of performance orientation, and low levels of uncertainty avoidance. However, unexpectedly, the ambidexterity-performance relationship appears to be stronger in countries with high levels of power distance, and assertiveness does not appear to moderate the ambidexterity-performance relationship. In addition, this analysis confirms the conclusions of Junni et al. (2013) who note that the ambidexterity-performance relationship can be moderated by research context and study design.

This research makes a contribution to research by answering a call to consider the boundary conditions of organizational ambidexterity research (e.g., Birkinshaw & Gupta, 2013) and to look at how environmental factors might moderate ambidexterity-performance relationships (e.g., Junni et al., 2013). Additionally, this research makes a contribution to practice in identifying ways that practitioners can assess the level of fit between their organizational learning strategies and the national cultural context in which they are embedded. If practitioners know that their strategy

is a poor fit for their strategy, they can better anticipate performance outcomes and might wish to seek ways to overcome this lack of fit, potentially through 'organizational culture.'

Of course, this study also has some weaknesses. To begin with, the GLOBE dimensions of culture were used in this analysis, but cultures differ in many other ways, such as low- versus high-context differences. Hence, the omission of other elements of culture as potential moderators is a weakness of this analysis, but this omission is also an opportunity for future research. It is also possible that the literature search in this meta-analysis missed some studies, and this may be especially true of unpublished studies. Next, it is entirely possible that a robust organizational culture could help firms to overcome any negative effects from a mismatch between greater levels of ambidexterity and national culture. However, this meta-analysis was unable to test for a moderating role of organizational culture, and this is a weakness of the current research that also represents an opportunity for future empirical studies in this area. And finally, a comparatively large number of studies identified for this analysis were conducted in the context of the USA, potentially magnifying the effect of that country as a study context. However, it also appears that greater numbers of studies in these areas are being conducted in a different countries and regions, suggesting that in the near future the overall body of research will become more globally representative.

Chapter 3. Culture and R&D search intensity

3.1 Abstract

This research assesses macro-level culture as a factor in the behavioral explanations for research and development (R&D) investments. The behavioral view offers that both shortfalls between actual organizational performance and aspirational performance, and organizational slack, are positively associated with R&D investments. Using an unbalanced panel of data on 85 firms in the global automotive industry between 2003 and 2015, with 613 firm-year observations, this study tests these relationships while controlling for a firm being from an Asian culture. Social psychologists have identified meaningful differences between socialized patterns of thought and attention in Asian and western individuals, and even when controlling for culture, results in this analysis indicate positive relationships between shortfalls in aspirational performances, as well as absorbed organizational slack, and R&D investments in the subsequent year. Additionally, a firm's status as being from an Asian culture negatively moderates both these positive relationships. These moderating roles may occur because Asian managers are more attentive to the context in which their organizations are embedded, and are therefore less sensitive to changes in the focal organization, relative to western managers.

3.2 Introduction

The goal of this analysis is to develop a more nuanced understanding of how macro-level culture, in this case shared patterns of thought (Masuda & Nisbett, 2001) within societies, relates to research and development (R&D) investments. Over the past decade and a half, researchers have sought to offer *behavioral* explanations for R&D investment decisions (e.g., Alessandri & Pattit, 2014; Chen, 2008; Chrisman & Patel, 2012; Greve, 2003a; Patel & Chrisman, 2014). To do this, these authors have drawn heavily upon the behavioral theory of the firm and organizational learning research (Cyert & march, 1963; Greve, 2003b). The key insights offered from this growing body of research are that decisions to increase R&D investments may be made to improve performance following a period of poor performance relative to aspirations (Gomez-Mejia et al. 2014; Greve, 2003a; O'Brien & David, 2014), or these decisions may be made when managers perceive sufficient organizational slack to buffer the organization from any losses incurred when R&D investments are not successful (Chrisman & Patel, 2012; Chen & Miller, 2007; Greve, 2003a; Kim, Kim & Lee, 2008; Wu & Tu, 2007).

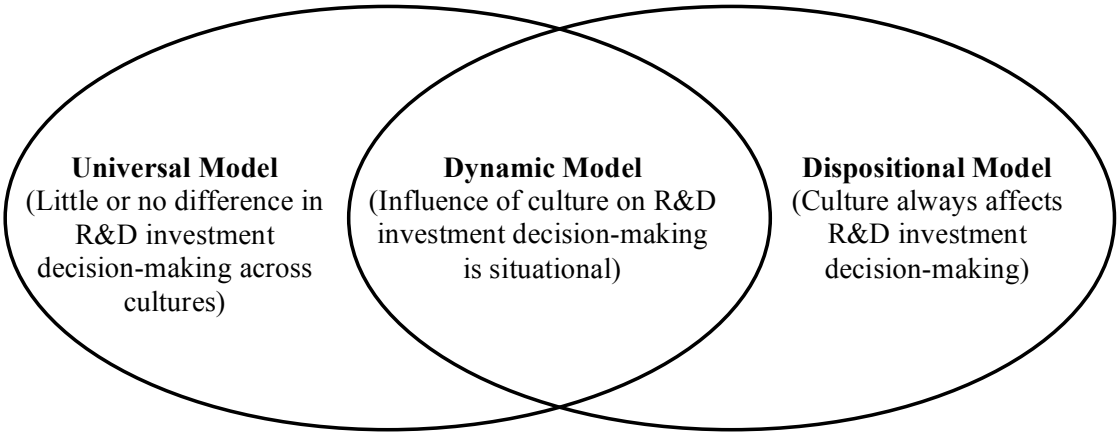
This research has sought to offer a view of R&D investment decision-making that is universalistic in that the key insights are assumed, or at least presented, to be universally generalizable. However, there is an awareness in the broader strategic management literature that the national cultures in which organizations are embedded may correspond to systematic differences in strategic management decisions (e.g., Hennart & Larimo, 1998; Newman & Nollen, 1996; Schneider & De Meyer, 1991). Yet, the behavioral research on R&D investment decisions up to this point has mostly avoided bringing any discussion of national culture into theorizing and empirical testing. The notable exception comes from O'Brien and David (2014), who argue that performance triggered R&D investments by Japanese managers may depend upon the absence or presence of transactional institutional investors.

The observation that the behavioral research on R&D investment decisions has been universalistic at the risk of potentially missing a role for national culture is

not offered as a criticism. Rather, up until this point, this research has rightfully focused on developing a clear nomological net, with constructs and relationships that have been tested in different industry contexts. Additionally, empirical research in this area has typically focused on single-nation contexts, meaning that national culture should influence all the firms in a sample in the same way, and would not result in systematic differences among firms. In particular, researchers have most frequently focused on industry contexts in the United States (e.g., Chen, 2008; Chen & miller, 2007; Chrisman & Patel, 2012; Gomez-Mejia et al., 2014; Patel & Chrisman, 2014) and Japan (e.g., Greve, 2003a; O'Brien & David, 2014). However, there are many industries, such as the automotive and electronics industries, which are global in nature, and often involve competition across countries between firms who are national champions in their home countries and maintain strong national identities. Hence, the absence of any analysis of national culture as a factor in the behavioral theory of R&D investments represents a gap in the literature, and this analysis is an effort to fill this gap.

In addition, to a universal model of decision-making processes, Briley and colleagues (2000) offer that researchers have also adopted dispositional and dynamic models. A universal model assumes that culture has little or no bearing on decision-making processes, but a dispositional model assumes that culture affects decision-making processes in a direct way, and a dynamic model appears to be a compromise between these two extremes, where culture can influence decision-making processes on a situational basis. In the context of R&D investment decisions, figure 3.1 summarizes these different models of culture's role at a high level of abstraction.

Figure 3.1 The possible models for national culture's role in R&D investment decisions



To achieve the stated objective of this research, exploring how culture relates to R&D investments, this analysis is organized into several sections. First, a review of the literature on the behavioral view of R&D investments decisions will lead to two hypotheses that reflect the existing research, consistent with a universal model. While these first two hypotheses are not entirely novel, testing them represents a contribution to research through replication. Second, a review of selected and relevant literature on national culture, and the social psychology research on Asian and western cultural clusters specifically, will lead a hypothesis on a direct effect of culture on R&D investment decisions, consistent with a dispositional model. Third, the behavioral view of R&D investments will be discussed with reference to Asian and western cultural clusters, and two hypotheses on moderating roles for culture will be offered, consistent with a dynamic model. Together, the fourth and fifth hypotheses represent new ideas and theoretical contributions to the behavioral view on R&D investments. Following the theoretical discussion, the hypotheses will be tested in the context of R&D investments of firms from multiple countries in the global automotive industry between 2003 and 2015.

3.3 Background

3.3.1 Universal model: behavioral view of R&D investment decisions

In the behavioral view, researchers have argued that decision makers use general organizational goals, cast as aspirations, when making decisions (Greve, 2003b). This notion is different from the classical economics assertion that decisions are made to achieve specific optimal configurations and performance in organizations, and behavioral researchers have argued that general organizational goals are more realistic because multiple decision makers within organizations are often forced to bargain and satisfice (Cyert & March, 1963). Additionally, simple decision rules may be necessary when boundedly rational decision makers lack perfect information (Levitt & March, 1988; Payne, Bettman, & Johnson, 1988; Sterman, 1989). In other words, decision makers may not have the necessary data or cognitive capacity to make optimal decisions. Hence, decision makers are likely to use simple aspirational reference points as goals in decision making, and these aspirations correspond to the lowest level of performance tolerable to them (Schneider, 1992).

These performance aspirations may be defined in terms of performing at least as well as other firms in the same industry, or other firms that share similar characteristics (Clark & Montgomery, 1998; Lant & Baum, 1995). Aspirations may also be cast in terms of matching or exceeding the performance of the focal firm in a previous time (Greve, 2003b; Lant, 1992; Lant & Montgomery, 1987). In either case, the resulting aspirations represent simple decision rules, and so long as these aspirations are satisfied, decision makers will perceive goal attainment.

If performance is below the aspirational levels of performance used by decision makers, they are likely to perceive a problem (Baum et al., 2005; Greve, 1998). In this case, decision makers may perceive a loss situation (Greve, 2003b) and they are likely to place a greater level of emphasis or importance on reducing or eliminating the loss (Kahneman & Tversky, 1979). Hence, managerial tolerance for risk will increase in loss situations (Bromiley, 1991; Heath, Larrick, & Wu, 1999; Kuehberger, 1998). On the other hand, if aspirations are exceeded, decision makers

should see less value in additional gains (Kahneman & Tversky, 1979), and their tolerance for risk should decrease.

When performance falls below aspirations it is perceived as intolerable, and this perception coupled with an increased managerial tolerance for risk is likely to cause managers to search for solutions to the performance shortfall (Barnett & Sorenson, 2002; Ben-Oz & Greve, 2015; Cyert & March, 1963, Greve, 2003b; Madsen & Desai, 2010; Parker, Krause, & Covin, 2015). In many contexts, this problemistic search process involves increased R&D expenditures (e.g., Alessandri & Pattit, 2014; Chen, 2008; Chen & Miller, 2007; Chrisman & Patel, 2012; Gomez-Mejia et al., 2014; Greve, 2003a; Kim, Kim & Lee, 2008; O'Brien & David, 2014; Patel & Chrisman, 2014). Hence, from the perspective of a universal model, where culture has little or no effect on behavioral explanations for R&D expenditures, the following hypothesis is offered.

Hypothesis 1: There is a positive relationship between shortfalls in actual performance vis-à-vis aspirations and R&D expenditures.

In addition to shortfalls between actual performance and aspirations, researchers adopting the behavioral view have argued that excess organizational resources, or organizational slack, can lead to organizational search behaviors (Cyert & March, 1963; Greve, 2003a). When firms have resources in excess of what is needed to service debt, operate, and pay for expenses, decision makers may perceive that these excess resources can insulate their organizations from the unknown (Greve, 2003b). For example, when organizations have organizational slack, decision makers may be less concerned with unexpected environmental instability, because the slack creates the perception of a buffer between environmental instability and worse case scenarios, and this decreases any hesitation about risk taking (Geiger & Cashen, 2002; Sharfman, Wolf, Chase, & Tansik, 1988). It follows that, researchers focusing on the behavioral theory of the firm have argued for relationships between excess resources, or organizational slack, and search behavior (Greve, 2003a; Lin, Cheng, & Liu, 2009; Tseng et al., 2007). In many contexts, this slack search process involves increased

R&D expenditures (e.g., Chrisman & Patel, 2012; Chen & Miller, 2007; Greve, 2003a; Kim, Kim & Lee, 2008; Wu & Tu, 2007). Again, from the perspective of a universal model, the second hypothesis in this analysis is consistent with the expectation of past research.

> *Hypothesis 2: There is a positive relationship between organizational slack and R&D expenditures.*

3.3.2 Dispositional model: culture and R&D investment decisions

Several researchers have also set out to explore possible direct effects of national culture on R&D investments (e.g., Couto & Vieira, 2004; Nakata & Sivakumar, 1996; Shao, Kwak, & Zhang, 2013; Varsakelis, 2001) or innovative activities (e.g., Efrat, 2014; Nam et al., 2014; Prim et al., 2017). For example, Varsakelis (2001) and Efrat (2014) have both indicated that there is a main effect for national culture on the R&D investments. Similarly, Li and colleagues (2013) argued that national culture can have a direct effect on corporate risk taking in general, which can include R&D investments. This notion of a direct effect of national culture on R&D investment decisions suggests that culture will often influence these decisions, because decision makers are always embedded in culture. Hence, this body of research is consistent with the dispositional model of culture's role in decision making.

More often than not, this body of research has hypothesized direct relationships between specific cultural dimensions, such as those introduced by Hofstede (1980) and the GLOBE study (House et al., 2004). And in particular, researchers have tended to focus on the distinction between individualism and collectivism and a direct effect on R&D, as well as a direct effect of uncertainty avoidance on R&D (e.g., Couto & Vieira, 2004; Shao, Kwok, & Zhang, 2013). Individualism describes a cultural preference for independence and differentiation, and uncertainty avoidance describing a cultural preference for avoiding ambiguity and risk (Hofstede, 1980). However, Nakata and Sivakumar (1996), highlight the difficulty in offering coherent theoretical expectations on relationships between

specific cultural dimensions and R&D investments or activities, when individual dimensions can have clear and valid competing theoretical relationships with R&D investments and activities. For example, the authors note that highly individualistic cultures are more likely to allow for R&D project champions to push investments as a result of personal visions, and individualistic cultures may allow for greater levels of autonomy that facilitate R&D. Alternatively, highly collectivistic cultures are more likely to facilitate the clan-like characteristics required for organization-wide recognition and support for the benefits of R&D investments. These two ideas offer reasonable, and competing, expectations on a direct relationship between individualism/collectivism and R&D investments, and the authors offer additional competing expectations for other cultural dimensions. Nakata and Sivakumar (1996) suggest that these competing expectations can offer clearer insights if we consider the impact of culture on the *success* of R&D projects at different stages, but this does not entirely resolve the problem of competing (and valid) expectations on the relationships between individual cultural dimensions and R&D *investment decisions*.

In addition, the very existence of multiple cultural dimensions illustrates that national culture in not one-dimensional. As a result, it is difficult to clearly anticipate R&D investment decisions in a specific national culture based upon a single dimension, because another dimension within the same culture may suggest a different R&D investment decision outcome. For instance, at the national level, Prim and colleagues (2017) find that uncertainty avoidance is negatively related to the development of technology and knowledge in countries, and at the same time long-term orientation results in a positive association. Yet, these two dimensions can be positively correlated in some cultures, such as cultures with a common Confucian history, leading to ambiguity on any expectation regarding R&D investment decisions.

Perhaps more importantly, the concept of cultural dimensions may be poorly suited for research questions seeking to understand variance in managerial decisions (Caprar et al., 2015), such as R&D investment decisions across cultures. As noted above, Nakata and Sivakumar (1996) illustrate that cultural dimensions often offer insights into success from strategic decisions, but are not as consistent when it comes

to predicting actual decisions. Potentially, this may be because cultural dimensions have primarily focused on measuring separate values within countries (e.g., Hoftsede, 1980), and are relevant to the fit between organizational strategies and the different values in which it is embedded. However, for decision making, relied upon schema, norms, and complex cognitive structures within a culture (Leung & Morris, 2015) may be more relevant. This notion is similar to what Earley (2006) refers to as the "gestalt" approach, where cultures are examined as whole intact systems, rather than separate component parts, as in the values-based cultural dimensions approach. From the gestalt approach, the specifics of different cultural systems should be used to inform expectations on specific relationships. It follows that given the previously discussed problems with using existing cultural dimensions to predict decision-making specifically, it would be more appropriate to adopt a gestalt-type framework for understanding relationships between complex cultural systems and R&D investment decisions.

Potentially, this gestalt approach could be achieved by considering culture at a higher level of analysis, in terms of cultures that share similarities. This idea is, in fact, not foreign in the cultural dimensions literature, as researchers who have unpacked the construct of national culture to understand dimensions, have also noted the existence of clusters of national cultures which share characteristics in terms of the complex combinations of multiple dimensions (e.g., Hofstede, 2001; House et al., 2004). Ronen and Shenkar (2013), note that the common characteristics among nations in a cultural cluster go well beyond familiar cultural dimensions, and can include common languages, historical interactions, and religions, but these clusters can be identified by common patterns in the configurations of their cultural dimensions. By asking how cultural cluster membership relates to R&D investment decisions, one can effectively ask how a complex cultural system relates to R&D investment decisions.

In the last two decades, cross-cultural psychologists have directed their attention to better understanding cognitive differences in clusters and have identified consistent differences between individuals and groups from Asian cultures, who are socialized into a system of holistic thought patterns, versus individuals and groups in

western cultures, who are socialized into focused systems of analytic thought patterns (e.g., Imada, Carlson, & Itakura, 2012; Masuda et al., 2008; Masuda & Nisbett, 2001; Nisbett et al., 2001). This East-West cultural distinction is consistent with a gestalt approach, and offers an opportunity to view culture in a more complex and integrated way, that also accounts for socialized thought patterns and norms. Specifically, Asians are more likely to direct their attention to the greater context and to explain events by linking them to this context (Masuda & Nisbett, 2001; Senzaki, Masuda, & Ishii, 2014). On the other hand, Westerners are more likely to direct their attention to focal objects, and to explain events by linking them to the objects (Masuda & Nisbett, 2001).

One potential explanation for these differences is that Asian cultures tend to score higher on collectivism, so their social environments are more complex in that individuals are hyper aware of role relations, leading to greater attention being directed towards the social context in which they are embedded (Miyamoto & Nisbett, 2005; Nisbett & Masuda, 2003). On the other hand, Western cultures tend to be more individualistic, relative to Asian cultures, so individuals face fewer social constraints and are freer to focus on their own goals related to focal objects (Miyamoto & Nisbett, 2005; Nisbett & Masuda, 2003). Additionally, psychologists have found that socialization into one of these two systems of thought occurs early in an individual's childhood (Imada, Carlson, and Itakura, 2012), and starts to take root as early as ages 5 to 7 (Duffy et al., 2009).

Taken alone, without any of the antecedents to R&D investment decisions identified in the behavioral view, R&D is a specific focal activity. So, considering the research on cognitive differences between the Asian and western cultural clusters, it is reasonable to expect western managers to be more attentive to organizational specifics and focused on R&D. Additionally, western managers may be more likely to define and pursue goals in relation to specific objects (Nisbett & Masuda, 2003), so this analysis anticipates a positive direct relationship between a firm being embedded in a western culture and R&D investments. Or, there should be a negative relationship between membership in the Asian cultural cluster and R&D investments. This expected direct effect is not moderated or mediated by situational factors, so it is

consistent with the dispositional model of culture's role in decision making, and is formalized in the third hypothesis of this analysis.

> *Hypothesis 3: There is a negative relationship between an organization being embedded in an Asian culture, and R&D investments.*

3.3.3 Dynamic model: Culture and the behavioral view of R&D

So far, this discussion of R&D investments has adopted two very different perspectives. In the universal model, culture is not included as a factor that comes to bear on R&D investment decisions, but rather there are behavioral explanations that are assumed to be universally generalizable. Alternatively, the dispositional model assumes that culture has a direct effect on R&D investment decisions. Yet, as mentioned in the introduction, there is a third model of culture's role in decision making which seeks a middle ground between these two perspectives, and this model has not yet been fully applied to R&D investment decisions. This third model, the dynamic model, is consistent with the observations of Schneider and De Meyer (1991), who note that in general national culture may impact interpretations of and responses to strategic issues that arise. From this perspective, culture would have a role in R&D investment decisions, which differs from the universal model, but the effect of culture on R&D investment decisions would not entail a direct effect as in the dispositional model. Rather, the role of culture in R&D investment decisions would depend upon strategic issues that arise.

This notion is relevant to insights from the previously described research on Asian versus western cultural clusters with differing patterns of thought and attention. Research on the difference between holistic versus analytic cultures suggests that managers from these two different cultural clusters may pay attention to *different* types of strategic issues that arise. For example, in experiments conducted by social psychologists (e.g., Boduroglu, Shah, & Nisbett, 2009; Masuda & Nisbett, 2006; Miyamoto, Nisbett, & Masuda, 2006), researchers find differences described in terms of a change-blindness paradigm, where individuals from western countries, which

emphasize focused analytical attention, are more sensitive to changes in focal objects, but less aware of changes to the context. Researchers have even used MRI scans to observe neural function while participants processed different pictures, and results suggest that culture affects neural function and causes westerners to activate more regions of the brain associated with object processing (Gutchess et al., 2006). On the other hand, individuals from Asian countries are more sensitive to changes in the context or periphery, and less sensitive to changes in focal objects. With regards to the current analysis, these results suggest that members of the western cultural cluster should be more sensitive to changes in organizational performance, because they pay more attention to focal objects, such as the organization (Masuda & Nisbett, 2001). In addition, because managers in these cultures are less constrained by social context, they should be more focused and direct with regards to their goals for the organization (Nisbett & Masuda, 2003). At the same time, managers in these cultures should be blind to, or less attentive to, changes in the greater context in which the organization is embedded. On the other hand, members of the holistic (Asian) cultural cluster should be more sensitive to changes in the greater context in which the organization is embedded, and blind to, or less attentive to, changes in the focal organization.

Given that behavioral explanations for R&D investment decisions begin with either performance shortfalls relative to aspirations, or organizational slack, it is reasonable to anticipate that western managers will be more sensitive to the triggers of R&D investment decisions because they relate to the focal object, the firm. On the other hand, Asian managers may be less sensitive to these changes in the focal object, or the organization, as they direct their attention to the greater context in which the organization is embedded. Hence, these ideas suggest a dynamic role for culture in the behavioral explanations for R&D investment decisions, where Asian managers will be less sensitive to shortfalls in aspirational performance or excess resources, and will be less likely to make greater investments in R&D. Hence, the fourth and fifth hypotheses in this analysis are consistent with the dynamic model of culture's role in decision making, as follows.

Hypothesis 4: The positive relationship between shortfalls in actual performance vis-à-vis aspirations and R&D expenditures, is negatively moderated by a firm's status as being embedded in the Asian cultural cluster.

Hypothesis 5: The positive relationship between organizational slack and R&D expenditures, is negatively moderated by a firm's status as being embedded in the Asian cultural cluster.

3.4 Methodology

3.4.1 Data

To test the above hypotheses, this analysis focuses on the global automotive industry, for several reasons. To begin with, firms in the automotive industry often retain strong national identities even though the industry itself is global (Schulze, MacDuffie, & Taube, 2015). This combination of local influence and global competitive industry structure suggests that the global automotive industry is especially well suited to the current study, because firms should be comparable across borders, but at the same time there should be cultural diversity when comparing the cultural backgrounds of their managerial ranks. In addition, within the automotive industry firms often emphasize competition through innovation and the development of technology (Hashmi & Van Biesebroeck, 2016; Schulze et al., 2015). Data suggests that the historical arch of the global automotive industry has been dominated by Europe, North America, and Japan (Sturgeon et al. 2009), but non-Japanese Asian automotive firms that compete through internal R&D have only become prevalent in approximately the last 15 year. For example, Xi and colleagues (2009) trace the history of the Chinese automotive industry back for many decades, but they note that a period of "autonomous innovation" for Chinese automotive companies only began in the early 2000's. Hence, the sampling frame for this analysis includes firm-year observations between 2003 and 2015, because this period covers the start of the

period in which firms from more of the Asian cultural cluster (other than just Japan) began to participate and compete through autonomous innovation, including investments into R&D.

Data were collected from a number of sources. To begin with, data on annual R&D expenditures, employees, and total income for automotive firms was coded using the European Commission's annual *EU Industrial R&D Investment Score Board*. In addition, data on aggregate global automobile production was coded from the Organisation Internationale des Constructeurs d'Automobiles' (OICA) annual *Correspondents' Survey*, and financial reporting data on firms was accessed and coded from the Mergent Online database, which compiles annual reports from companies around the world and aggregates their yearly financial data. Firms that were founded in one country and subsequently acquired by a firm in another country were not included in the sample after their acquisition. For example, Volvo was founded in Sweden in 1927, and was sold to the Ford Motor company of the US in 1999, and then re-sold to the Chinese automotive firm Geely in 2010, and Volvo was not included in the sample because it was already owned by a foreign (i.e., non-Swedish) company at the start of the sampling frame. The resulting database consists of an unbalanced panel with a total of 85 different firms and 613 firm-year observations, and the distribution of firms by country are presented in table 3.1.

Table 3.1 Distribution of countries and total firms in sample

Asian countries* (firms)	**Western countries (firms)**
Japan (32)	USA (18)
China (8)	Germany (9)
India (2)	France (6)
Taiwan (1)	Italy (3)
	Austria (2)
	UK (2)
	Finland (1)
	Sweden (1)
Total Asian countries = 4	Total western countries = 8
Total Asian firms = 43	Total western firms = 42

**There was significant participation of Korean firms in the global automotive industry over this period, but limitations on the availability of data for some variables required in this analysis meant that no Korean companies were included.*

3.4.2 Dependent variable

Consistent with past research (e.g., Chen & Miller, 2007; Chrisman & Patel, 2012; O'Brien & David, 2014), the dependent variable in this analysis is *R&D Intensity*, or the ratio of a firm's total R&D expenditures in a focal year over its total sales revenues in the same year. As Greve (2003a) points out, a single measure of R&D intensity may not reveal all the investments that a firm made in R&D, because some resources devoted to R&D efforts may be non-financial. However, R&D intensity may reflect the total adjustments in the problemistic and slack search of a firm, hence, one-year lagged R&D intensity was adopted in this analysis to measure R&D investments in the year following a focal firm-year. It is also worth noting that budget allocation processes are often inertial, so consistent with the approach taken in past research (e.g., Greve, 2003a; O'Brien and David, 2014), models in this analysis also include the focal firm's R&D intensity in the previous year as a control variable for first-order autocorrelation.

3.4.3 Independent variables

The first independent variable of interest is performance relative to aspirations, and consistent with past research (e.g., Bromiley, 1991; Chen, 2008; Greve, 2003a; O'Brien & David, 2014), this analysis measures performance using a firm's return on assets (ROA), because ROA is not sensitive to distortions that can occur as a result of differing levels of financial leverage in firms across the sample. Given this measure, a spline function was created (e.g., Greve, 2003a; Chen & Miller, 2007; O'Brien & David, 2014) to estimate separate slopes for performance below and above aspirations. This procedure is illustrated in equations 1 and 2 below, presented in the form of 'if, then' coding statements.

To code *Performance* > *Aspirations*:

If, $(\mathrm{ROA}_{t,j} - \overline{\mathrm{ROA}}_t) > 0$, then coded as $(\mathrm{ROA}_{t,j} - \overline{\mathrm{ROA}}_t)$, otherwise coded as 0.

(1)

To code *Performance* < *Aspirations*:

If, $(\mathrm{ROA}_{t,j} - \overline{\mathrm{ROA}}_t) < 0$, then coded as $(|\mathrm{ROA}_{t,j} - \overline{\mathrm{ROA}}_t|)$, otherwise coded as 0.

(2)

Specifically, where *t* is a focal year and *j* is a focal firm, to code performance above aspirations, if a firm's ROA minus the average sample ROA excluding the focal firm, was greater than zero, then this value was coded, otherwise, if the value was negative or zero it was coded as zero. To code performance below aspirations, if a firm's ROA minus the average sample ROA excluding the focal firm was negative, then the absolute value was coded, otherwise, if the value was positive or zero it was coded as zero. Notably, these spline functions capture performance relative to social aspirations, but the same process was repeated using a focal firm's ROA in the previous year, instead of the sample average ROA excluding the focal firm's ROA. This measure captured historical aspirational performance, but was not significant in any of the models and was therefore dropped from the analysis. Greve (2003b) notes that the use of social versus historical aspirations are industry and context specific, and this result suggests that automotive firms tend to focus more of comparisons with competitors, as might be expected in a highly competitive global industry. Next, consistent with past research (e.g., Greve, 2003a; Kim, Kim & Lee 2008; O'Brian & David, 2014; Patel & Chrisman, 2014) key measures of organizational slack, were created using yearly firm data. First, to measure *Absorbed Slack*, the ratio of selling, general and administrative expenses to total sales revenues in a year was used (O'Brien & David, 2014). Next, to measure *Unabsorbed Slack*, the ratio of a firm's quick assets to total liabilities was used (Greve, 2003a; Kim, Kim, & Lee, 2008). And finally, *Potential Slack* was measured as the ratio of a firm's total debt to equity (Bromiley, 1991; O'Brien & David, 2014). Each of these measures of slack could

indicate whether there are excess resources required for firms to engage in slack R&D search.

And finally, to code a firm's cultural cluster status, a dummy variable was used to indicate if a firm was from the *Asian* cultural cluster (1), with western cluster membership being the reference category (0). As a point of interest, and to test the robustness of this categorization, the GLOBE (House et al., 2004) dimensions for practices were coded for each observation and a K-means cluster analysis was conducted to identify two clusters, and the clusters reflect the Asian-western cultural cluster memberships illustrated above in table 3.1 perfectly.

3.4.4 Control variables

In addition to the key independent variables in this analysis, a small number of firm and industry control variables were included, and these were based upon Greve's (2003a) study, which first empirically explored the behavioral factors related to R&D investments. Specifically, firm size may serve as a proxy for additional resources that are not reflected in the measures of slack, so the logarithm of the total number of *Employees* in a firm in each year was included (Greve, 2003a; Patel & Chrisman, 2014). Additionally, to control for industry conditions, the *Total Industry Production*, or total number of vehicles produced, in the global automotive industry was included as a control variable (Greve, 2003a). Additionally, the percentage increase in the sum of total incomes for all the firms in the sample over the prior year was included as a measure of *Growth in Industry Income* (Greve, 2003a). To summarize, these variables and operational definitions are listed in table 3.2, along with data sources used to calculate the variables and representative references for past studies which have used the same measures.

Table 3.2 Variables, operational definitions, and data sources

Variable	Operational definition	Data Sources	References
R&D Intensity	$(100 * \frac{\text{R\&D expenditures}_{tj}}{\text{Total Revenues}_{tj}})_{t+1,j}$	European Commission's Annual "EU Industrial R&D Investment Score Board"	Chen, 2008; Chen & Miller, 2007; Chrisman & Patel, 2012; Greve, 2003a; O'Brien & David, 2014
Employees	$\text{Log}(\text{Total Employees})_{t,j}$	European Commission's Annual "EU Industrial R&D Investment Score Board"	Greve, 2003a; Patel & Chrisman, 2014
Total Industry Production	Total world motor vehicle production	Annual correspondents' survey from OICA	Greve, 2003a
Growth in Industry Income	$\sum \text{Total Income}_{t,j\ldots n}$	"EU Industrial R&D Investment Score Board"	Greve, 2003a
Absorbed Slack	$\frac{\text{Selling, General \& Admin. Expenses}_{t,j}}{\text{Total Revenues}_{t,j}}$	Mergent Online	Greve, 2003a; O'Brien & David, 2014; Patel & Chrisman, 2014
Unabsorbed Slack	$\frac{\text{Quick Assets}_{t,j}}{\text{Total Liabilities}_{t,j}}$	Mergent Online	Greve, 2003a; Kim, Kim & Lee 2008; O'Brian & David, 2014; Patel & Chrisman, 2014
Potential Slack	$\frac{\text{Total Debt}_{t,j}}{\text{Total Equity}_{t,j}}$	Mergent Online	Bromiley, 1991; Greve, 2003a; O'Brien & David, 2014; Patel & Chrisman, 2014
Performance > Aspirations	If, $(\text{ROA}_{t,j} - \overline{\text{ROA}}_t) > 0$, then coded as $(\text{ROA}_{t,j} - \overline{\text{ROA}}_t)$, otherwise coded as 0.	Mergent Online	Chrisman & Patel, 2012; Greve, 2003a; O'Brien & David, 2014
Performance < Aspirations	If, $(\text{ROA}_{t,j} - \overline{\text{ROA}}_t) < 0$, then coded as $(\lvert\text{ROA}_{t,j} - \overline{\text{ROA}}_t\rvert)$, otherwise coded as 0.	Mergent Online	Chrisman & Patel, 2012; Greve, 2003a; O'Brien & David, 2014
Asian	Dummy variable, 1 = Firm based in an Asian country 0 = Firm based in a western country	Cultural relevance of clusters confirmed with K-means cluster analysis (2 clusters) using dimensions from the GLOBE study (House et al., 2004).	Masuda & Nisbett, 2001/2006; Nisbett & Masuda, 2003
Autocorrelation Control	$(100 * \frac{\text{R\&D expenditures}_{tj}}{\text{Total Revenues}_{tj}})_{t-1,j}$	"EU Industrial R&D Investment Score Board"	Greve, 2003a; O'Brien & David, 2014

3.4.5 Analysis

A correlation matrix, along with descriptive statistics, as presented in table 3.3, does not indicate any concerning correlations between independent variables. However, as a point of interest, variance inflation factors (VIFs) where calculated using pooled versions of the models in this analysis, and the highest VIF was 1.46 for performance below aspirations, which is well below the commonly used thresholds of 4 or 10 (O'Brien, 2007). Following the approach of Greve (2003a) models with variable effects were compared to models with fixed effects, and the variable effects were significant but the fixed effects were not. Hence, models with random effects for firms were used in this analysis. In addition, the target of inference for this analysis is in essence a population of clusters, rather than simply clusters in the dataset, lending credence to the choice of random effects models.

Table 3.3 Descriptive statistics and correlation matrix

	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9
1.R&D Intensity	4.03	3.20	0.42	66.29	-								
2.Employees	4.50	0.55	3.15	5.77	0.03	-							
3. Total Industry Production	76.55	10.44	60.49	90.71	0.00	0.02	-						
4. Growth in Industry Income	8.37	59.54	-112.87	157.10	0.06	0.02	0.39	-					
5.Absorbed Slack	0.13	0.07	0.01	0.56	0.27	-0.16	-0.06	0.00	-				
6.Unabsorbed Slack	1.25	3.88	0.23	86.68	0.41	0.08	-0.02	0.00	0.10	-			
7.Potential Slack	1.36	4.99	0.00	78.02	0.29	0.12	-0.05	0.00	0.10	0.00	-		
8.Performance > Aspirations	1.65	2.99	0.00	26.45	0.18	-0.17	-0.05	-0.04	-0.06	0.00	0.09	-	
9.Performance < Aspirations	1.85	4.79	0.00	51.15	0.50	-0.08	-0.03	-0.00	0.10	0.17	0.23	-0.06	-
10.Asian	0.47	0.49	0.00	1.00	-0.04	-0.07	0.07	0.00	0.02	0.02	-0.09	-0.07	-0.07

3.5 Results

The three models used to test hypotheses in this analysis are presented in table 3.4. To begin with, consistent with past research (e.g., O'Brien & David, 2014) a focal firm's R&D intensity in the previous year, used as a control for first-order correlation, was positive and significant ($p<0.001$) across all the models, supporting the expectation that there is some inertia in the R&D budgeting process. However, none of the other control variables –*Employees, Total Industry Production, and Growth in Industry Income*- were significant in any of the models, and once again, this result is consistent with past empirical research exploring the behavioral factors related to R&D investments (e.g., Greve, 2003). The lack of significance on these control variables suggests that in this empirical context, industry conditions and firm size may not be primary factors in R&D investment decisions.

With regards to the spline function used to capture performance relative to aspirations, performance above aspirations is not significant in any of the models, but the direct effect of performance below aspirations results in a positive and significant ($p<0.001$) estimate across all the models. This result suggests an overall relationship where performance shortfalls vis-à-vis aspirations are positively associated with R&D investment in the subsequent year. This result supports hypothesis 1. Next, estimates for unabsorbed slack and potential slack are not significant in any of the models, suggesting that these types of organizational slack are not associated with R&D investments in the context of the global automotive industry. However, estimates for absorbed slack are positive and significant across all three of the models, suggesting that absorbed slack is positively associated with R&D investments in the subsequent year. The lack of significant on unabsorbed slack and potential slack, along with significant estimates for absorbed slack is consistent with the findings of past research in a different empirical context (Greve, 2003a). Overall, these results support hypothesis 2, when organizational slack is measured as absorbed slack. Together, support for hypotheses 1 and 2 lend support for a universal model of R&D decision making, where direct relationships exist, even when controlling for culture, as in model 2.

Table 3.4 Culture and behavioral factors related to R&D investments

	1	2	3
Intercept	0.479	0.624	-0.354
	(1.387)	(1.397)	(1.425)
Employees	0.299	0.284	0.443
	(0.233)	(0.233)	(0.239)
Total Industry Production	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Growth in Industry Income	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)
Absorbed Slack	5.869***	5.738***	9.722***
	(1.707)	(1.701)	(2.083)
Unabsorbed Slack	0.008	0.007	0.007
	(0.024)	(0.024)	(0.023)
Potential Slack	-0.017	-0.019	-0.017
	(0.019)	(0.019)	(0.018)
Performance > Aspirations	0.057	0.055	0.054
	(0.035)	(0.035)	(0.034)
Performance < Aspirations	0.078***	0.076***	0.105***
	(0.023)	(0.023)	(0.026)
Asian		-0.202	1.532**
		(0.265)	(0.567)
Performance < Aspiration * Asian			-0.098*
			(0.049)
Absorbed Slack * Asian			-11.724**
			(3.693)
Autocorrelation Control	0.285***	0.285***	0.262***
	(0.020)	(0.020)	(0.021)
R^2	0.396	0.399	0.408
Adjusted R^2	0.390	0.391	0.399
F-Statistic	43.898	39.846	34.429
df	9	10	12
Wald test		Δ2~3	Δ3~4***

*Notes: *,**,*** significant at p<0.05, p<0.01, and p<0.001 respectively. Random effects models. An unreported model that only included the three control variables and the autocorrelation control was ran and none of the three control variables resulted in significant estimate. A Wald test showed that model 1 was an improvement over the unreported reduced model (p<0.001). Interaction terms between the Asian dummy variable and unabsorbed slack, as well as potential slack, were included in unreported models and the resulting estimates were not significant.*

Next, in model 2 the dummy variable for a firm originating from a country in the Asian cultural cluster does not result in a significant estimate. This result does not support the notion of a dispositional model in this empirical context, where culture would have a direct relationship with R&D investments, controlling for other factors. This result also means that hypothesis 3 is not supported. However, the interaction

term for performance below aspirations and Asian cultural cluster membership is negative and significant ($p<0.01$). This result lends support to the idea that Asian managers will be less attentive to performance relative to aspirations, and may be more concerned with changes in the contextual environment surrounding the organization. As a result, membership in the Asian cultural cluster negatively moderates, or reduces, the positive relationship between shortfalls in actual performance relative to aspirations and R&D investment decisions. This result supports hypothesis 4. And finally, the interaction term for absorbed slack and Asian cultural cluster membership is also negative and significant ($p<0.001$). Once again, this result suggests that, relative to western managers, Asian managers may be less focused on the focal object/organization in this empirical context, and may be directing their attention more to the context surrounding the organization. Hence, membership in the Asian cultural cluster negatively moderates, or reduces, the positive relationship between absorbed slack and R&D investment decisions. This result offers support for hypothesis 5 and, along with support for hypothesis 4, suggests that there is validity to a dynamic model of culture's role in the R&D decision-making process.

3.6 Conclusion and Discussion

The behavioral explanations for R&D investment decisions appear to be consistent with the universal model in this empirical context, where relationships endure, even after controlling for culture. Performance shortfalls relative to aspirations and absorbed organizational slack appear to be positively related to R&D intensity across a sample of automotive firms from different nations. However, culture also appears to have a dynamic role in the model, in that the positive relationships between performance shortfalls, slack, and R&D investments are negatively moderated by a firm being embedded in an Asian culture, as managers in these cultures may be less sensitive to changes in the focal organization, but will instead be more attentive to the context in which the organization is embedded. Together, these ideas lend support for the key ideas communicated in the literature on behavioral explanations for R&D

investments, but also adds a layer of nuanced understanding that suggests these relationships are not reversed or blocked in some way by culture, but may be moderated by culture.

This nuanced understanding represents a contribution to the literature, because empirical behavioral research on R&D investments has not, until now, considered the potential role of culture, despite the link between culture and strategic decision making (Hennart & Larimo, 1998; Newman & Nollen, 1996; Schneider & De Meyer, 1991). This research is also practically relevant, because there are many industries which have become global in nature, and developing a better understanding of how managers from differing nations make R&D investment decisions is one explanation for variance in R&D investments, which have competitive implications as well as implications for consumers and society. Additionally, for practitioners, the effect of Asian-western differences in attention on offers potential points of caution. That is, if western managers are hyper attentive to the focal organization, at the expense of attention to the greater context, this means that they may be making R&D investment decisions without fully considering all the relevant data. Similarly, if Asian managers have a myopic focus on the context, at the expense of attention to the focal organization, they may be making R&D investment decisions that do not fully account for relevant information.

Of course, all research has limitations, and this analysis is not an exception. Out of necessity, actual R&D intensity was used as a proxy for R&D investment decisions, yet, it is also possible that investment decisions were made but not acted upon. This limitation reflects a broader issue with empirical research in the BTF and the PFM, as this research typically measures performance outcomes and actual activities at the firm level, but cannot usually measure the theoretical mechanisms leading to decisions and the cognitive process of decision-making itself. That is managerial attention, risk tolerance, problemistic search, and cognition are mostly unobservable and occur within the so-called ‘black box’ of organizations. Just like most empirical research that relies upon samples using objective data from many real-world firms, this analysis can be criticized based upon its level of internal validity. Yet at the same time, this approach affords some level of confidence in terms of

external validity, or generalizability, to the population of interest, which is the global automotive industry in this case. The alternative approaches could include experimental design or detailed case studies, but these approaches are open to criticism for the opposite reason: they have a high level of internal validity but perhaps less external validity or generalizability. For both research on the Performance Feedback Model and East-West thought processes, the best possible outcome for the literature may be to have studies which adopt both approaches in different contexts and with multiple rounds of replication, so that we can reasonable assess the fidelity of these ideas based upon a foundation of empirical studies that have high levels of external validity in different contexts, and experimental or qualitative studies that have high levels of internal validity. And indeed, both the literature on East-West differences in attention and cognitive patterns and the literature on the PFM have included multiple empirical studies using firm data, qualitative analyses, and experimental designs. Hence, if the current analysis is viewed as a contribution to two broader bodies of literature, the issue of measuring firm-level triggers and outcomes, rather than managerial cognition per se, is not a concern.

An additional limitation is that this analysis focuses on a specific industry, so one needs to exercise caution in generalizing the findings to other industrial contexts. However, this issue also represents an opportunity for future research that replicates this analysis in different contexts. This avenue of inquiry could be especially fruitful, because the dynamic model suggests that the role of culture on decision making is situational, and changing the industrial context of this research could uncover boundary conditions, or enhancing factors, on the dynamic role of culture in R&D investment decision making.

Chapter 4. Internationalization, strong future-time reference languages, and IP protection: evidence from global automotive suppliers

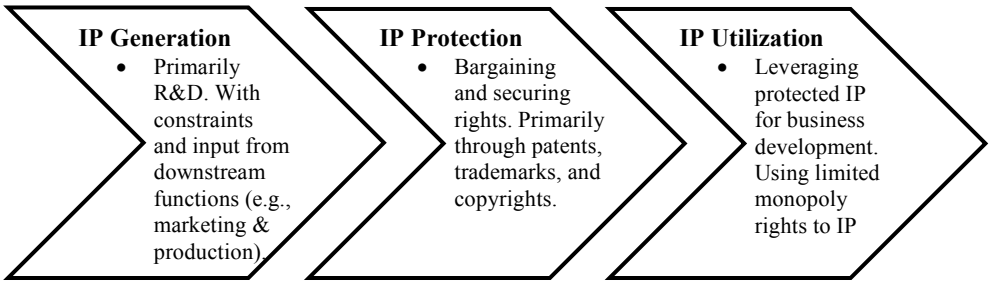
4.1 Abstract

Research has offered insights into factors associated with intellectual property (IP) generation and utilization. However, there are gaps in our understanding of factors related to IP *protection*. This analysis considers the roles of internationalization and home country language in the propensity of firms to protect IP through patenting. Specifically, this study posits a U-shaped relationship between internationalization and patenting activities. Additionally, research suggests that decision makers from countries with languages that oblige speakers to grammatically mark the future will engage in greater levels of temporal discounting. Hence, decision makers in these firms may discount the future value of generated IP and engage in less IP protection through patenting. Along the same lines, being from countries with these languages should weaken the U-shaped relationship between internationalization and patenting activities. Results from negative binomial models, using an unbalanced panel (n=567 firm-year observations) with data on 64 large automotive suppliers from 13 different countries between 2007 and 2016, support the notion that firms from countries with languages that strongly oblige speakers to grammatically mark the future engage in less patenting. Additionally, results suggest that there is a U-shaped relationship between internationalization and patenting, but only for firms from countries that do not always oblige speakers to grammatically mark the future.

4.2 Introduction

The objective of this analysis is to assess factors associated with the propensity of organizations to protect their intellectual property (IP) through patents. IP in modern organizations can be viewed in terms of an IP value chain (Reitzig & Puranam, 2009), as presented in figure 4.1. The first activity in this chain is IP generation, and the primary source of IP in many industries comes from research and development (R&D) activities (Acs, Anselin, & Varga, 2002; Lungeanu, Stern, & Zajac, 2016), often guided by inputs and constraints from activities further downstream, such as production and marketing (Reitzig & Puranam, 2009). The next activity in the IP value chain is IP protection, which is primarily done through bargaining and securing 'rights' (Reitzig & Puranam, 2009), usually in the form of patents, trademarks, or copyrights. In the context of large modern firms whose operations involve some type of manufacturing and/or technology, patents are the dominant IP protection vehicle. And finally, organizations manage and leverage IP to develop business opportunities and extract profits in the IP utilization portion of the IP value chain (Ernst, Conley, & Omland, 2016; Reitzig & Puranam, 2009).

Figure 4.1 The IP value chain



In terms of IP generation, the organizational learning literature has identified R&D as a key organizational search behavior conducted to solve problems or explore

for new opportunities (e.g., Chen, 2008; Chrisman & Patel, 2012; Greve, 2003a; O'Brien & David, 2014; Patel & Chrisman, 2014). At the same time, research has also explored IP utilization, often in terms of relationships between IP and firm performance (e.g., Artz, Norman, Hatfield, & Cardinal, 2010; Bloom & Van Reenen, 2002; Decarolis & Deeds, 1999; Ernst, 2001). However, with a few notable exceptions (e.g., Reitzig & Puranam, 2009; Thakur-Wernz & Samant, 2017), research has been slower to explore factors related to IP protection. In many cases, IP protection through patents gives organizations limited monopoly rights for up to 20 years (EPO, 2016; JPO, 2017; USPTO, 2015). These patents confer "the right to exclude others from making, using, offering for sale, or selling" the innovations for which patents are granted (USPTO, 2015). So, patents offer a critical link between organizational learning in the IP generation stage and extracting value in the future, during the IP utilization stage.

Given the importance of IP protection through patenting, there is a need to more fully explore the factors that relate to this phenomenon, beyond its link with R&D-based IP generation (Reitzig & Puranam, 2009). IP protection is an intermediate step between learning and subsequent benefits, so it is reasonable to explore the factors driving it in terms of those factors that might affect the perceived value of innovations in the present and *future*. The organizational learning literature has suggested that organizations may have less confidence in knowledge generated in various contexts (Haunschild & miner, 1997; Rhee, Kim, & Han, 2006). In the context of large organizations today, experiences in different contexts often results from globally disaggregated value chains and co-creation with international customers. Yet, the internationalization process literature (e.g., Johanson & Vahlne, 1977) suggests that greater levels of international experience lead to greater levels of confidence in resulting knowledge. Confidence in the value of IP generated should relate to the propensity to protect it through patenting, yet there appears to be conflicting expectations on how international experience might influence confidence in IP generated. Hence, the first research question in this analysis asks, what is the relationship between internationalization and IP protection through patenting?

Confidence in generated IP should play a role in decisions to protect IP through patents, but the perceived opportunities to extract profits from IP in the *future* should also play a role in patenting decisions. That is, a key benefit of patents is the ability to secure limited monopoly rights to profit from innovations for a specific period into the *future*. All else being equal, differences in the perception of the future value of patents should be partially explained by differences in temporal discounting, or the degree to which decision makers discount the value of returns as they become more temporally distant. Recent research has illustrated that decision makers systematically differ in the degree to which they engage in temporal discounting based upon how strongly their spoken languages grammatically mark the future (Chen, 2013). Hence, the second research question in this analysis asks, how does language relate to IP protection through patenting?

To answer these questions, this analysis is divided into several sections. The first section will draw upon selected and relevant literature to offer three hypotheses on relationships between internationalization, language, and IP protection through patenting. The second section will describe the empirical context and methodology used to test the three hypotheses. The third section will present the results of the analysis. And finally, a discussion and conclusion section will summarize the analysis, offer implications for practitioners and researchers, and identify key limitations.

4.3 Background

4.3.1 Internationalization and IP protection

Many researchers have sought to explore the consequences of international operations (e.g., Borda, Geleilate, Newburry, & Kundu, 2017; Contractor, Kundu, & Hsu, 2003; Semrau, Ambos, & Kraus, 2016). Perhaps the largest body of literature that fits this description is the literature that has sought to better understand the financial performance consequences of international operations (e.g., Berry & Kaul, 2016; Shin, Mendoza, Hawkins, & Choi, 2017; Tsai, 2014). Within this body of literature,

there have been inconsistent findings, with authors finding positive relationships (Han, Lee, & Suk, 1998), S-shaped relationships (Outreville, 2012), and even M-shaped relationships (Almodovar, 2012) between international operations and firm financial performance. This diversity in results has spurred some debate on what we can anticipate in terms of "general" outcomes of internationalization (Hennart, 2007). Transaction cost economics scholars argue that the configuration of a firm's international operations given its firm-specific transaction cost factors should allow us to explain outcomes of international performance, and especially *financial* performance outcomes (Hennart, 2007/2011). The alternative view is that outcomes from deploying resources, learning from international operations, and acquiring resources from international operations, will depend upon the stage, or degree, of internationalization of a firm (Contractor, Kundu, & Hsu, 2003; Kirca, Fernandez, & Kundu, 2016; Kundu, Kumar, & Kundu, 2007). This debate is difficult to resolve when *financial* performance is the key outcome of interests.

However, when we examine IP generation and protection as an outcome, theoretical expectations on the implications of international operations may become less controversial. If one defines performance in terms of the generation and protection of IP, then the argument that suboptimal configurations will hurt this type of performance is less clear. For example, within the organizational learning literature, March (1991) has argued that organizations may develop deeper and more complex knowledge stocks when some members of the organization have not been fully socialized into the organization's routines, and therefore learn at a slower rate. This source of inefficiency allows cumulative knowledge stocks, conceptualized as the organizational code (March, 1991), to adjust and improve. Other organizational learning theorists have highlighted the learning benefits of organizational failure (e.g., Haunschild & Rhee, 2004; Lant & Montgomery, 1987; Madsen & Desai, 2010), further highlighting the notion that a perfectly configured and optimally performing organization may not learn as much. Similarly, the performance feedback model literature suggests that poor financial performance can lead to expanded organizational learning activities (e.g., Greve, 1998, 2003a). Or, stated another way, when firms experience poor outcomes they may engage in search activities such as

R&D (Chen, 2008; Greve, 2003a; O'Brien & David, 2014), rather than engaging in superstitious learning that only results in incremental and related knowledge gains (Denrell & March, 2001; Rhee & Kim, 2015). These insights suggest that any theoretical expectation for a relationship between international operations and IP generation and subsequent protection should be based on the organizational learning literature, rather than the transaction cost economics literature.

Organizational learning outcomes can be embedded in organizational routines (Cyert & March, 1963), but they can also be technical in nature, as in the case of new product innovations created through R&D (Greve, 2003a), and legally protectable to some degree with patents (Thakur-Wernz & Samant, 2017). The conversion from unpatented IP to patented and protected IP should require some degree of confidence in the future value of the IP. That is, organizations must be confident that they can benefit from the limited monopolistic rights afforded by patents, before they dedicate resources to the patenting process. Yet, firms may not always be confident in the value of their IP. Research on potential 'deviant' learning effects (Zollo, 2009) suggests that sometimes new knowledge derived from experience and search activities can have negative consequences. For example, in order to benefit from experiential learning, including learning from international activities, firms must be able to sort through and understand what they have learned through experience (Levinthal & March, 1993). However, in the initial stages of international activities, resulting knowledge is likely to be different from the deep knowledge stocks that firms accumulated domestically, prior to engaging in international activities. Some research has suggested that new and varying experiences can decrease confidence in all a firm's knowledge stocks (Haunschild & Miner, 1997; Rhee, Kim & Han, 2006), because this variance makes it difficult to sort through and understand the different contours of this knowledge. Additionally, decision makers may view knowledge gained in one context as being somehow illegitimate if it is different from experience gained in another context (i.e., Deephouse, 1996; Zuckerman, 1999). Hence, firms may be less confident in the future value of knowledge, and by extension IP, because it was derived from both domestic and international experiences that differ in substantial ways. If firms are not confident in the value of their generated IP, they

should be less likely to dedicate resources to protecting it. If this is the case, new experiences abroad may negatively relate to IP protection through patenting.

As a hypothetical example, one can imagine suppliers in a global industry. Initially these suppliers generate IP in the context of domestic operations, which they protect through patents because they are confident in the future value of this IP. They are confident in this IP because experience has made them familiar with the needs and demands of their domestic customers. In some cases, IP may have even been influenced by their customers through co-creative processes. Now, imagine that these suppliers begin selling to international customers, with different needs and preferences. The resulting experience, knowledge, and IP generated to satisfy these needs, including IP generated through co-creative activities with very different customers, is likely to be different from the IP generated prior to engaging in international exchanges. This variance may make it difficult to sort through and understand the resulting knowledge stocks and generated IP, and may result in decreased confidence in the value of this IP. As a result, these suppliers may pursue fewer patents to protect what they have generated.

However, insights from the internationalization process model (Johanson & Vahlne, 1977; Li, Easterby-Smith, Lyles, & Clark, 2016) suggest that as firms gain greater levels of experience in foreign markets, the confidence that they have in the knowledge they gain from those markets also increases. And more recently, this stream of literature has shifted to further suggest that greater experience with relationships in foreign markets can lead to increased confidence in what is experienced (Johanson & Vahlne, 2009) and subsequently greater commitment. This new focus on the role of local relationships highlights the role of co-creation with local partners in host markets as one key mechanism through which local-market knowledge is created (Brouthers, Geisser, & Rothlauf, 2016). These notions both suggest that as firms gain greater levels of experience doing business in foreign markets, they should have greater confidence in the IP that they generate because of activities in these markets. If these firms have greater confidence in the future value of their IP, then it follows that they should engage in more patenting to protect it. To continue the earlier hypothetical example, if suppliers initially have little confidence

in new IP generated at early stages in internationalization, this lack of confidence should decrease and eventually reverse to become an increasing level of confidence as greater levels of international exchange and interaction lead to greater levels of knowledge and more extensive relationships. Suppliers will have a clearer idea of the value of generated IP in foreign markets, after they have more experience with these markets.

Taken together, the literature on deviant learning effects (e.g., Rhee, Kim, & Han, 2006; Zollo, 2009) coupled with the internationalization process literature (Johanson & Vahlne, 1977/2009), suggests a curvilinear relationship between internationalization and IP protection through patenting. Specifically, during early stages of international operations, variance in knowledge and generated IP may reduce confidence in the future value of IP, resulting in a decline in patenting. However, this negative trend should reverse itself at later stages in international operations, as firms develop greater levels of confidence in IP that is generated alongside greater levels of experience in foreign markets. As confidence in IP increases, firms should also be more confident in the future value of IP, and they should engage in more patenting to protect it. These ideas lead to the first hypothesis in this analysis:

> *Hypothesis 1: All else being equal, there is a U-shaped relationship between internationalization and the rate at which firms patent to protect IP.*

4.3.2 Language and IP protection

As discussed above, one of the key benefits of protecting IP through patents is the ability to extract profits via limited monopoly rights for a specified time into the *future*. If IP is viewed as being valuable, then future returns will justify patenting it. However, scholars have observed that people often discount future returns as they become more temporally distant (Ersner-Hershfield, Wimmer, & Knutson, 2009; Read, Frederick, Orsel, & Rahman, 2005; Trope & Liberman, 2003; Zauberman, Kim, Malkoc, & Bettman, 2009), a phenomenon known as temporal discounting. For

instance, an individual may delay saving for retirement because the future feels distant. This individual would be discounting the future value of retirement savings because the demands and wants of today seem more immediate, and potentially less abstract.

More recently, a nascent body of economics literature has suggested that language may enhance (reduce) this human tendency towards temporal discounting (Chen, 2013; Chen, Cronqvist, Ni, & Zhang, 2017; Mavisakalyn & Weber, 2017; Perez & Tavits, 2017; Roberts, Winters, & Chen, 2015). This is *one* idea that has emerged from the Linguistic Relativity Hypothesis (LRH), which posits that differences in the structures of languages relate to systematic differences in cognition and behavior (Mavisakalyn & Weber, 2017). In short, the LRH views language as having a complex relationship with culture, where language can influence cognition and behavior.

The idea that language can relate to temporal discounting comes out of the "linguistic-savings hypothesis" (Chen, 2013), which argues that language can result in biased perceptions of time *and* different levels of precision in beliefs about future rewards timing. Specifically, Chen (2013) notes that linguists distinguish between strong future-time reference (strong-FTR) languages and weak future-time reference (weak-FTR) languages. In strong-FTR languages, grammar dictates that speakers must grammatically indicate future events when stating predictions. An example of a strong-FTR language is English, where future predictions and plans almost always require a grammatical future marker (Copley, 2009), with the specific exception of habitual or recurring events that occur almost as a rule. Alternatively, in weak-FTR languages, such as German, a grammatical future marker is not always required. Using an example similar to one offered by Chen (2013, p.694), we can illustrate this difference by contrasting German and English sentences.

a. German: Morgen schnee es
b. Direct German-to-English translation: Tomorrow $\text{snow}_{\text{Present Tense}}$ it
c. Natural English: Tomorrow it $\text{will}_{\text{Future Tense}}$ snow

In sentence ‘a’, in German, a speaker conveys the future nature of an event by specifying “tomorrow.” However, there is no grammatical future tense marker, because the future prediction does not have an intentional component. The prediction of snow is offered in a present tense. Without an intentional component to the future prediction, inclusion of a future marker is optional. Alternatively, in English the prediction of snow in sentence ‘c’ must include a future marker (will), even though the future prediction does not have an intentional component. This relative inflexibility in the need to specify the future illustrates that English is a strong-FTR language. Importantly, being a weak-FTR language does not mean that it is grammatically impossible to mark the future, but it does mean that speakers of these languages will be less likely to do so during normal conversation (Chen, Cronqvist, Ni, & Zhang, 2017).

In the case of strong-FTR languages, the requirement to speak about the future in a way that clearly separates it from the present may lead speakers to perceive the future as being more distant (Chen, 2013). Conversely, in the case of weak-FTR languages, describing the future in the present tense may make it feel more immediate, or less distant (Perez & Tavits, 2017). In terms of temporal discounting, these ideas suggest that strong-FTR language speakers may engage in more temporal discounting, or may discount future opportunities more, because the future is perceived as being more distant, but the opposite should be true for weak-FTR language speakers (Kim, Kim, and Zhou, 2017). Additionally, when the future is precisely specified, strong-FTR language speakers should perceive more certainty about payoffs in the future (Chen, 2013). On the other hand, weak-FTR language speakers should perceive less certainty about the timing of future returns, and this uncertainty should make saving, investing, or preparing in advance more attractive (Chen, 2013). Taken together, these ideas suggest that, overall, strong-FTR language speakers would engage in more temporal discounting than weak-FTR language speakers.

This relationship between strong-FTR language and future discounting has been examined in several contexts. For example, Perez and Tavits (2017) find that strong-FTR language speakers were less likely to support future-oriented policies. Similarly, research has found relationships where strong-FTR language use is

negatively correlated with savings (Chen, 2013; Roberts, Winters, & Chen, 2015), including corporate savings (Chen, Cronqvist, Ni, & Zhang, 2017). Additionally, Kim, and colleagues (2017) found evidence that strong-FTR language speaking managers were more likely to engage in earnings management, which may result in negative consequences in the future. Additionally, similar relationships have been found in experiments that compare choices made by children who speak strong- versus weak-FTR languages (Sutter, Angerer, Glatzle-Rutzler, & Lergetporer, 2015).

Given that much of the value of protecting IP through patenting is in the ability to extract future profits from limited monopoly rights to IP for some period into the *future*, it is reasonable to anticipate that groups of people who are likely to engage in greater levels of temporal discounting would have a greater discount rate for these future returns. Additionally, Chen's (2013) linguistic savings hypothesis suggests that strong-FTR language speakers may engage in temporal discounting more than weak-FTR language speakers. Hence, the second hypothesis in this analysis anticipates a negative relationship between a firm's status as being from a predominantly strong-FTR language country and the rate at which they patent their IP, and is as follows:

> *Hypothesis 2: All else being equal, there is a negative relationship between a firm's status as being from a predominantly strong-FTR language country and the rate at which they patent to protect IP.*

4.3.3 Language and the internationalization-IP protection relationship

In the above discussion on relationships between international operations and IP generation and subsequent protection, the relationship is hypothesized in general terms. However, the discussion on temporal discounting by strong-FTR language speakers suggests that there may be a moderating effect when it comes to the IP protection stage in the IP value chain, after international operations affect IP generation.

If strong-FTR language speakers discount the future value of actions and decisions in the present (Chen, 2013; Chen, Cronqvist, Ni, & Zhang, 2017; Mavisakalyn & Weber, 2017; Perez & Tavits, 2017; Roberts, Winters, & Chen, 2015), then it is reasonable to expect that prior to internationalization, organizations from predominantly strong-FTR language countries would engage in less IP protection through patents, as the value of patents lies in the ability to maintain rights for a period into the future, typically 20 years (EPO, 2016; JPO, 2017; USPTO, 2015). If organizations from predominately strong-FTR language countries have less confidence in the value of IP generated at early stages of internationalization due to deviant learning effects (Deephouse, 1996; Powell & Rhee, 2016; Rhee, Kim & Han, 2006; Zollo, 2009; Zuckerman, 1999), this should further enhance the reduced tendency to patent IP at early stages of internationalization. In other words, organizations from predominantly strong-FTR language countries will further discount the future value of IP because they will be more uncertain about IP generated at early stages in international operations. However, as illustrated in the internationalization process literature (Johanson & Vahlne, 1977, 2009; Li, Easterby-Smith, Lyles, & Clark, 2016), uncertainty about knowledge, or the value of IP generated through learning in this case, during international operations should shift to certainty at higher levels of internationalization. Yet, even if firms from predominantly strong-FTR language countries become more certain about IP generated at later stages in internationalization, they may still discount the future value of that IP, and should therefore be less likely to protect the IP through patenting. These ideas lead to the expectation that the U-shaped relationship between internationalization and IP protection through patenting should be enhanced in firms from predominantly weak-FTR language countries, and weakened in firms from predominantly strong-FTR language countries. Along these lines, the third and final hypothesis in this analysis is as follows:

> *Hypothesis 3: All else being equal, a firm's status as being from a predominantly strong-FTR language country will weaken the U-shaped relationship between internationalization and the rate at which firms patent to*

protect IP.

4.4 Methodology

4.4.1 Data

The empirical context of this analysis is large automotive industry suppliers. This context was selected because large automotive suppliers operate in a manufacturing industry that is innovation driven (Hannigan, Cano-Kollmann, & Mudambi, 2015) and international in nature (Bloomfield, 1991; Rugman & Collinson, 2004), meaning that IP generation is a core part of the business. In addition, automotive suppliers often sell to multiple customers, who may make some of their own components in-house, and may also purchase parts from other suppliers (Drauz, 2014). These automotive suppliers often engage in close interactions and development with customers, so in some cases IP generation can result from co-creative processes (Jean, Sinkovics, & Hiebaum, 2014). Hence, both customers and competing suppliers could observe and utilize the IP that a company generates, and this suggests that there is value to IP protection through patenting.

In order to identify which firms to include in the sample, all of the automotive suppliers that have ever appeared in *Automotive News'* annual ranking of the world's largest suppliers were identified. Next, relevant yearly company data was gathered for all the firms on the list, whose annual statements had been coded into the *Mergent Online* database. In some cases, the *Mergent Online* database had missing values for some firms in specific years (e.g., missing data on R&D expenditures). In these cases, an effort was made to collect the missing data from the companies' annual statements, or *Toyo Keizai*'s annual *Japan Company Handbook* in the cases of missing data for Japanese automotive suppliers. Data was not available for 2 firms from the United States, 1 firm from Italy, and 1 firm from Brazil, so these firms were eliminated from the database. Additionally, data on the numbers of patents granted to a firm in each focal year were collected via patent searchers using the *World Intellectual Property Organization*'s (WIPO) *PatentScope* database, and data on the

total number of resident patent applications for each firm's home country in each focal year was collected from the *World Bank*'s *World Development Indicators* data file. And finally, data on a firm's home country being predominantly either strong- or weak-FTR was collected from Chen's (2013, pg.715 & 728) article on the linguistic savings hypothesis. After all the variables were coded, the resulting database was an unbalanced panel with data on 64 different large automotive suppliers and 567 firm-year observations, from the year 2007 through 2016. Of the 64 firms in the sample, 27 were from predominantly strong-FTR language countries, and 37 were from predominantly weak-FTR language countries, as illustrated in table 4.1.

Table 4.1 Firms and their home countries

Predominantly strong-FTR (total firms)	**Predominantly weak-FTR (total firms)**
Canada (3)	Belgium (1)
France (3)	China (1)
Korea (3)	Germany (6)
Spain (1)	Japan (25)
UK (1)	Norway (1)
USA (16)	Sweden (2)
	Switzerland (1)
Total =27 firms	Total =37 firms

4.4.2 Dependent variable

The outcome of interest in this analysis is IP protection through patents. Patents are valuable because they offer patent holders the right to block others from using a patented product, process or design without first securing the patent holder's permission for a specified period into the future (Teece & Sherry, 2017). This legal ownership essentially provides a period within which a firm can benefit from a "limited monopoly" (Joyce et al., 2003 pg.2), which is consistent with the IP protection construct. Hence, the count of *Total Patents* granted (Dutta & Folta, 2017;

Thakur-Wernz & Samant, 2017) to a focal firm in a focal year (t=0) was used as the dependent variable in this analysis.

The major patent offices in the world include the European Patent Office (EPO), the United States Patent and Trademark Office (USPTO), and the Japanese Patent Office (JPO) (Reitzig & Puranam, 2009). Patents through the EPO are perhaps the most straight forward, and can be applied to any invention in any field of technology, so long as the invention involves an "inventive step" and could have an industrial application (EPO, 2016 pg.108). Alternatively, the USPTO offers 'utility patents' for processes, machines, manufactured articles, substances, and improvements thereof, in addition to 'design patents' for ornamental items intended for manufacture, and 'plant patents' for newly developed plant species that have been asexually reproduced (USPTO, 2015). And finally, the JPO offers 'patents' for inventions or methods, and 'utility models' which only cover devices related to the structure or shape of articles and are usually used for innovations that are relatively incremental in nature (JPO, 2017). The JPO notes that utility models do not offer the same level of assurance in IP protection as patents, because they are not granted after an expert examination and require owners to warn infringers before taking legal action (JPO, 2017). Additionally, if the owner of a utility model initiates legal actions against an alleged infringer and the government subsequently rules in favor of the infringer, the owner would be responsible for paying all the related expenses of the infringer (JPO, 2017). Hence, most substantial innovations with commercial potential are protected via patents through the JPO. Given these descriptions, the count of total patents awarded to a firm in a focal year was limited to the total count of European patents, US utility patents, and Japanese patents (i.e., excluding US design patents, US plant patents, and Japanese utility models). Potentially, this aggregation of total patents granted across different patent offices risks double counting patents that were granted to a firm by multiple offices for the same innovation. As a result, during the process of coding these patents the individual patents granted to focal firms in 150 (approximately 26 percent of the sample) randomly selected firm-years were examined, and the number of double counted patents was trivial.

4.4.3 Independent variables

The degree to which firms engage in international operations can be measured in a variety of ways that account for the depth and breadth of international involvement (e.g., Goerzen & Beamish, 2003; Thomas & Eden, 2004), as well as the motive for international operations (e.g., Verbeke, Li, & Goerzen, 2009). However, the most common measure appears to be the ratio of foreign sales to total sales (FSTS), which has been used by many researchers over the years (e.g., Agmon & Lessard, 1977; Contractor, Kumar, & Kundu, 2007; Contractor, Kundu, & Hsu, 2003; Michel & Shaked, 1986). Some authors have argued that foreign direct investment (FDI) based measures of international operations may be better, but Contractor and colleagues (2007) make a compelling argument that sales ratios offer an adequate index of how internationalized firms are in industries that have disaggregated value chains across various geographic locations, such as the automotive industry, because it is difficult to tell if firms are using FDI or export-based strategies for internationalization in these types of industries.

In the case of the automotive industry, the appropriate ratio may be sales outside of a firm's region over total sales. Specifically, Domanski and Lung (2009) note that the European automotive industry is geared primarily towards the European home market, with the truly "global" sales being the sales that occur outside of the region. Along the same lines, Rugman and Collinson (2004), argue that the overall automotive industry may be global in the sense that firms sell in many national markets around the world, but automotive firms tend to do the bulk of their business within their own region. This tendency towards a focus on regional sales has been observed in terms of business within the 'triad' regions of Europe, Asia, and North America (Rugman, 2001). These ideas suggest that the ratio of sales from outside of a firm's triad region over its total sales may be a better proxy for the degree to which the firm has devoted resources and efforts to internationalization outside of its 'home' market. Consistent with this notion, the ratio of sales outside of a firm's triad region to its total sales, expressed as a percentage to make it easier to interpret coefficients, was used as a proxy for the degree of internationalization (*Internationalization*). It is

possible that this measure could be an outcome of innovation. That is, strong innovation and IP could be driving internationalization. Hence, a lag was used, where the models looking at patents as an outcome in a focal year (t=0) included the measure of internationalization three years prior (t= -3). This three-year lag is consistent with past research considering patents as an outcome (e.g., Thakur-Wernz & Samant, 2017), and is a midpoint considering that patents may take up to five years to be granted by the world's major patent offices (EPO, 2016; JPO, 2017; USPTO, 2015).

The second independent variable in this analysis captures the predominant future-time reference approach of languages used in each firm's home country, this was done using a dummy variable indicating whether a firm's home country was predominantly a *strong-FTR* language country (1), or a predominantly weak-FTR language country (0). These home country categorizations were adopted directly from Chen's (2013, pg.715 & 728) article on the linguistic savings hypothesis. Chen's categorization was based upon the European Science Foundation's own project that identified a typology of languages in Europe (Dahl, 2000). In languages that are classified as strong-FTR, speakers are required to mark the future in almost all sentences about the future, with only a few exceptions (Dahl, 2000; Thieroff, 2000). And most notably, in strong-FTR languages, speakers are obliged to mark the future even in situations where they are predicting future occurrences without an intentional component (Chen, 2013), as illustrated in the English and German language comparison earlier in this study. In addition to the countries in the European Science Foundation's typology, Chen (2013) classifies a number of non-European countries as having either predominantly strong-FTR or weak-FTR languages based upon their grammatical characteristics and rules. As a robustness test of these categorizations of non-European languages/countries, Chen (2013) further collected full sentence weather forecasts from various locations, in various languages, and compared his categorizations to the ratio of grammatically future marked verbs over total numbers of future referring (but not necessarily future marked) verbs. Also, he compared his categorizations to the ratio of sentences containing grammatical future markers over total sentences within the weather forecasts. Both the verb ratios and the sentence

ratios correspond with Chen's (2013, pg.728) categorizations of strong- or weak-FTR languages for non-European languages. These ratios also correspond to the European Science Foundation's typology for the European languages that Chen collected weather forecasts for.

4.4.4 Control variables

In addition to the dependent and independent variables in this analysis, several control variables were included. The first control variable was a focal firm's age (*Age*). A focal firm's age was calculated as the observation year minus the year that a firm was established (Audia & Greve, 2006). Additionally, this variable was lagged by three years, as patent applications in the three major patenting offices might take up to five years to be granted and a three-year lag represents the middle point of this range. Additionally, the logarithm of firm age was used to account for a skewed distribution in this variable. Potentially, older firms may be more inertial and resistant to change (Thornhill & Amit, 2003), and this might correspond to less IP generation and therefore less IP to protect (Balasubramanian & Lee, 2008). Alternatively, it is possible that older firms would have deeper knowledge stocks, and may have learned to continuously generate and protect IP for future performance benefits. Given these competing possibilities, this variable was included without a priori expectation on its relationship with IP protection through patenting. A firm's size may also relate to patenting (Acs & Audretsch, 1988, 1991). For instance, larger firms may have more resources to devote to both IP generation and protection. In past research, firm size has been measured using the total number of employees (e.g., Greve, 2003a), but in the current analysis, reliable yearly data on the total numbers of employees in each firm was impossible to access, so the total assets (*Assets*) of each firm was used as an alternative measure of size (Niresh & Velnampy, 2014), and once again, the logarithm of this variable was used to account for a skewed distribution, and a three-year lag was used.

Next, given that IP generation has been closely linked to organizational learning, several control variables were adopted from the organizational learning and

performance feedback literature (e.g., Chen, 2008; Greve, 2003a; O'Brien & David, 2014). Specifically, the performance feedback model suggests that firms may invest to generate more IP if they have excess organizational slack, and may therefore have more IP to protect via patenting (Greve, 2003a; Kim, Kim, & Lee, 2008; O'Brien & David, 2014; Patel & Chrisman, 2014). Specifically, when firms have excess resources, managers may perceive a cushion to buffer them from environmental shocks, and may feel more comfortable investing resources into exploratory search activities (Greve, 2003a). However, organizational slack can present itself in numerous ways, so to control for the possible effect of excess resources, this analysis includes three measures of organizational slack. The first measure is *absorbed slack*, or the ratio of selling, general, and administrative expenses to overall revenues (Greve, 2003a; O'Brien & David, 2014; Patel & Chrisman, 2014). The second measure is *unabsorbed slack*, or the ratio of quick assets to total liabilities (Greve, 2003; Kim, Kim, & lee, 2008; Patel & Chrisman, 2014). And the final measure of slack was *potential slack*, or the ratio of total debt to total equity (Bromiley, 1991; Greve, 2003a; O'Brien & David, 2014). Additionally, measures of slack can vary considerably from one year to the next, so simply using a three-year lag for these measures may not capture the slack available across the five-year window within which firms might wait for patents to be granted. Hence, the five-year averages for each of these measures of slack was used. In other words, each measure of slack is averaged over the period of one to five years prior to a focal observation year.

The second construct related to search behaviors in the organizational learning and performance feedback literatures is performance shortfalls relative to aspirations (Chrisman & Patel, 2012; Cyert & March, 1963; Greve, 2003a; O'Brien & David, 2014). Specifically, research in this area suggests that managers use easily agreed upon threshold levels of performance cast as performance aspirations (Cyert & March, 1963; Greve, 2003a). If actual performance falls short of these aspirations, this should trigger a search for solutions (Greve, 1998), and should also lower managerial tolerance for risk (Audia & Greve, 2006). This search process is a mechanism for organizational learning, and shortfalls between aspirational performance and actual performance have been related to increased R&D

expenditures (Chen, 2008; Greve, 2003a). As a result, it is possible that poor performance relative to aspirations can lead to IP generation and therefore more IP to protect. Consistent with past research (e.g., Chen, 2008), in this analysis performance relative to aspirations is assessed in terms of a focal firm's historical return on assets (ROA). That is, if a firm's ROA in a specific year was less than its ROA in the prior year, this was coded as a shortfall (1). However, as previously noted, patents often take up to five years to be granted, so the number of years where a firm experienced a shortfall in the five years prior a focal year was divided by five and expressed as a percentage. As a result, the percentage of years in five years prior to a focal year was used as a measure of *performance shortfalls* in this analysis, with the expectation of a positive relationship with patenting.

The organizational learning and performance feedback literature discussed above has looked at how slack and performance shortfalls relate to *changes* in search activities in the form of R&D (Greve, 2003a). Yet, the generation of IP to protect should also relate to overall levels of R&D (Aces & Audretsch, 1988; Lungeanu, Stern, & Zajac, 2016; Reitzig & Puranam, 2009). Hence, a control variable for *R&D intensity* (Chen, 2008; Chen & Miller, 2007), or the ratio of R&D expenditures to total revenues expressed as a percentage, was included in this analysis with the expectation of a positive relationship with IP protection through patenting. And again, the average R&D intensity of a firm over the prior five years was used to account for year-to-year variations during the five-year window from when a firm might apply for a patent to when one of the world's major patent offices would grant it. It is also possible that the tendency to protect IP through patents depends to some extent upon a firm's capabilities and resources that are relevant to this process. That is, firms can benefit from technical skills and access to the services of highly specialized lawyers in the patenting process (Reitzig & Puranam, 2009). Hence, this analysis also includes a control variable for the total number of patents acquired in the prior 5 years, or the firm's recent *patent portfolio* (Bena & Li, 2014; Caner, Bruyaka, & Prescott, 2017), because measure may serve as a proxy for a firm's capabilities related to IP protection through patenting. Additionally, some of the patent portfolios for firms were quite

large, so this five year sum of patents acquired was divided by 100 to aid in the interpretation of estimated coefficients.

And finally, there may be differences in the environments that firms are embedded in, which relate to IP generation and eventual protection in the firms (Allred & Park, 2007). Specifically, knowledge stocks and innovation activities may be greater in some countries, and firms in these countries should benefit from access to these environments (Carree, Piergiovanni, Santarelli, & Verheul, 2015), leading to a positive relationship with IP generation and protection through patenting. As a result, this analysis also includes a control for *home-country patenting* conditions. Specifically, the total number of resident patent applications per million people in each home country was used (Olavarrieta & Villena, 2014). However, this variable was skewed, so its logarithm was used. Also, the numbers of patent applications in each country did not fluctuate greatly from year-to-year, so a three-year lag structure was used. As a summary, table 4.2 presents all the variables, operational definitions, and data sources used in this analysis.

Table 4.2 Variables, operational definitions, and data sources

Variable	Operational definition	Data Sources	References
Total Patents	$\text{Total Patents Issued}_{t=0,j}$	WIPO PatentScope Database	Aces, Anselin, & Varga, 2002; Dutta & Folta, 2016; Thakur-Wernz & Samant, 2017
Age	$\text{Log}(\text{Year} - \text{Foundation Year})_{t-3,j}$	Mergent Online	Audia & Greve, 2006
Assets	$\text{Log}(\text{Total Assets})_{t-3,j}$	Mergent Online	Niresh & Velnampy, 2014
Absorbed Slack	$\sum_{t-5}^{t-1}((\frac{\text{Selling, General \& Admin. Expenses}_{t,j}}{\text{Total Revenues}_{t,j}}) \times \frac{1}{5})$	Mergent Online	Greve, 2003a; Patel & Chrisman, 2014
Unabsorbed Slack	$\sum_{t-5}^{t-1}((\frac{\text{Quick Assets}_{t,j}}{\text{Total Liabilities}_{t,j}}) \times \frac{1}{5})$	Mergent Online	Greve, 2003a; Kim, Kim, & Lee, 2008
Potential Slack	$\sum_{t-5}^{t-1}((\frac{\text{Total Debt}_{t,j}}{\text{Total Equity}_{t,j}}) \times \frac{1}{5})$	Mergent Online	Greve, 2003a; O'Brian & David, 2014
Performance Shortfalls	$\sum_{t-5}^{t-1}(\text{Performance Shortfall}_{t,j} \times \frac{1}{5} \times 100)$ Where, 'Performance Shortfall' is a dummy variable (1) indicating that a firm's ROA in a given year (t) is lower than its ROA in the prior year.	Mergent Online	Chrisman & Patel, 2012; Greve, 2003a
R&D Intensity	$\sum_{t-5}^{t-1}(100 \times (\frac{\text{R\&D Expenditures}_{t,j}}{\text{Total Revenues}_{t,j}}) \times \frac{1}{5})$	Mergent Online; Toyo Keizai; firms' annual statements	Aces & Audretsch, 1988; Chen, 2008; Chen & Miller, 2007
Patent Portfolio	$\sum_{t-5}^{t-1}(\frac{\text{Total Patents Issued}_{t,j}}{100})$	WIPO PatentScope Database	Bena & Li, 2014; Caner, Bruyaka, & Prescott, 2017
Internationalization	$100 \times \frac{\text{Sales Outside Triad Region}_{t-3,j}}{\text{Total Revenues}_{t-3,j}}$	Automotive News' annual ranking of the top OEM suppliers; Toyo Keizai; firms' annual statements	Contractor, Kumar, & Kundu, 2007; Contractror, Kundu, & Hsu, 2003
strong-FTR	Dummy variable, 1= Firm based in predominantly strong-FTR language country 0 = Firm based in predominantly weak-FTR language Country	Chen, 2013	Chen, 2013; Dahl, 2000; Thieroff, 2000
Home-Country Patenting	$\text{Log}(\frac{\text{Resident Patent Applications in Home country}_{t-3}}{1{,}000{,}000})$	The World Bank's World Development Indicators Data.	Olavarrieta & Villena, 2014

4.4.5 Analysis

To assess the potential threat of multicollinearity in this analysis, pooled ordinary least squares (OLS) versions of the models were used to calculate variance inflation factors (VIFs), and the largest VIF was 2.23 for the logarithm of a firm's total assets, as listed in table 4.3, which also presents descriptive statistics from the variables in the sample. This VIF is well below the commonly used threshold VIFs of 4 and 10 (O'brien, 2007), and suggests that multicollinearity is not a strong concern in this analysis. Additionally, table 4.4 presents a correlation matrix, and shows that while several independent variables have correlations above 0.30, there are no exceptionally large correlations.

Table 4.3 Descriptive statistics

Variable	Minimum	Maximum	Mean	Standard Deviation	VIF
Total Patents	0	5,318	295.4	739.90	-
Age	2	257	69.96	39.90	1.65
Assets	7.97	10.92	9.62	0.45	2.23
Absorbed Slack	0.02	1.15	0.11	0.07	1.28
Unabsorbed Slack	0.09	1.45	0.51	0.21	1.20
Potential Slack	0.17	4.98	1.72	0.89	1.01
Performance Shortfalls	0	100	44.61	18.99	1.03
R&D Intensity	0.01	25.53	3.76	3.27	1.25
Patent Portfolio	0	251.39	15.34	37.23	1.83
Internationalization	10.00	85.00	46.00	18.00	1.13
strong-FTR	0.00	1.00	0.44	0.49	1.46
Home-Country Patenting	2.65	5.98	4.96	0.76	1.10

Given that the dependent variable of interest in this analysis is the count of total patents granted to a firm in a focal year, negative binomial models were used. Negative binomial regression models were used instead of Poisson models because the outcome variable appears to be dispersed, as indicated in the descriptive statistics

presented in table 4.3. In addition, it is entirely possible that additional firm factors not included as control variables in this analysis could explain some variance in the number of patents a firm gets. Hence, random effects for firms were included in all the models in this analysis. Random effects were selected over fixed effects because the strong- versus weak-FTR categorization frames the target of inference around a population of clusters, instead of clusters within a sample or dataset.

Table 4.4 Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Total Patents	-										
2. Age	0.09	-									
3. Assets	0.50	0.42	-								
4. Absorbed Slack	0.07	0.16	-0.11	-							
5. Unabsorbed Slack	0.00	-0.17	-0.14	0.12	-						
6. Potential Slack	0.01	0.01	0.05	-0.00	0.02	-					
7. Performance Shortfalls	-0.07	-0.01	0.00	-0.01	0.07	0.04	-				
8. R&D Intensity	0.28	-0.04	0.19	0.21	0.08	0.04	0.05	-			
9. Patent Portfolio	0.95	0.08	0.49	0.06	0.01	0.01	-0.05	0.29	-		
10. Internationalization	-0.09	0.25	0.05	0.08	0.02	-0.01	0.07	0.12	-0.08	-	
11. strong-FTR	-0.24	-0.05	0.16	-0.18	-0.31	-0.01	0.03	-0.11	-0.26	0.03	-
12. Home-Country Patenting	0.14	-0.03	-0.00	-0.17	0.08	-0.05	-0.12	0.04	0.12	0.01	-0.10

4.5 Results

Four negative binomial models were used to test the three hypotheses in this analysis, as presented in table 4.5. Model 1 includes control variables plus the direct effect of internationalization, and the squared term for internationalization is added in model 2. Next, the strong-FTR dummy variable is added in model 3, and the moderating effect of strong-FTR on the internationalization and IP protection through patenting relationship was tested in model 4.

In terms of control variables, age resulted in positive and significant ($p<0.01$) estimates in models 1 and 2, but after the strong-FTR variable was added in models 3 and 4, the estimate became negative and significant ($p<0.05\sim0.01$). Given that models 3 and 4 are more fully specified, these results suggest that age is negatively related to patenting in this empirical context. Next, consistent with expectation, the logarithm of total assets resulted in positive and significant estimates across all four models ($p<0.001$). The estimates for absorbed slack were consistently negative, but only significant at better than 10 percent ($p<0.01$) in model 3. These results suggest that there is not robust evidence of a relationship between absorbed slack and patenting. Alternatively, estimates on unabsorbed slack were positive and significant ($p<0.05\sim0.001$) in models 1 through 3. These results offer some support for the notion that firms with more unabsorbed slack will engage in more IP protection through patenting. However, none of the estimates on potential slack were significant. Next, contrary to expectation, the percentage of years, in the prior five years, where a firm experienced a shortfall between actual performance and historical aspirations resulted in negative and significant estimates in all the models ($p<0.05$-0.01). Next, as anticipated, R&D intensity resulted in positive and significant estimates ($p<0.01$) across all four models. Similarly, the control for a firm's five-year patent portfolio also resulted in positive and significant estimates ($p<0.001$) across all four models. And finally, the control for the overall level of patent applications in a firm's home country resulted in positive and significant estimates ($p<0.001$) across all four models.

Table 4.5 Language, out-of-region sales, and patents

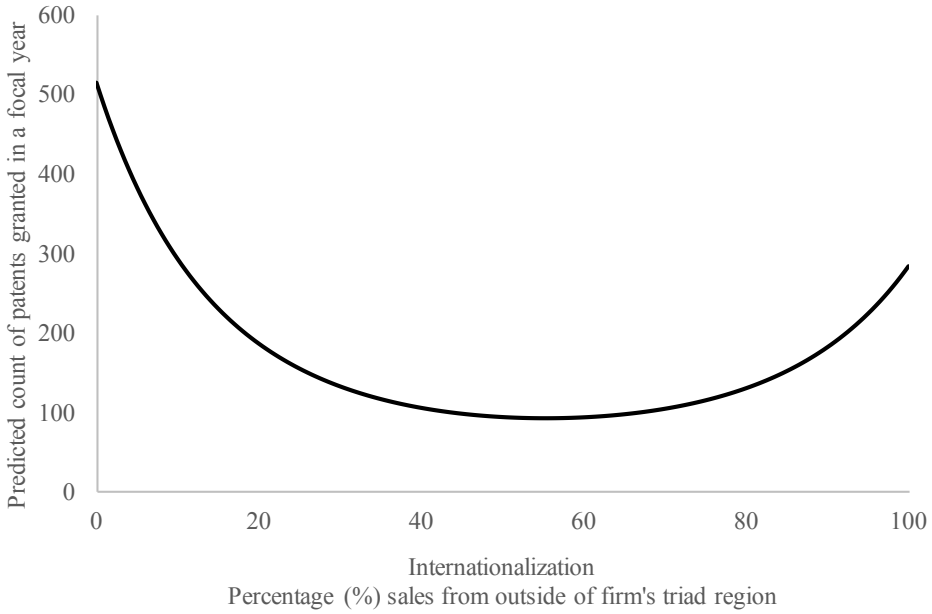
	1	2	3	4
Intercept	-7.950***	-7.791***	-14.403***	-12.828***
	(1.623)	(1.620)	(1.576)	(1.685)
Age	0.004**	0.004**	-0.004**	-0.003*
	(0.001)	(0.001)	(0.001)	(0.001)
Assets	0.944***	1.011***	1.797***	1.714***
	(0.161)	(0.163)	(0.164)	(0.165)
Absorbed Slack	-1.103	-0.768	-1.829**	-1.302†
	(0.742)	(0.740)	(0.700)	(0.696)
Unabsorbed Slack	1.290***	1.150***	0.591*	0.214
	(0.234)	(0.235)	(0.229)	(0.237)
Potential Slack	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Performance Shortfalls	-0.008**	-0.007**	-0.007**	-0.006*
	(0.002)	(0.002)	(0.002)	(0.002)
R&D Intensity	0.046**	0.046**	0.046**	0.046**
	(0.016)	(0.016)	(0.015)	(0.015)
Patent Portfolio	0.025***	0.023***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Internationalization	-0.454	-3.399*	-1.888	-5.757***
	(0.280)	(1.435)	(1.334)	(1.732)
Internationalization ^{2}		0.029*	0.016	0.056**
		(0.014)	(0.013)	(0.017)
strong-FTR			-1.370***	-3.446***
			(0.114)	(0.625)
strong-FTR x Internationalization				11.355***
				(2.825)
strong-FTR x Internationalization ^{2}				-0.127***
				(0.029)
Home-Country Patenting	0.551***	0.513***	0.571***	0.579***
	(0.072)	(0.073)	(0.068)	(0.070)
n	567	567	567	567
Log Likelihood	-3,344.2	-3,342.7	-3,288.9	-3,280.3
Model improvement		Δ1~2 †	Δ2~3***	Δ3~4***

*Notes: †, *,**, and *** significant at p<0.10, 0.05, 0.01, and 0.001 respectively. Negative binomial models with random effects for firms.*

Next, the internationalization independent variable was not significant in model 1, but when the squared term was added in model 2, the internationalization

estimate was negative and significant ($p<0.05$) and the squared term resulted in a positive and significant estimate ($p<0.05$). This combination suggests a U-shaped relationship, as predicted. As a matter of interest, a cubed term was also included in an unreported model, and this cubed term did not result in a significant estimate. The outcome in negative binomial models is the predicted logarithm of a count variable. Hence, to aid in interpretation, figure 4.2 presents a graph of the predicted count of patents granted to a focal firm in a focal year at various levels of internationalization, with all the other variables in model 2 held at their mean. In other words, this graph presents the exponent of the predicted outcome, so that it can be interpreted in a meaningful way, as the predicted count of patents granted. The relationship resembles a U-shape. However, in model 3, when the dummy variable for a firm being from a predominantly strong-FTR language country is included, all the estimates based upon internationalization become non-significant.

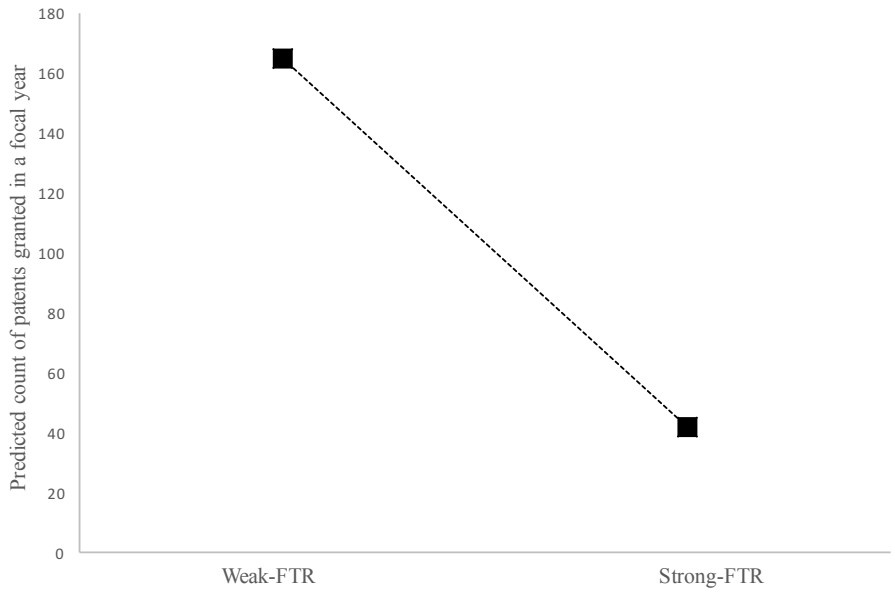
Figure 4.2 Internationalization and IP protection through patents



In model 3 the dummy variable for strong-FTR language, results in a negative and significant estimate ($p<0.001$). Specifically, with all other variables in model 3

held constant at their means, the predicted count of patents for firms from predominantly weak-FTR language countries is 165 patents, as illustrated in figure 4.3. However, when a firm is from a predominantly strong-FTR language country, this prediction goes down to 42 patents. This result lends support to the notion that strong-FTR language firms may discount the future value of IP, or may perceive uncertainty in the timing of future returns from IP, and are therefore less likely to protect IP through patenting to secure exclusive rights that would allow for profits from limited monopoly rights in the future. In addition, this result lends support for hypothesis 2.

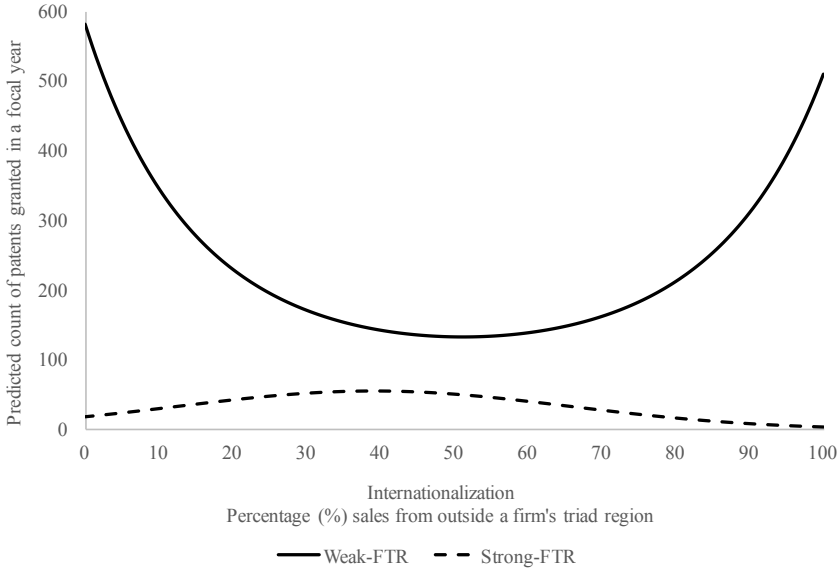
Figure 4.3 Language and IP protection through patents



And finally, model 4 includes interaction terms between strong-FTR and internationalization, as well as strong-FTR and the squared term for internationalization. After these interactions are included, the direct effect of internationalization becomes negative and significant ($p<0.001$) again and its squared term results in a positive and significant estimate ($p<0.01$) again. In addition, the direct effect of strong-FTR remains negative and significant ($p<0.001$), and its interaction with internationalization is positive and significant ($p<0.001$), while its

interaction with internationalization squared results in a negative and significant estimate ($p<0.001$). Figure 4.4 presents the predicted count of patents granted at various levels of internationalization for both strong-FTR language firms and weak-FTR language firms, with all the other control variables in model 4 held constant at their means. Interestingly, the U-shaped relationship remains for weak-FTR language firms, but disappears for strong-FTR language firms. There even appears to be a slight increase in patenting in the middle-range of internationalization for strong-FTR firms. These results offer insight into why the U-shaped internationalization-patenting relationship identified in model 2 disappeared in model 3. Specifically, the shape may depend upon language type, rather than simply being weakened or enhanced by it. Overall, these results suggest that there is strong support for hypothesis 2, but the results relative to hypotheses 1 and 3 need to be interpreted with a little nuance. That is, there may not be a 'general' relationship between internationalization and IP protection through patenting when controlling for strong-FTR, which does not support hypothesis 1. However, there is a U-shaped relationship between internationalization and IP protection through patenting for firms from predominantly weak-FTR language countries, which supports hypothesis 3. Additionally, the finding that a U-shaped relationship between internationalization and IP protection through patenting is only manifested in the context of firms from predominantly weak-FTR language countries, rather than simply being enhanced by weak-FTR language, suggests a much more powerful role for language in the temporal discounting of IP than expected.

Figure 4.4 Language, internationalization, and IP protection through patents



4.6 Conclusion and Discussion

This analysis has sought to expand on our understanding of the intermediate step in the IP value chain, IP protection. In particular, this analysis has focused on IP protection through patenting innovations by large suppliers in the global automotive industry. Decisions to devote resources to IP protection through patents should center on decision maker assessments of the value of IP in the present and future. Hence, drawing upon the organizational learning literature on deviant learning effects (e.g., Deephouse, 1996; Haunschild & Miner, 1997; Rhee, Kim, & Han, 2006; Zuckerman, 1999) and the internationalization process literature (e.g., Easterby-Smith, Lyles, & Clark, 2016; Brouthers, Geisser, & Rothlauf, 2016; Johanson & Vahlne, 1977, 2009), this analysis anticipated a U-shaped relationship between internationalization and patenting activities, as experience at the early stages in internationalization may decrease confidence in IP generated, but at later stages in internationalization confidence should increase. Additionally, this analysis anticipated a negative relationship between a firm's status as being from a predominantly strong-FTR language country and patenting, as strong-FTR language speakers may discount the

future value of patents to a greater extent than weak-FTR language speakers (Chen, 2013; Chen, Cronqvist, Ni, & Zhang, 2017; Mavisakalyn & Weber, 2017; Perez & Tavits, 2017; Roberts, Winters, & Chen, 2015). The results suggest that, in the context of large automotive industry suppliers, firms from predominantly strong-FTR language countries do engage in less IP protection through patenting. Additionally, there does appear to be a U-shaped relationship between internationalization and IP protection through patenting, but this relationship only occurs in the case of firms from predominantly weak-FTR language countries. Potentially, this result suggests that even if firms from strong-FTR countries experience a U-shaped relationship between internationalization and the *confidence* that they have in IP generated, the act of protecting this IP through patenting will not follow the same shape, because decision makers may discount the future value of IP, even if they are confident in it.

The implications for practitioners from predominantly strong-FTR language countries seem clear. Efforts to reduce temporal discounting in the IP value chain should be made, because such discounting may reduce the ability to generate returns from limited monopoly rights to innovations in the future. Potentially, firms from these countries could require formal assessments of the *future* value of all newly generated IP, and this future value could be linked to the present. For example, assessments could indicate the potential for IP generated to help recover current R&D expenses, if exclusive rights are secured through patents. In addition, assessments could indicate the potential for IP generated to contribute to the perceived value of the firm in the market, as analysts attempt to value organizations with reference to future expectations. For academics, this analysis offers additional factors that might relate to the understudied middle step in the IP value chain. In particular, identifying a role for language in IP protection is a novel contribution within this literature. Given that strong-FTR speakers may engage in more temporal discounting, and the value of filing patent applications is in securing exclusive rights for a period into the future, future analyses that contain firms from multiple national contexts may need to control for language. In addition, future research may consider relationships between language and patenting at the higher country-level of analysis.

As with all research, this study has some limitations. To begin with, it is worth noting that a disproportionate number of firms from predominantly weak-FTR language countries in the sample were Japanese. This concentration of firms from one country in the sample, could affect results if that country is in some way an outlier. An effort was made to reduce this issue by controlling for the level of patenting within a firm's home country, but it is still worth acknowledging this limitation. Next, some readers may be disappointed with the operational definition of internationalization in this analysis, preferring instead to use FDI-based measures. While Contractor, Kumar, and Kundu (2007) have noted that sales ratio-based measures are adequate proxies in the context of industries with globally disaggregated supply chains, this limitation remains because reliable data was not available to run robustness tests with FDI-based measures of internationalization. And finally, there are advantages to running empirical analyses in the context of a single industry. For instance, firms in the sample are more likely to be comparable in terms of the issues and decisions that they face, and there is no need to control for more general industry effects. However, the downside to single-industry empirical analyses is that it is difficult to generalize findings to other industries and contexts. This is a limitation in the current analysis, but also an opportunity for future research, which can explore the roles of internationalization and language in IP protection through patenting in different contexts.

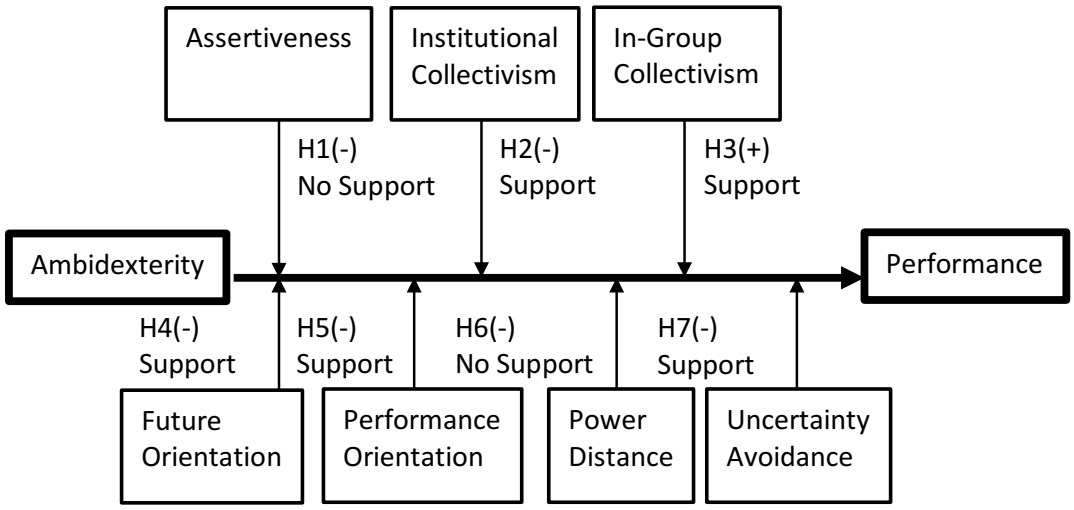
Chapter 5. Conclusion

This final chapter of this thesis offers an opportunity to reflect upon the key findings and contributions of the three essays that have been presented. This summary will be done with specific reference to each of the essays, but also in a broader sense by addressing the findings and contributions as they relate to the overarching research aim and question presented in chapter 1. Additionally, this chapter offers an opportunity to clarify the limitations of each of these essays, and to identify some of the many opportunities for future research.

5.1 Summary of key findings

In the first essay, a meta-analytic approach was used to assess the moderating effects of various national cultural dimensions on relationships between organizational ambidexterity and performance in studies that use single-nation samples. The empirical results suggest that higher levels of institutional collectivism, future orientation, performance orientation, and uncertainty avoidance negatively moderated ambidexterity and performance relationships among studies that used single-nation samples. Additionally, higher levels of in-group collectivism positively moderated ambidexterity and performance relationships in this sample of single-nation studies. Counter to expectation, assertiveness did not moderate ambidexterity and performance relationships in the sample of single-nation studies, and power distance positively moderated the relationship, which was the opposite moderating effect of what was hypothesized. These findings are summarized graphically in figure 5.1.

Figure 5.1 Essay 1 findings: National culture as a moderator of ambidexterity-performance relationships



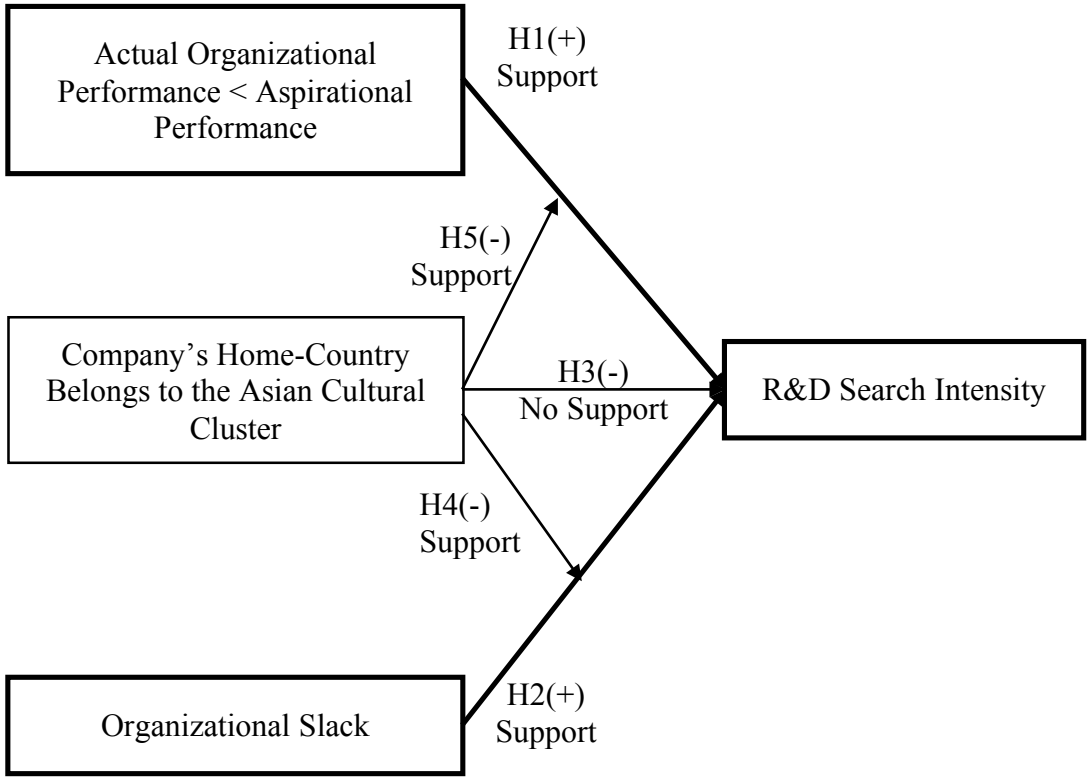
Beyond the specific moderating roles of individual national cultural dimensions on ambidexterity and performance relationships in a sample of single-nation studies, there is another key finding in the broader area of culture and organizational learning behaviors or outcomes that comes from essay 1. Specifically, essay 1 offers support for the notion that when there is a good 'fit' between an organization's strategic learning behaviors and its national cultural context, this may lead to better performance outcomes. This idea further bolsters the arguments of a number of researchers (e.g., Freytag & Thurik, 2007; Marino et al., 2002; Rauch et al., 2010; Saeed et al., 2014) who have hypothesized a moderating role for national culture in strategy and performance relationships based upon the idea that a good fit between the two improves the likelihood of successful strategy implementation of execution.

In the second essay, insights from the PFM and the behavioral theory of R&D were presented and potential moderating roles for one categorical distinction between cultures were hypothesized. In the context of global automotive firms, the empirical results in the second essay support the insights and findings of a large body of past

research (e.g., Allessandri & Pattit, 2014; Chen, 2008; Chen & Miller, 2007; Chrisman & Patel, 2012; Gomez-Mejia et al.,2014; Greve, 2003a; Kim et al., 2008; O'Brien & David, 2014; Patel & Chrisman, 2014), by identifying positive relationships between shortfalls in actual performance relative to aspirational performance and R&D expenditures, while controlling for R&D expenditures in previous time periods. Essay 2 also replicated past research findings in the same body of literature that indicates a positive relationship between organizational slack and R&D expenditures, and like some past research, this relationship was limited to absorbed slack (Greve, 2003a; O'Brien & David, 2014; Patel & Chrisman, 2014).

However, unlike past research in this area, essay 2 tests for the direct and moderating effects of a focal firm's home-country belonging to either an Asian (or holistic thought oriented) cultural cluster, or a western (or analytic thought oriented) cultural cluster. In western cultures, where decision makers have been socialized into analytic thought processes, managers may pay greater attention to focal objects and ideas, while Asian decision makers may devote more attention to the context in which their organizations are embedded (Masuda & Nisbett, 2001; Miyamoto & Nisbett, 2005; Nisbett & Masuda, 2003; Senzaki, Masuda, & Ishii, 2014). Hence, decision makers in Asian firms may be less responsive to focal-firm issues such as performance relative to aspirations and organizational slack, relative to western decision makers. Consistent with this idea, the empirical analysis in essay 2 identifies a negative direct effect for a firm's Asian cultural cluster membership on R&D search intensity, while including a control for R&D search intensity in previous time periods. Additionally, essay 2 finds a negative moderating effect for a firm's Asian cultural cluster membership on the positive relationship between performance shortfalls relative to aspirations and R&D search intensity, as well as a negative moderating effect on the positive relationship between (absorbed) organizational slack and R&D search intensity. These results are summarized in the conceptual model presented in figure 5.2. In a broader sense, the findings in essay 2 lend credence to the notion that culture can act as an antecedent to strategic decisions, such as R&D search investments, which constitute a type of search and learning behavior.

Figure 5.2 Essay 2 findings: Culture and R&D search intensity

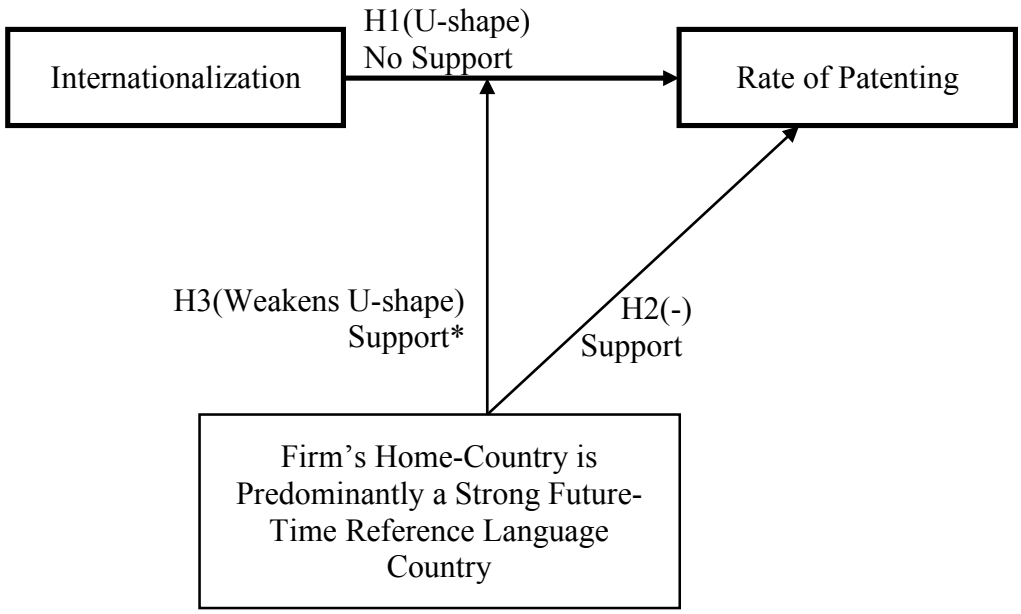


The third essay in this thesis focuses on one stage in the IP value chain, which describes organizational learning behaviors and outcomes that primarily focus on codifiable knowledge that results from R&D-type activities. Specifically, essay 3 looks at the rate of patenting IP to protect it as an outcome, and focuses on the empirical context of automotive industry suppliers. Given the international nature of this empirical context, the role of internationalization in organizational learning was acknowledged and past research (Johanson & Vahlne, 1977/2009; Rhee, Kim, & Han, 2006; Zollo, 2009) was used to hypothesize a U-shaped relationship between internationalization and the rate of patenting. The idea that internationalization may relate to the rate of patenting in a firm is consistent with existing research (e.g., Thakur-Wernz & Samant, 2017), but potential direct and moderating effects of culture have not been actively pursued in this literature stream. In essay 3, the Linguistic Relativity Hypothesis (LRH) (Mavisakalyn & Weber, 2017) is used to

argue that decision-makers in firms from countries that predominantly use strong-FTR languages may engage in more temporal discounting (Chen, 2013; Chen et al., 2017; Perez & Tavits, 2017) and perceive less future value in IP, resulting in relatively lower rates of patenting IP to protect it and extract future rents from it, all else being equal.

The empirical results of essay 3 did not find an overall U-shaped relationship between internationalization and the rate of patenting. However, a firm's status as being from a predominantly strong-FTR language country was negatively related to its rate of patenting, as hypothesized. In addition, a moderating effect for a firm's status as being from a predominantly strong-FTR language country on the relationship between internationalization and rate of patenting suggests that there is a U-shaped relationship between internationalization and the rate of patenting, but only in the case of firms in the sample that are from predominantly weak-FTR language countries. These findings are summarized in the conceptual model presented in figure 5.3. As with essay 2, the findings in essay 3 offer further evidence that culture can act as an antecedent to strategic decisions, including decisions to protect IP through patenting.

Figure 5.3 Essay 3 findings: Internationalization, language and patenting



**Supported in that there was a U-shaped relationship for firms whose home country is predominantly a weak-time reference language country, but there was not the same relationship for firms whose home country is predominantly a strong-time reference language country.*

5.2 Contributions

Beyond focusing upon the results of each of the three essays in this thesis, it is also useful to explore the resulting contributions to theory and practice that can be derived from this thesis.

5.2.1 Contributions to theory

In the case of essay 1, a great deal of past research has focused on the performance implications of organizational ambidexterity (e.g., He & Wong, 2004; Junni et al., 2013; Tushman & O'Reilly, 1996). The key theoretical insight in this large volume of literature is that ambidexterity may offer a solution to myopic pursuit of either exploration or exploitation alone (Duncan, 1976; March, 1991). Research in this area has also acknowledged that there is a need to better explore the boundary conditions that surround ambidexterity and performance relationships (Birkinshaw & Gupta,

2013), and differences in organizational culture have been identified as one potential moderator, or facilitator, of ambidexterity and performance relationships (Tushman & O'Reilly, 1996). However, until now, research has not fully explored the potential roles of national culture as a moderator of ambidexterity and performance relationships, despite a growing awareness that links between strategic activities and performance outcomes may be moderated by how well the strategic activities 'fit' with the national culture in which a firm is embedded (Freytag & Thurik, 2007; Rauch et al., 2010; Saeed et al., 2014).

Essay 1 contributes to theory by testing and identifying the moderating role(s) of national culture on ambidexterity and performance relationships. The implication of this contribution is that researcher may be better prepared to interpret and understand varying results on the intensity of the ambidexterity-performance relationship. That is, by expanding the nomological net surrounding ambidexterity-performance relationships, researchers may be able to better understand or anticipate instances where empirical results depart from expectations on this relationship, when samples are taken in different national cultural contexts.

In the case of essay 2, Performance Feedback Model researchers have rightfully devoted a great deal of energy focusing on the core constructs and relationships with in the model (e.g., Greve, 1998/2003a). These related constructs include assessments of performance relative to aspirations, organizational search, risk tolerance, organizational slack, and some sort of change. Following the development of this model, it has been tested most frequently with R&D search intensity as an outcome (e.g., Chen, 2008; Chen & Miller, 2007; Chrisman & Patel, 2012; O'Brien & David, 2014), and this body of research has been called the behavioral theory of R&D (Greve, 2003a). At the same time, a growing number of researchers have argued that national culture may have a direct effect on the R&D expenditures of firms (e.g., Couto & Vieira, 2004; Efrat, 2014; Nakata & Sivakumar, 1996; Shao et al., 2013; Varsakelis, 2001). However, a potential moderating role of culture on the PFM, and the behavioral theory of R&D more specifically, has not been fully addressed or tested. Hence, the key theoretical contribution of essay 2 is in filling this gap and identifying a moderating role for a focal firm's status as being from either the Asian

or western cultural clusters (Masuda & Nisbett, 2001; Senzaki, Masuda, & Ishii, 2014).

Essay 3 offers further support for the nascent literature on the LRH, which approaches culture in a new way. Additionally, essay 3 offers an additional outcome, patenting, that may relate to strong-FTR language use, by offering further evidence in support of the LRH, and by expanding the universe of strategic decisions that relate to languages spoken. The implication of this contribution is that the perceived future value of knowledge may be partially related to cultural differences, and this may relate to efforts to protect knowledge in the IP value chain, but researchers may also find that temporal discounting could lead to other outcomes as wells, such as efforts to formalize routines that reinforce knowledge to ensure that the knowledge survives well into the future of an organization. Further development of the LRH is important, because like the Asian-western cultural framework discussed in essay 2, categorizing national cultures by the predominant languages spoken offers a way to classify national cultures in terms of clusters, which can help to avoid problems with using national cultural dimensions in some research contexts (e.g., multicollinearity in contexts where multiple cultural dimensions are included). Collectively, the contributions from each of the three essays in this thesis highlight that national culture can, and should, be understood through multiple frameworks. Researchers should select the best framework for understanding national culture based upon their research questions, as well as their research contexts.

5.2.2 Contributions to practice

In terms of contributions to practice, each of the essays in this thesis offers support for the idea that national culture can either help/hinder in the conversion of strategic activities into performance, or can lead to different strategic decisions themselves. Being aware of the potential impacts of national culture may help decision makers to either anticipate barriers to success, or may help them to develop better decision-making processes. For example, essay 1 highlights the potential for a 'misfit' between culture and an ambidexterity strategy to hinder resulting performance, so managers may seek to implement specific actions to overcome this issue. Potentially, managers

in organizations pursuing ambidexterity strategies from countries that score high on institutional collectivism could structure work teams, meetings, and rewards around smaller cross-functional teams to reduce the potential negative moderating effect of institutional collectivism at the functional specialization or department level, while enhancing the positive moderating effects of in-group collectivism. Potentially, an effort to do this could be modeled on L'Oréal's approach to product development, which emphasizes cohesion at the unit of teams, rather than at the level of strategic business units (Hong & Doz, 2013). For L'Oréal, emphasis on teams allowed them to better utilize multicultural employees, but one could imagine that this emphasis on teams as the key unit in organizational life may offer a route to prioritizing in-group collectivism over institutional collectivism. In cases where the organizations are from countries that score high on future orientation, managers could create both working groups that identify opportunities for exploration *and* working groups that are charged with improving upon current activities, to avoid a myopic focus on exploration. For members of teams focusing only on identifying exploration opportunities, members would be free to pursue ideas without emphasis on maximizing short-term efficiency and financial performance. If organizations pursuing ambidexterity are in countries that score high on performance orientation, managers could require proposals and reports to include short-term, medium-term, and long-term performance forecasts under different market conditions to account for potential changes in the competitive landscape, to avoid a myopic focus on exploration to achieve short-term performance at the potential expense of long-run success. An effort to do this might resemble traditional scenario analysis practices (e.g., Clemons, 1995) or even dynamic scoring assessments run by some governmental accounting agencies (e.g., Mankiw & Weinzierl, 2006). Similarly, for organizations in countries that score high on uncertainty avoidance, teams that are tasked with exploratory activities should be assured that failure of new products, services, and activities will not negatively impact their careers. One approach to achieving this type of system is detailed by Tushman & O'Reilly (1996), who describe a period in time when customers would joke that the 'BA' initials for *British Airways* actually stood for "Bloody Awful." After BA instituted a system where managers were evaluated in terms of both what they

accomplished *as well as* what they did to improve, managers no longer felt restricted and accepted the uncertainty that was involved in trying new ways to interact with customers and identify better ways of interacting. As a result, BA's customer satisfaction, reputation, and performance improved. In addition, decision-makers in organizations from high-uncertainty countries could use reminders or question lists to ensure that decisions regarding exploratory activities are not made strictly based upon a desire to avoid uncertainty. An example question might ask is a decision not to pursue a new opportunity is because if the opportunity is successful it could pose a threat to the organization's core business. If the answer is "yes," then the decision maker may need to revisit the decision, because if the exploratory activity could replace an existing core business it may have a negative impact on short term performance, but it could also be a future core business for the organization and source of competitive advantage. In situations like this, forcing decision makers to take a second look could help them to avoid potential problems. As an illustration, in 1975 an engineer at Kodak was asked to create the world's first digital camera, and when he did, the company decided to kill the project because it could potentially threaten their core business: film (Lucas & Goh, 2009; Vitton, Schultz, & Butz, 2014). As a result, Kodak was late to the digital revolution in photography and never recovered (Lucas & Goh, 2009). Many of these implications for practice could be considered best practices for all organizations hoping to benefit from ambidexterity, but depending upon the national cultures that they are embedded in, some of these recommendations may be especially relevant or important.

The key implications for practice from essay 2 can be linked to the potential for Asian managers with a holistic thought process to devote greater amounts of attention to the context surrounding their organization, and for western managers with an analytic thought process to devote greater amounts of attention to the focal organization and relevant factors such as performance relative to aspirations or the presence of organizational slack. Certainly, western managers and Asian managers pay attention to *both* the focal organization and the external context, but essay 2 and a growing body of research suggests that their attention will be lopsided (Masuda & Nisbett, 2001; Miyamoto & Nisbett, 2005; Nisbett & Masuda, 2003). For example, if

managerial attention is sharply focused on the organizations recent performance, and making adjustments to improving this performance in subsequent periods, they may be less aware of relevant changes in the macro-external or competitive industry environments. On the other hand, if managerial attention is sharply focused on the context surrounding the organization, there may be missed opportunities to improve upon the internal operations of the organization. Hence, one recommendation is to equally prioritize the evaluation of firm performance or factors and changes or patterns in the greater context. By creating the routine of devoting considerable time to evaluating each, both western and Asian managers might be able to avoid the pitfalls of a lopsided distribution of their attention. In practice, this might involve running evaluations that continuously follow the framework of something like the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis that is usually conducted more periodically. Liking more frequent analyses to the SWOT framework may help to overcome problems with lopsided attention because this framework focuses simultaneously on the focal organization (i.e., strengths and weaknesses) and the context in which it is embedded (i.e., opportunities and threats). A second key implication for practice from essay 2 is that managers should be aware that their R&D search intensity investments may be influenced by their national culture, or the membership of their nation in a cultural cluster.

The implications for practice from essay 3 are mostly relevant to firms from predominantly strong-FTR language countries, where decision makers may discount the future value of intellectual property. Specifically, if strong-FTR language decision makers engage in greater levels of temporal discounting and subsequently protect less IP through patenting, this may reduce their abilities to generate exclusive returns from this IP in the future, and this could make it more difficult to recoup R&D investments and secure IP-related competitive advantages, or it may even have an effect on the market's perceived value of a firm. Potentially, organizations within predominantly strong-FTR language could proactively initiate regular (e.g., semi-annual) audits of patents and IP to identify gaps, where new IP is not fully protected. Following the insights of Rivette and Kline (2000), these audits could also include assessments of IP's business and commercial value in the present and the future. Potentially,

requiring decision makers to more fully catalogue both new IP and its future value will reduce temporal discounting and prime them to patent innovations.

5.3 Key limitations and areas for future research

As with all research, each of the essays in this analysis has limitations that are worth noting, and most of these limitations can be linked to opportunities for future research. In the case of essay 1, GLOBE dimensions (House et al., 2004) were used to operationalize different aspects of national culture, but there are many more frameworks and approaches to understanding and categorizing different national cultures, and some of these may act as moderators between ambidexterity and performance in single nation contexts. While this is a notable limitation for essay 1, this limitation also highlights opportunities for future research to replicate the analysis using different approaches to understanding national culture (e.g., Hall, 1960; Hofstede, 1980; Schwartz, 1992; Masuda & Nisbett, 2001; Mavisakalyn & Weber, 2017; Meyer, 2014). For example, a high- versus low-context categorization scene could be used to differentiate between the countries in which individual studies in the meta-analysis were conducted and then the moderating effect of the difference could be tested. An additional limitation of essay 1, and the meta-analytic approach, is that even though the study inclusion criteria used to select studies offers some control, there are still likely to be significant differences between studies in terms of internal validity and rigor. In addition, some differences between samples used in the included studies may not be empirically described, and therefore they cannot be controlled for or accounted for using moderator analyses in the meta-analysis. The potential for differences in organizational cultures among organizations within the different studies used in the meta-analysis in essay 1 is one good example of a factor that could not be examined. However, as more empirical research is being conducted in this area, there may be an opportunity in the future to gather enough empirical ambidexterity-performance manuscripts to run moderator analyses that divide the sample by studies in different national cultural contexts *and* with samples that have different characteristics in terms of measured organizational cultures. Along the sample lines, a large number of the studies included in the meta-analysis in essay 1 were conducted

in the United States, but there has also been an increasing number of studies conducted outside of the United States in recent years. Hence, in the coming years there may be opportunities to re-run an analysis like the one in essay 1, with a sample of studies from a more diverse collection of national contexts.

The most notable limitation of essay 2, which examined the potential moderating effects of membership in Asian or western cultural clusters on the PFM with R&D search intensities as an outcome, is that the PFM is built upon a rich nomological net of theoretical constructs and relationships that are not necessarily observable. For example, the cognitive processes of search, making decisions, and evaluating risk tolerances of decision makers are not actually observable. The same issue is true of managerial attention to either the context or the focal firm in essay 2. Hence, most of the PFM literature, including essay 2, has tested hypotheses by measuring antecedents (e.g., performance) and outcomes (e.g., adjustments to R&D search intensity) of the model. This area of research is very well theorized and impactful in the strategic management literature, but the actual theoretical mechanisms are still packed away within the 'black box' of organizations, and this remains a limitation. Potentially, future research could attempt to open this black box through different epistemological approaches, such as experimentation and case studies. The combination of existing empirical research in this area that has a high degree of external validity but lower internal validity, with future experimental and case study research that has a high level of internal validity with lower levels of external validity could greatly enhance our understanding of the PFM, and potentially the moderating effects of national culture on PFM outcomes such as changes in R&D search intensity. An additional limitation of essay 2 is that the empirical analysis was conducted in the context of a single industry (global automotive companies), so caution should be taken when generalizing to other industries. This limitation also highlights an opportunity for future research to replicate essay 2 using samples from different industries.

The need for caution in generalizing findings is also a limitation of essay 3, which was also used a specific industry (global automotive suppliers) for empirical analysis. It follows that replicating essay 3 in different empirical contexts is also an

opportunity for future research. The second key limitation in essay 3 is the use of a firm's percentage of sales from outside its triad region as a measure of internationalization, instead of FDI based measures of internationalization. The use of this operational definition has its proponents and opponents (Contractor et al., 2007), and replicating essay 3 in different contexts where FDI measures of internationalization are clearly better, and available, is an opportunity for future research. An additional opportunity for future research based upon essay 3 is to assess the use of English as a lingua-franca in organizations from predominantly weak-FTR language countries. If the adoption of English for business purposes in organizations from these countries results in greater levels of temporal discounting, relative to the use of the predominate weak-FTR language in the home country, this may be an argument for more fully considering both the benefits *and* drawbacks of adopting English as a working language.

And finally, a notable limitation of this entire thesis is that it is entirely empirical. Early in the process of collecting data for essay 2, I reached out to a number of automotive firms and automotive supply firms using professional contacts. These outreach efforts included contacting American auto suppliers in Flint and Auburn Hills (Michigan, USA), a Korean automotive supplier's subsidiary in Georgia (USA), and Korean automotive companies in Korea. In each case, my requests for interviews were either denied, or met with no response. Hence, this limitation stems from barriers to access and resources. Yet, this is still a notable consideration, and if possible, I hope that future research can gain access to decision makers in companies like this to better understand the processes of R&D investment decisions and well as patenting decisions, and the potential roles that national culture might play in these phenomena.

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("*" indicates the study was included in at least one of the meta-analyses in essay 1, presented in chapter 2)

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