

**Underutilized Productive Resources and National Institutions of
Corporate Governance:
Effects on Firm Innovation Strategy**

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Dedication

真理子へ

何よりも大事なものは、真理子がいつも笑わせてくれるおかげで毎日が楽しいことです。いつも本当にどうもありがとう。

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Chapter One: Introduction

Why do some firms engage in more extensive efforts to innovate than others? This dissertation addresses this question by investigating the role of underutilized firm resources—what Cyert and March (1963) and other management scholars describe as “slack”—in motivating firm efforts to innovate. In doing so, I provide two explanations for why firms might be more inclined to use slack to innovate rather than reducing slack by laying off employees or selling assets. First, slack constitutes a valuable input for promoting innovation with fewer concerns about opportunity costs associated with diversion of resources from other uses in the firm. Second, national regulations offering differential protections to firm stakeholders may encourage the use of slack to innovate if it serves the public policy goal of protecting preferred firm stakeholders like employees.

Building on ideas articulated by Edith Penrose in *The Theory of the Growth of the Firm* (1959), I develop a theoretical framework linking the intensity with which firms engage in innovation development to heterogeneity in human and physical resource levels within the firm and to variation in institutional conditions that constrain how firm resources are managed. Although previous management research on the effects of organizational slack has taken up the issue of how underutilized firm resources promote innovation, extant research has not extensively considered how current understandings of this relationship might be altered by characteristics of these specific types of resources or national institutional differences. With respect to underutilized resource type, the theoretical focus of prior research has been trained on the innovation-enabling properties of slack, which, in turn, has contributed to an empirical focus on financial resources. At

the same time, the management of underutilized resources within the firm necessitates decisions regarding resource allocation. Although cross-national institutional differences are likely to bear on these decisions, organizational slack researchers have yet to extensively consider the implications of institutional influences. Limiting the focus to isolated institutional contexts provides only a partial picture of the relationship between underutilized resources and firm innovation strategy.

In this dissertation I address these shortcomings with two separate but related empirical studies that examine the extent to which underutilized firm resources motivate firm innovation and the extent to which national institutions that constrain firm decision making influence the strength of that relationship. The central claim of the first study is that the more extensive the presence of underutilized human and physical resources within the firm the more firms will engage in innovation efforts aimed at creating value from those resources. The second study claims that the strength of this relationship is contingent upon the strength of national regulatory institutions that protect the rights of two important firm stakeholder groups—minority shareholders and employees. As the rights of either group become more protected, firm decision making regarding the allocation of resources to innovation becomes more constrained. These constraints diminish the strength with which underutilized resources motivate innovation search in contexts of strong shareholder rights, while magnifying that strength where employment protections receive more institutional support.

The first study of this dissertation is presented in Chapter Two. In it, I examine the role of underutilized resources in motivating firm innovation by building on ideas originally developed in the *Theory of the Growth of the Firm* (Penrose, 1959). Previous

research examining the effects of organizational slack on firm strategy has focused on how slack protects the firm from performance fluctuations and changes in the external environment (Bourgeois, 1981; Nohria & Gulati, 1996). This view of slack derives largely from the conceptualization of slack described by Cyert and March in the *Behavioral Theory of the Firm* (1963). In terms of the relationship between slack and innovation, these buffering characteristics of slack establish the theoretical justification underlying its innovation-enabling properties. Although this research has been valuable toward improving our understanding of underutilized firm resources, it has been limited in two respects. First, theoretical developments regarding the effects of underutilized resources have largely ignored their potential innovation-motivating properties. Second, the focus on innovation enabling has led to an empirical focus on resources that align better with these properties. In particular, it is the presence of underutilized financial resources that has received the bulk of empirical attention in extant scholarship.

Penrose, like Cyert and March (and writing around the same time), was concerned with the internal workings of the firm. However, the Theory of the Growth of the Firm (TGF) focuses primarily on the role of underutilized firm resources in shaping firm action, whereas the Behavioral Theory (BTF) is much broader in scope. Although today Penrose is primarily cited for her view of the firm as a collection of resources—which has developed into the basis for the resource-based view of the firm (Mahoney & Pandian, 1992)—her main contribution was more explicitly about how underutilized resources drive firm growth. Importantly, the TGF perspective on underutilized firm resources differed from that of the BTF in that Penrose provided the theoretical basis for how underutilized resources *motivate* as well as enable firm growth (Pitelis, 2007).

Reconnecting with the Penrosian view of resources, therefore, provides a theoretical foundation for examining this additional important, but neglected, property of underutilized resources with regard to their role in firm innovation. Additionally, the TGF identifies two types of firm resources—physical and human. However, neither resource type has received substantial attention in extant slack research, which has been predominantly concerned with underutilized financial resources. Accordingly, bringing attention back to the main ideas of the TGF as originally articulated by Penrose provides a further impetus to address these omissions.

Distinguishing between the innovation-motivating and innovation-enabling effects of different resources also allows for the integration of insights on underutilized resources based on the BTF with the Penrosian drivers of innovation from the TGF. Management research has not extensively considered how the effects of different types of underutilized resources may be combinatorial in nature. Accordingly, this first study of the dissertation is able to make an additional contribution to management research on slack and innovation by examining how the strength of the innovation-motivating effects inherent in Penrosian resources varies with firm levels of innovation-enabling financial resources.

A final contribution of Chapter Two to management research is made with respect to research employing the dynamic capabilities perspective (Teece, Pisano & Shuen, 1997; Helfat & Peteraf, 2003). Research in the dynamic capabilities stream emphasizes the importance of the process of new capability generation—particularly through innovation—to the ability of firms to remain competitive over time. Although firms are assumed to make efforts to develop these capabilities, issues pertaining to the

circumstances under which such efforts may be more or less forthcoming has not been a topic of extensive research. The first study of the dissertation takes up this issue by applying TGF arguments regarding the cyclical nature of firm growth rates to the timing of innovation search activities.

The second study of this dissertation is presented in Chapter Three. This study builds on the arguments developed in the first by examining how the strength of drivers of firm innovation effort is contingent on features of the national institutional environment. I focus on how national institutions that influence corporate governance by providing stronger legal protections to two firm stakeholder groups—employees and shareholders—constrain the set of acceptable decisions available to firm management regarding resource allocation to innovation activities. The central claim of this portion of the dissertation is that when the rights of either minority shareholder or employee stakeholders are more protected by these national corporate governance institutions (NCGIs), firm decision making with regard to the management of underutilized resources becomes constrained. These constraints can augment or restrict the innovation effort motivated by the presence of underutilized resources. This study considers how the strength with which Penrosian resources—human and physical resources—as well as unabsorbed slack resources—in the BTF sense—promote firm innovation effort are contingent on these national corporate governance institutions.

National institutions are an important determinant of the extent to which stakeholder interests are accounted for in firm decision making (Aguilera & Jackson, 2003; Pfeffer & Salancik, 1978). Literature in law and finance has identified how regulatory institutions dictate the strength of shareholder rights and employment

protections at the national level (Botero, Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2004; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998). Examples of such regulatory institutions include labor rights and laws that facilitate minority shareholder voting. Accordingly, these institutional characteristics will bear on firm decisions regarding resource allocation to innovation activities. However, this issue has yet to be addressed in management research into the effects of organizational slack on firm strategy.

Anecdotal observation suggests that these cross-national differences in the strength of NCGIs are important for firm innovation strategies. Germany and the UK lay on opposite ends of the spectrum with respect to shareholder rights (UK strong, Germany weak) and employment protections (UK weak, Germany strong). Data on national R&D intensity from the World Bank World Development Indicators database show that German national R&D intensity levels tend to run well above those of the UK. For example, in 2009, German R&D expenditure of 2.9% of GDP was substantially ahead of the corresponding value of 1.8% for the UK. This divergence between the two countries in terms of innovation investment is widely reported in the business press. For example, the *Economist* newspaper has referred to the problems of “low productivity, low business investment in research and development (R&D) and fitful innovation” as a “familiar British complaint” (*Economist*, 2007: 4). The same publication has noted the propensity of German firms to invest in innovation.

A recent article in the *Economist* about the German *Mittelstand* noted that these firms responded to the challenge posed by increasing global competition—particularly from Asia—by, among other things, maintaining a commitment to innovation

(*Economist*, 2012). Some of the most successful of these German firms maintain R&D intensity levels above 10% (Simon, 2009). Skilled employees provide another critical pillar of the competitiveness of German firms and the firms in turn tend to maintain commitments to those employees. Markus Miele, managing director of Miele, a German kitchen equipment manufacturer, explicitly stated that German firms do not set out to maximize shareholder value but rather take a longer-term approach to management (*Economist*, 2012). By contrast, a report commissioned by the UK Government Department for Business, Innovation & Skills concluded that an excessive focus on short-term performance and profits is a problem for innovation investment in the UK (Kay, 2012). A consequence of this focus is that short-term competitive challenges are met with solutions that focus on immediate profitability. For example, British pharmaceutical firm GlaxoSmithKline recently responded to increased competition from rival production of generic drugs by laying off two percent of its R&D workforce (*Wall Street Journal*, 2008). In his report to the UK Government's Department for Business, Innovation and Skills, Kay (2012) notes that short-termism in the UK poses potential costs to the long-term competitiveness of the country. This dissertation attempts to provide more systematic evidence of the impact of these institutions on how firms respond to the presence of underutilized resources.

Research in the national innovation systems (NIS) stream has drawn substantial attention to the critical role of the institutional environment in shaping innovation at the national level (Lundvall, 1992; Nelson, 1993). The study presented in Chapter Three shares this focus on the relationship between institutions and innovation with the NIS perspective. However, this study adopts a more focused approach than research in the

NIS tradition in two respects. First, I focus on a single type of institutions—stakeholder rights—that varies in strength across countries rather than on unique national combinations of institutions that work together to influence innovation patterns in a particular country but which may not be generalizable across national contexts. Second, I am concerned with innovation at the firm-, as opposed to national-, level. My primary interest is in how institutions shape firm behavior and decision making rather than in their macro-level effects on innovation in the country as a whole. I focus on the set of firms for which the constraints posed by institutional supports for stakeholder rights are most likely to bind, namely publicly traded corporations.

To address the influence of national institutions on firm level innovation activities, I develop an integrated cross-level theoretical framework (Martin, Cullen, Johnson, & Parboteeah, 2007; Rousseau, 1985) that focuses on how national differences in regulatory institutions interact with firm characteristics to shed light on an important contingency moderating the strength of drivers of firm innovation activity. In doing so, I integrate an institutional perspective on stakeholder influence with the innovation-motivating properties of underutilized human and physical resources outlined in the TGF. Research on innovation has tended to focus on either organizational or institutional influences separately. However, by conducting research on separate tracks, researchers have missed the opportunity to gain better understanding of the innovation process (Coriat & Weinstein, 2002). The cross-level theoretical framework developed here integrates influences at the institutional as well as firm level of analysis to help deepen understanding of why some firms engage in more innovative effort than others.

This second study of the dissertation addresses several gaps in current research in the strategic management and international business subfields of general management. Although previous empirical research on organizational slack has found that underutilized resources have a positive effect on firm innovation effort, the question of how national institutional context moderates the strength of these relationships has not been sufficiently addressed. Extending the TGF to understand how its predictions regarding firm search are moderated by institutional context helps to identify important boundary conditions of this theory.

Successful innovation requires commitment from organizational decision makers (O'Sullivan, 2000; Van de Ven, Polley, Garud, & Venkataraman, 1999). When these decision makers are located in different countries, they operate under substantially different sets of governance constraints stemming from cross-national institutional differences. However, research investigating how regulatory institutions shaping corporate governance influence the innovation strategies of firms has not been extensive. In filling this gap, this dissertation also contributes to international business scholarship by addressing the micro-question of comparative corporate governance (CCG) research, namely 'how do cross-national differences in corporate governance bear on firm strategy?' (Aguilera & Jackson, 2010). Moreover, by linking macro-level CCG insights detailing differences in national governance features with a TGF perspective on innovation, I attempt to provide a theoretical mechanism for how institutions governing stakeholder rights influence firm decision making.

There are many types of innovations that firms develop and adopt (Van de Ven et al., 1999). In both studies of this dissertation, I focus on technological innovation

specifically. Development of new technologies provides a critical component for firms to offer improved or entirely new products as well as more efficient processes for production and delivery of those offerings. At the same time, firm efforts to innovate technologically are more readily visible across firms and countries through attention to research and development expenditures.

Description of the measures and methodological approaches used to test the arguments in each of the studies are presented in chapters two and three, following the respective theory and hypothesis development sections. To test the hypotheses regarding the relationship between underutilized firm resources and innovation effort, I employ a sample consisting of more than 3,000 firms from 18 countries observed over the ten-year period from 1996 to 2005. This sample is used for empirical testing of the arguments developed in both the first and second studies. The second study adds additional national level measures required by the cross-level theoretical framework.

Empirical tests reveal support for the central arguments presented in the dissertation. More specifically, I find support for the claim in the first study that firms with more extensive levels of underutilized resources exhibit higher levels of innovation effort. Results also indicate that this relationship is stronger for firms with more extensive financial resources and following periods of stronger firm growth. Tests also reveal support for the claims of the second study. These claims were tested using a two-stage technique, novel to International Business research, where estimated individual, country-level effects of underutilized resources were used as dependent variables in estimates of national institutional characteristics. Institutional protections of both shareholder and employee rights moderate the strength of the relationship between underutilized resources

and firm innovation effort. Stronger institutional protection of shareholder rights diminishes the relationship. Stronger institutional protection of employee rights magnifies the relationship. However, such institutional moderator effects are significant for only one type of relationship—the relationship between underutilized firm human resources and innovation effort. Neither the relationship between underutilized firm physical resources such as plant, property and equipment and innovation nor that between unabsorbed slack and innovation is moderated by institutional protections of stakeholder rights. Results from both studies proved robust to several alternative methodological and measurement approaches. Chapters two and three conclude with a discussion of the respective results from each chapter, study limitations and possible extensions for future research.

The dissertation closes with Chapter Four, which provides a summary of the two studies and their relevance to current management research. Additionally, this chapter discusses implications for policy makers concerned with national economic competitiveness and aggregate innovation patterns regarding the importance of considering the importance of firm heterogeneity in assessing the impact of national regulations on multiple dimensions of domestic firm strategies. Chapter Four also considers some implications for managerial practitioners confronting the internal and external forces, discussed in this study, that promote and constrain innovation development within the firm. In particular, this dissertation draws attention to the importance of managerial consideration of the potential advantages of alternative national institutional configurations and how such configurations may enable firms to increase the credibility of their commitment to innovation.

Chapter Two: Underutilized Resources and Firm Innovation Effort

2.1 Introduction

Innovation enables firms to provide new, better quality and lower cost products and services. The ability of firms to continually deliver these offerings over time constitutes an important determinant of firm competitiveness (Teece, Pisano, & Shuen, 1997). Given the overriding concern of management scholars with firm performance, the process by which firms—as Schumpeter (1983: p.65) famously described it—develop “new combinations” of existing and new knowledge and resources is of obvious importance. Accordingly, management research has identified numerous drivers, characteristics and outcomes of the innovation process (Damanpour, 1991). The present study is concerned with one particular driver of firm innovation effort that has been the subject of managerial research—namely, underutilized firm resources (Nohria & Gulati, 1996). In particular, I examine the innovation-motivating properties of underutilized human and physical resources—two resource types that have been relatively understudied in the extant literature on organizational slack.

2.2 Background and Literature Review

Management scholarship examining relationships between slack resources and firm strategy has built extensively on the conceptualization of slack as articulated in Cyert and March’s *A Behavioral Theory of the Firm* (1963). According to the Behavioral Theory of the Firm (BTF), organizational “slack is the difference between the payments required to maintain the organization and the resources obtained from the environment by

the coalition” (Cyert & March, 1992: p. 189). Subsequent research has broadened the definition. For example, Nohria and Gulati (1996: p.1246) define slack as being the stock “of resources in an organization that is in underutilized of the minimum necessary to produce a given level of organizational output.” The emphasis in much management research on how slack affects firm strategy is on the role organizational slack plays in insulating the firm from fluctuations in performance and changing external conditions (Meyer, 1982; Sharfman et al., 1988; Singh, 1986) and in helping to mitigate potential adverse consequence associated with strategic decisions (Bourgeois, 1981; Nohria & Gulati, 1996).

Research on slack distinguishes between types of resources based on the ease with which different resource types can be allocated to alternative uses within the firm (Singh, 1986; Sharfman, Wolf, Chase, & Tansik, 1988). Resources that can easily be reallocated to new or different ends within the firm are generally referred to as unabsorbed slack. Those resources employed toward specific ends that cannot readily be altered in the near term are considered to be forms of absorbed slack (Singh, 1986).

Unabsorbed slack is not committed to any particular use within the organization. It is highly flexible and faces few if any restrictions in terms of the activities to which it may be applied (Sharfman et al., 1988). Slack enables the pursuit of innovation whose ultimate value is uncertain and not immediate (Bourgeois, 1981; Nohria & Gulati, 1996). Of the types of unabsorbed slack, financial slack is, by far, the most frequent subject of study by management scholars. Underutilized financial resources are argued to provide a buffer against performance volatility that protects firm projects from cancellation during challenging times. This is particularly important for the ability of firms to maintain R&D

projects that enable firms to develop new capabilities (Greve, 2007; Kim, Kim & Lee, 2008; O'Brien, 2003).

Resources that cannot be quickly or easily allocated to alternative uses are referred to as absorbed slack (Singh, 1986). Absorbed slack is tied to specific organizational activities (Voss, Sirdeshmukh, & Voss, 2008). Consequently, absorbed slack cannot be reallocated in the short-term. Absorbed slack is generally defined to include underutilized resources related to any activity in the firm, such as specific pieces of machinery and administrative staff.

Management research has generated ample evidence that organizational slack is a significant influence on a range of important firm outcomes including performance (e.g. Greenley & Oktemgil 1998; Tan & Peng, 2003; Love & Nohria, 2005; George, 2005), firm growth (Mishina, Pollock & Porac 2004; Chandler & Hanks, 1994; Cooper, Gimeno-Gascon & Woo, 1994) and risk taking (Wiseman & Bromiley, 1996). The relationship between firm slack and innovation activities constitutes another important topic that has received attention in extant research (Nohria & Gulati, 1996; Voss, Sirdeshmukh & Voss, 2008). For the most part this research has attended to innovation outcomes such as levels of firm patenting activity, or the development or adoption of innovations (Nohria & Gulati, 1996; Damanpour, 1991; Mellahi & Wilkinson, 2010; Greve, 2003, 2007).

Organizational slack is important to multiple dimensions of firm innovation. Beyond its effects on innovation outputs, the relationship between slack and innovation inputs is also important. The development of new innovations is frequently the result of a conscious effort on the part of the firm to develop new technologies and capabilities. The

process of research and development requires the allocation of firm resources toward the purchase of special equipment, the hiring of employees with specialized skills and the funding of efforts at experimentation. Many features of the internal and external environment influence the extent to which firm efforts to innovate translate into actual innovations. Innovation is, at its core, an uncertain process. Many innovation projects are ultimately unsuccessful in achieving their intended objectives (Van de Ven et al., 1999). Numerous difficulties based on technical as well as market challenges may intervene between the efforts of a firm to develop an innovation and successfully accomplishing that task (Lazonick, 2007). Moreover, even when innovations are successfully developed, their adoption or commercialization by the firm does not automatically follow. Risks of adopting an innovation exist beyond those associated with developing the innovation in the first place. Consequently, many firms develop innovations that are not further commercialized or adopted for reasons such as a lack of alignment with customer demands (Burgelman, 1991; Christensen & Bower, 1996) or unfavorable market conditions (Voss et al., 2008). Focusing on innovation outcomes may, therefore, not provide a complete picture of the extent to which firms are actually attempting to innovate.

Focusing on innovation effort rather than innovation output more closely follows theoretical arguments regarding the effects of underutilized resources on firm innovation strategies. A central tenet of the BTF is that organizations engage in performance driven search (Gavetti, Greve, Levinthal & Ocasio, 2012). When firm performance fails to meet desired levels, those firms react by searching for and implementing alternative strategies capable of restoring performance to expectations. However, Cyert and March (1963)

observed that while the implications of performance driven search for innovation should manifest themselves in the form of more extensive innovation effort in firms with worse performance, in practice this result did not materialize to the extent that would be expected. They argued that this discrepancy could be addressed through attention to the effects of organizational slack. Firms whose success has exceeded performance goals over time accumulate resources in underutilized of what is needed to maintain the present organizational coalition (Levinthal & March, 1981). These resources allow firms to engage in more extensive experimentation with less concern for the immediate performance consequences.

Innovation should, therefore, be more prominent in firms that have been successful over time because success inherently leads to the accumulation of slack. In other words organizational search, as it relates to innovation, will be driven by levels of organizational slack. This implies that search for innovation—that is, innovation effort—follows from the presence and level of underutilized resources within the firm. By contrast, the link to actual innovation outcomes may be less direct because of the technological and market challenges intervening between the search for innovation and the eventual results of that search. Accordingly, the present study focuses on innovation effort rather than actual produced or adopted innovations.

The BTF conceptualization of slack also has important implications for the relative salience of different types of slack to innovation effort. According to Cyert and March (1992: p. 189) “slack provides a source of funds for innovations that would not be approved in the case of scarcity but that have strong subgroup support.” In other words, slack *enables* firms to innovate. Research into the relationship between slack and

innovation effort has, indeed, been predominantly focused on the enabling property of slack as articulated in the BTF. Another implication of the BTF conceptualization of slack is that financial resources—that is, the slack that exists as “funds for innovations”—are of particular relevance. Accordingly, although theoretically both absorbed and unabsorbed slack are argued to have similar enabling properties (e.g. Nohria & Gulati, 1996), empirical research as well as theory detailing the nuances and boundary conditions of how and when slack enables innovation have overwhelmingly focused on unabsorbed slack—which tends to be defined in terms of financial resources.

A survey of extant management research into the effect of unabsorbed slack on innovation effort reveals this focus of scholarly attention to the enabling aspects of financial slack. Prominent empirical studies examining this relationship make direct mention of slack’s enabling properties (i.e. Greve, 2003; Chen, 2008; Chen & Miller, 2007; Kim, Kim & Lee, 2008; Nohria & Gulati, 1996). Moreover, with the exception of Greve (2003), all of these studies focus exclusively on financial measures of slack. Relatively few studies have examined relationships between non-financial slack and innovation. Attention to absorbed slack—broadly conceived—and, more specifically, to variation among types of absorbed slack is rare. In one of the few studies to explicitly examine the effect of absorbed slack on innovation effort, Greve (2003) found only tentative support for a positive effect of absorbed slack on R&D intensity among Japanese shipbuilders. Although absorbed slack was found to be positively related to firm R&D intensity, this effect was only significant across firms and disappeared when unique firm level factors were incorporated into the analysis.

A substantial part of the reason for the focus on financial slack can be attributed to ability of financial resources to be easily and quickly reallocated among potential uses within the firm and, at the same time, to cushion the firm from changes in the external environment. These features suggest that the focus on financial slack is appropriate in the context of applying the theoretical arguments as to how slack enables innovation described in the BTF. However, one consequence of this focus on innovation-enabling financial resources is that the question of whether underutilized resources motivate—as opposed to enable—firms to engage in more extensive innovation effort has not been substantially addressed. This represents a potentially significant oversight.

The ability to innovate represents only part of the reason why firms might actually attempt do so. Here, the motivation to engage in such efforts has clear salience and, according to Penrose in *The Theory of the Growth of the Firm* (1959) underutilized firm resources provide a critical source of that motivation. Like Cyert and March, Penrose was also concerned with the relationship between underutilized resources and firm strategy. However, the TGF focuses less on the cushion that underutilized resources provide the firm in terms of protection from internal and external changes. Rather, underutilized firm resources present a challenge to management to find ways to make more effective use of those resources. Because underutilized resources entail costs to the firm but these resources are not producing the full value they are capable of, managers will be under pressure to conceive of new approaches, processes and activities capable of more effectively extracting value from underutilized resources. From the perspective of the TGF, in addition to enabling innovation efforts, underutilized firm resources also serve to motivate those efforts. Pitelis (2007: p. 480) notes that:

“While Cyert and March’s claim explains why slack may enable innovation, it does not provide a general cause for why slack may also induce innovation...Such a general cause is provided by Penrose.”

Penrose argues that unused productive services, which arise in the presence of underutilized firm resources, constitute a fundamental force driving both firm expansion and innovation. In Penrose’s words, underutilized resources present the firm with both “a challenge to innovate” and an “incentive to expand” (Penrose, 2009: 76). She notes that “the belief that [unused productive services] exist [within the firm] acts as an incentive to acquire new knowledge...[this search for knowledge about the potential unused services of a resource] may take the form of research into its characteristics or of research into ways of combining its known characteristics with those of other resources” (2009: 69). In other words, underutilized resources “facilitate the introduction of new combinations of resources—innovation—within the firm” (Penrose, 2009, p.76). This particular emphasis of the TGF on the role of underutilized resources in motivating growth and innovation has been relatively overlooked by management scholars. This oversight even characterizes scholars employing the RBV who extensively cite Penrose for her view of the firm as a collection of resources but do not deeply consider the growth-motivating properties of resources. Attending to this oversight can help to build our understanding of why some firms engage in more extensive innovation activities than others.

Thus, while research providing evidence of the effect of underutilized financial resources on innovation search has helped to demonstrate the enabling role of underutilized resources on innovation argued in the BTF, research examining the motivating role of underutilized resources remains relatively underdeveloped. Another part of the reason for the lack of attention to the innovation-motivating properties of

underutilized resources is that the resources that motivate (as well as enable) innovation from the Penrosian perspective are not the financial resources that have been examined in studies based on the BTF perspective on slack. Rather, Penrose is concerned with resources that are used directly in the operation and production processes of the firm. Defining the firm itself as a “collection of productive resources” (2009: 21), Penrose goes on to define resources as “the physical things a firm buys, leases or produces for its own use, and the people hired on terms that make them effectively part of the firm” (2009: 60). In other words, firms consist of their physical *and* human resources. Physical resources are tangible things including “plant, equipment, land and natural resources, raw materials, semi-finished goods” while human resources consist of “unskilled and skilled labor, clerical, administrative, financial, legal, technical, and managerial staff” (Penrose, 2009: 21).

The overriding concern of Penrose (1959) lies with identifying features internal to the firm that motivate its expansion and growth. Penrose notes that she is “concerned with the growth of firms” (2009: 1) and that “in all of the discussion the emphasis is on the internal resources of a firm—on the productive services available to a firm from its own resources” (2009: 4). This focus aligns the TGF with, and indeed provides an important component of the basis for the resource-based view of the firm (RBV) (Barney, 1991; Wernerfelt, 1984). Although the TGF is commonly viewed as the basis for much of the RBV (Mahoney, 2005) and is extensively cited as originating with Penrose, the substance of which resources are relevant differs between the RBV and TGF. Research adopting the former perspective views resources in terms of how they are used within a firm. In this light, nearly anything that can be attributed to the firm can be considered a

resource (Barney, 1991; Mahoney & Pandian, 1992; Peteraf, 1993). From the latter perspective, firm resources are also of central concern. However, it is the productive services that resources are capable of rendering in the process of production, not the actual resources themselves which are the relevant inputs with respect to the theory.

This focus on the services embodied in resources represents an important distinction in the Penrosian conceptualization of underutilized resources. With respect to the potential services a resource may provide, it is not the individual that is relevant as an input but rather his or her ability to operate the machinery or manage a particular aspect of firm operations. The distinction between resources and productive services is important because human and physical resources are each capable of providing any number of productive services to the firm (Penrose, 1959).

In articulating how underutilized resources motivate (rather than merely enable) innovation search, it is necessary to adhere to the TGF focus on the role of underutilized human and physical resources. Doing so requires developing more accurate measures of these concepts than previous research that tends to measure absorbed slack at a very broad level, typically as a ratio of firm selling, general and administrative expenses to firm sales or assets (Singh, 1986; Greve, 2003). Not only do such broad measures lump human and physical resources together, they are substantially comprised of firm financial expenses such as taxes or advertising, that are not directly used in the production process. Consequently these measures do not effectively get at the concepts of human and physical resources as theorized in the TGF. Developing more explicit measures of the two types of Penrosian resources therefore makes an empirical contribution to research

on underutilized resources similar to that provided Mishina and colleagues (2004) in their study of how underutilized human resources shape firm growth patterns.

According to the TGF, firms always have underutilized resources because any resource is imperfectly divisible in terms of the services to the firm it is capable of rendering (Penrose, 1959). This means that firms are rarely, if ever, able to perfectly match resource needs and uses. As a result, of necessity, firms “overbuy” resources in this context. Moreover, the process of firm growth inherently involves the accumulation of new resources (which, again, are not perfectly divisible). The accumulation and maintenance of resources entails costs to the firm. However, if new uses for the services embodied in resources can be found, these services essentially constitute free inputs for the firm. Firms already own or pay for these underutilized resources but, at present, may not be allocating them to their most valuable ends to the full extent possible. There therefore exist strong incentives for firms to create value from underutilized resources, which, in turn, drives the growth of the firm.

Growth occurs primarily through increasing the scale or scope of the firm. That is, underutilized resources can be used to do more of the same, or can be used in new ways or in new activities. Penrose identifies three ways that firms diversify: through entering new markets with new products using the same production base, through expansion in the same markets with new products based on a different area of technology and through entering new markets with products based on new technologies (Penrose, 2009: 97). With respect to innovation, these types of diversification can be accomplished by combining underutilized firm resources with either other existing firm resources (in novel ways) or with new resources and capabilities expressly developed for the purpose of creating value

from the underutilized resources. Although both types of innovation accomplish the task, the focus of this study is on the latter approach.

Empirical management research examining the relationship between firm resources and diversification has focused extensively on how characteristics of resources possessed by the firm influence strategic decisions regarding diversification (e.g. Chatterjee & Wernerfelt, 1991; Pavitt, Robson & Townsend, 1989, Farjoun, 1994; Klepper & Simons, 2000; King & Tucci, 2002). This research has provided important and extensive insights into how existing firm resources and capabilities, once created, influence the nature and direction of subsequent diversification. For example, firms are more likely to expand into a new line of business when current resources are more applicable in the new business and when there exist difficulties in creating value from those resources through contracting (Silverman, 1999). However, research into the role of firm resources in providing the motivation for firms to engage in more extensive efforts to develop new capabilities in the first place—the other route to diversification—has been comparatively limited.

Given the critical role of innovation in enabling firms to develop and maintain competitive advantage (Teece, Pisano & Shuen, 1997; Eisenhardt & Martin, 2000), deepening the understanding of links between underutilized firm resources and heterogeneity in innovation efforts among firms constitutes an important contribution to management research. This study attempts to make a theoretical contribution to this research stream by extending TGF arguments regarding the role underutilized resources play in motivating firms to innovate explicitly to the extent to which firms engage in innovation search activity. Focusing on resources as defined by Penrose also enables

theoretical contribution to be made through integration of the motivating aspects of underutilized resources in the Penrosian sense with the enabling aspects of unabsorbed slack emphasized in Cyert and March's BTF perspective. These efforts are developed in the next section.

2.3 Theory and Hypotheses

2.3.1 Underutilized Resources and Innovation Effort

In articulating the TGF, Penrose (1959) emphasizes that one of the critical characteristics of the human and physical resources necessary to conduct firm operations and production activities is their indivisibility. In order to produce goods and services, firms must use the services—embedded in the resources—that serve as inputs to those processes. Although specific tasks require specific service inputs, firms are only able to purchase whole units of resources. That is, firms needing a single service input must hire a single employee or purchase a specific piece of equipment capable of providing that service. However, firms are rarely able to put to work all of the potential services capable of being provided by any specific resource. For example, a small firm may require the use sales staff to sell its products and services, but not be large enough for the salesman to occupy all of his time in that capacity, leading to him spending part of his time in non-sales related activities. Even though the firm may not need all of the services capable of being provided by a resource, Penrose (1959) argues that is generally difficult or expensive to obtain part of a resource. Consequently, it is frequently preferable or necessary for the firm to purchase and use the portion of the resource that it needs rather than to forego any use of that resource. The small firm described above is better served

by using only some part of the potential services of the salesman for sales than by not having a salesman at all.

In the process of firm growth, the imperative to increase output requires that additional resources (human and physical) are added to the firm. Because all of the services potentially offered by each resource cannot be used at one time, the firm always has some degree of underutilized services embodied in its resources (moving forward, the terms underutilized human resources and underutilized physical resources refer to these unused services embodied in each resource). These services include such things as unused man- or machine-hours or byproducts or production processes.

Acquiring resources entails costs to the firm. Accordingly, firms have incentives to extract as much value from their resources as possible. Unused services embodied in resources are essentially wasted. However, because the resources providing the services have already been acquired, they are capable of providing value to the firm at near-zero marginal cost if the firm can devise new ways to utilize them. The TGF argues that this imperative is a driving force behind the growth of the firm (Penrose, 1959).

According to Penrose, firms are constantly trying to find ways to put together the “jig-saw puzzle” created by the presence of underutilized resources. Because growth inherently entails the accumulation of new resources, firms engage in an ongoing process of growing and finding ways to productively utilize the resultant increase in underutilized resources. One way to put underutilized resources to use is through taking advantage of economies of scale by expanding the output of the firm. Because growth results in the accumulation of additional resources, “a higher level of output will be required if full use is to be made of resources” (Penrose, 2009: 65). Diversification offers another route

toward productive utilization of underutilized resources (Teece, 1982). Penrose notes that expanding production in existing lines of business may not be feasible at all times because market conditions may not warrant such expansion (1959). Under these circumstances diversification of output may be required in order to make effective use of underutilized resources. The presence of economies of scope may also lead firms to seek growth in new lines of business through diversification (Teece, 1980).

In making decisions as to how to take advantage of the productive opportunities available to the firm, the motivation is not merely to put unused resources to work. Inherently, some potential services associated with a given resource have more value (or potential value) than others. Recognizing this, Penrose submits that optimal firm growth “requires that the resources available to a firm, whether already acquired by the firm or obtainable in the market, be used to ‘best’ advantage” (2009: 40). To illustrate this point she provides the example of a small firm needing a chemist to test the quality of some set of firm products (2009: 63). Because the firm is small, it is unable to use all of the chemist’s time in this capacity, resulting in the need to assign some less valuable tasks to the chemist (such as inventory checking). As the firm grows and new productive opportunities avail themselves to the firm, the firm might, in theory, allocate that portion of the chemist’s time not presently dedicated to product quality testing to either additional inventory checking or to additional chemical testing. Because it is the chemical testing that is the more valuable resource, the incentives for the firm are to find ways to employ more of the chemists time toward this end as opposed to the less valuable task of additional inventory checking.

Levinthal and Wu (2010) expand upon this point, noting that much of the research on the development of new firm capabilities has failed to pay sufficient attention to the degree to which capabilities are scalable. Although some capabilities, such as the firm's brand and patents, are scale-free and can be freely used across activities, most firm capabilities are limited in the extent of activities to which they can be applied and, therefore, have opportunity costs associated with their use. Firms must therefore make choices regarding how underutilized resources are used, with some applications inherently providing more (potential) value than others. Because firms may expand into current or new markets using underutilized resources as currently configured or by developing new configurations of existing and novel resources, decisions regarding which course of action is most appropriate should account for which strategy most effectively deploys underutilized firm resources to create value. According to Penrose, "a firm has an incentive not only to engage in operations large enough to eliminate pools of idle services, but also to use the most valuable specialized services of its resources as fully as possible" (2009: 63).

The motivation of the firm to use its resources more effectively provides the economic incentive underlying much firm innovation (Kor and Mahoney, 2000). According to the TGF, the motivation to innovate derives from the presence of unused and freely available services, and the knowledge possessed by the firm regarding the potential ends to which those underutilized resources can be deployed. Together, knowledge held by firm employees and the characteristics of firm resources work to shape what Penrose refers to as the 'productive opportunity of the firm'. That is, "all the productive possibilities the [innovative actors within the firm] see and can take advantage

of” (Penrose, 1959: 28). In this way, the presence of underutilized resources combined with firm knowledge presents the firm with a “challenge to innovate” and “facilitate the introduction of new combinations of resources—innovation—within the firm” (Penrose, 2009: 76).

Within the TGF, the innovation-motivating properties of underutilized resources derive in large part from knowledge that accumulates within the firm regarding those resources. Increases in firm knowledge expand the range of potential services provided by any given resource. All firm resources are therefore capable of providing any number of services, allowing each resource to be used in multiple applications and in multiple ways. “The possibilities of using services change with changes in knowledge. More services become available, previously unused services become employed and employed services become unused as knowledge increases about the physical characteristics of resources, about ways of using them, or about products it would be profitable to use them for” (Penrose, 2009: 68). The variety of applications for firm resources is only limited by the range of ideas possessed by firm employees for using those resources, which are themselves shaped by the characteristics of the resources themselves. “The services that resources will yield depend on the capacities of the men using them, but the development of the capacities of men is partly shaped by the resources men deal with” (Penrose, 2009: 70).

The close links between the character of resources and the knowledge possessed by firm employees using them suggest that increased firm experience stemming from growth also shapes perceptions within the firm regarding the external demand for existing and potential firm products and services. The set of productive opportunities available to

the firm is also enhanced by changes in the environment and the potential for idle services to be used to address those changes. In Penrose's words, "changing experience and knowledge affect not only the productive services available from resources, but also 'demand' as seen by the firm" (2009: 76).

According to the TGF, firm experience precipitates organizational learning in two ways, through "changes in knowledge acquired and changes in the ability to use knowledge" (Penrose, 2009: 48). Learning within the firm occurs both informally as part of the process of operating, maintaining and expanding the firm as well as through formal instruction regarding those activities (Penrose, 1959). Any increase in firm experience with operations and production entails learning about opportunities to improve firm performance (Arrow, 1962). In the process of expansion, firms engage in various degrees of specializing activities, dividing and allocating tasks and engaging with different human resources within the firm to integrate and allocate underutilized resources.

In addition to learning from internal processes and activities, organizational learning also occurs as a result of firm experience with external stakeholders. Suppliers may provide valuable insights into quality and process improvements (Schroeder, Bates & Juntilla, 2002), especially when those relationships are long term (Gerwin, 1993). Meeting the demands of firm customers can force firms to solve problems in unique ways that induce novel knowledge development and routines to support those processes (Dyer & Singh, 1998; Madhok & Tallman, 1998).

According to Penrose, "the knowledge possessed by a firm's personnel tends to increase automatically with experience" (Penrose, 2009: 68). New knowledge creates new possibilities for using underutilized resources in new ways—innovating—to create

more value from those resources. Automatic increases in knowledge motivate firm innovation activities because “many of the productive services created through an increase in knowledge that occurs as a result of experience gained in the operation of the firm as time passes will remain unused if the firm fails to expand” (Penrose, 2009: 48).

Increases in firm knowledge also motivate firm innovation because efforts to create value from that knowledge are likely to be most effective if conducted within the firm. Organizational learning follows from circumstances and experiences unique to the firm. The process of developing new knowledge is therefore evolutionary in nature (Nelson & Winter, 1982). This evolutionary process suggests that much of the knowledge firms gain from experience that takes the form of underutilized resources will be firm specific (Augier & Teece, 2007). The TGF argues that the knowledge developed within a firm is closely tied to the idiosyncratic characteristics of the firm’s human and physical resources (Penrose, 1959). An important consequence of this is that knowledge developed within one firm is not available to other firms. Moreover, a substantial portion of organizational knowledge exists in the form of potential services embedded in firm human resources.

Individual employee knowledge is based on the unique operations, structure and history of the firm as well as relationships between and among other firm employees. Effectively employing such knowledge in any other firm would necessitate additional experience for the individual employee and, therein, additional costs to the other firm (Mahoney, 2005). When knowledge is unique to firm resource configurations, its value inside other organizations is necessarily less than what it would be inside the organization where it originated (Williamson, 1981). This restricts the extent to which value can be

created from underutilized resources through their deployment outside the firm. The firm-specificity of the knowledge gained by firm employees—upper-level management in particular—also works to increase the willingness of individual managers to make irreversible investments to facilitate expansion in the face of uncertainty (Kor & Mahoney, 2004). Accordingly, the firm-specificity of knowledge developed within the firm motivates innovation because such innovations are likely more valuable if developed within the firm.

Firm knowledge also increases through deliberate efforts on the part of the firm to learn more about the potential services that can be provided by resources. Penrose argues that when firms believe that increased knowledge about the resources they possess can improve firm efficiency and profitability, underutilized resources will act “as an incentive to acquire new knowledge...and shape the direction and search for knowledge” (2009: 68-69). This search for knowledge “may take the form of research into [resource] characteristics or of research into ways of combining its known characteristics with those of other resources” (Penrose, 2009: 69). Firms are also motivated to conduct research aimed at innovation for defensive reasons. Because current capabilities and processes quickly become obsolete, firms are pressured to not only keep up with the cutting edge of relevant research but to lead in the development of the most advanced products when possible. “For many, if not most firms, the more effective long-run protection both against direct competition as well as against the indirect competition of new products will lie in the firm’s ability to anticipate, or at least to match, threatening innovations in processes, products, and marketing techniques” (Penrose, 2009: 100). Although the TGF emphasizes the role of management in orchestrating resource allocation and innovation,

underutilized resources may also promote innovation through informal channels when enterprising employees experiment on their own without the awareness of management (Burgelman, 1991).

According to the TGF, the new knowledge that accumulates in firms may often be most valuable to the firm if used as a basis for new capability development. Penrose submits that “there is no reason to assume that the new knowledge and services will be useful only in the production of a firm’s existing products; on the contrary, they may well be useless for that purpose but still provide a foundation which will give the firm an advantage in some entirely new area” (2009:101). Making the best use of firm resources may require more than merely recombining resources the firm currently possesses. It may require the development of entirely new resources and capabilities. Building on existing skills and resources by developing new capabilities constitutes perhaps the most essential means by which firms establish and maintain competitive advantage (Teece, Pisano & Shuen, 1997). Given the primacy of remaining competitive as a firm objective, firms will have greater incentives to build on underutilized resources through innovation when underutilized resources are capable of increasing firm competitiveness, contingent on the development of new capabilities (Daneels, 2002). Firms invest in more extensive development of new capabilities through activities such as R&D when they have both physical resources and relevant knowledge bases upon which to build (Helfat, 1997). Accordingly, firms will engage in more extensive search for innovation when they have relatively greater levels of underutilized resources that motivate (as well as enable) those innovations.

Both types of Penrosian firm resources—human and physical—are important drivers of the extent to which firms search for new innovation. With respect to human resources, any additions to firm knowledge originate in the employees who possess it (Becker, 1993). Although some of this information may be easily codified, a substantial portion inherently remains with the employees in which it is embedded (Pfeffer, 1994). The ability of firms to innovate is, therefore, closely tied to human resources (Lepak & Snell, 1999). Accordingly, human resources are widely acknowledged to be critical to firm performance (Coff, 2002). The ability to effectively manage a firm's human resources at multiple levels of the firm is a crucial component of its ability to develop and maintain competitiveness (Becker & Gerhart, 1996). The trend in inter-firm competition towards becoming ever more knowledge-based works to make human resources an increasingly vital component of firm competitiveness (Grant, 1996; Hitt, Bierman, Shimizu & Kochhar, 2001).

The presence of underutilized human resources, in particular, has been demonstrated to drive firm growth and diversification (Mishina, Pollock & Porac, 2004). However, underutilized human resources will also promote innovation to internally develop new capabilities. One of the few studies explicitly examining the relationship between underutilized human resources and firm expansion was conducted by Mishina and colleagues (2004). These authors found that firms possessing underutilized human resources emphasized expansion of markets for existing firm products because of the ease with which unused services bundled in firm employees might be used in the same manner to increase output. Conversely, they found that underutilized human resources restricted

firms from pursuing a strategy of developing new products because of the difficulty of reallocating employee resources to new activities.

It is important to note, however, the short term focus of this study. Mishina and colleagues (2004) were focused on how underutilized resources interacted with firm growth strategies—either an emphasis on product or market expansion—to affect short-term (2-year) sales growth. Employing underutilized resources in new ways such as the development of new products is likely to involve firm effort to develop and integrate existing unused services with new activities—a task which would be challenging to accomplish in the short term. However, the possibility remains that innovation—either the form of new product development or otherwise—represents a high-value means of utilizing underutilized firm resources. Indeed, to the extent that underutilized employee resources consist of valuable new knowledge whose most valuable application is in new activities, firms will have incentives to engage in efforts to search for new innovations that employ those resources and such a strategy is likely to preclude product expansion in the short-term but may facilitate it over time.

The TGF explicitly addresses this possibility, noting that the presence of underutilized resources not only incentivizes innovation based upon novel combinations of existing resources (used and unused) but also creates strong incentives for the firm to search for and develop new knowledge capable of complementing existing resources (Penrose, 1959). Entrepreneurial resources consist of “those contributions to the operations of a firm which relate to the introduction and acceptance on behalf of the firm of new ideas, particularly with respect to products, location, and significant changes in technology, to the acquisition of new managerial personnel, to fundamental changes in

the administrative organization of the firm, to the raising of capital, and to the making of plans for expansion, including the choice of method of expansion” (Penrose, 2009: 28). Although entrepreneurial services differ from managerial services—“which relate to the execution of entrepreneurial ideas and proposals and to the supervision of existing operations”—the same firm personnel frequently perform both roles (Penrose, 2009:28). Penrose acknowledges that variation in preferences of a firm’s ‘entrepreneurs’ and constraints on their ability to provide those services may restrict the strength with which underutilized resources motivate firm expansion and the search for knowledge. Nonetheless, given the TGF assumption that firms aim to increase total long run profits, Penrose argues that even firms with modest entrepreneurial ambition are likely to seek out knowledge, noting that “both an automatic increase in knowledge and an incentive to search for new knowledge are, as it were, ‘built into’ the very nature of firms possessing entrepreneurial resources of even average initiative” (Penrose, 2009: 69). Accordingly, underutilized resources within the firm will generally motivate firms to create value from those resources through innovation.

Innovation need not always (or even frequently) be the consequence of possession of underutilized human resources. The TGF argues that underutilized resources broadly promote firm growth. Growth may be achieved through such means as increasing output through more intensive use of current resources or through diversifying into new lines of business. Nonetheless, the increases in knowledge and productive opportunities stemming from firm growth will work to create at least some attractive possibilities for innovation—either with respect to improving the efficiency with which current activities are conducted or through the development of entirely new activities, processes, products

or services. Moreover, “if a firm believes that the advantages which create its own ‘business opportunity’ are likely to be temporary because new things will inevitably be introduced by other firms, it will respond by an active ‘innovation policy’ of its own” (Penrose, 2009: 101). Because of the potential value from innovation, when valuable but idle knowledge resources are present, firms will be cognizant of the potential opportunities and seek to develop at least some of them. With the exception of firms that focus excessively on strategies to restrict competition at the neglect of focus on improving the quality of their products, “there is a strong tendency for each firm...to concentrate on the profitable development of [its resources]” (Penrose, 2009: 100). Accordingly, the degree to which firms engage in innovation development will generally be higher in firms with more extensive levels of underutilized human resources.

H1a: The level of underutilized human resources within a firm will be positively related to its level of innovation effort.

The role of firm resources in motivating and enabling expansion is not limited to human resources. The heterogeneity of services capable of being provided by firm resources applies to the firm’s physical resources as well. The process of firm growth precipitates increases in levels of both types and knowledge of resources. Penrose submits that this “process is one by which new productive services are continually becoming available to the firm, and the new services are not just those of its managerial and other personnel, but also of the physical resources with which a firm works”

(Penrose, 2009: 70). According to the TGF, as the firm expands new physical resources are purchased in markets for specific services they are known to be capable of providing. However, once these resources move inside the firm, the range of services they are capable of providing begins to change. Firm employees become familiar with the characteristics and operational aspects of physical resources. Moreover, “many developments in technological knowledge become available to firms not simply as new knowledge, but physically embodied in the form of the capital equipment they buy” (Penrose, 2009:70). The potential for physical resource use is shaped by the knowledge and experience of the people using them. In turn, the knowledge of the people using the physical resources is shaped by that use as well as the character of those resources. As knowledge and experience grow, so too do the possibilities for using resources in new ways extending beyond the service for which the equipment and machinery was originally purchased.

The motivation to apply underutilized resources toward their most valuable applications will motivate firm search for innovation in the presence on underutilized physical resources for reasons identical to those motivating innovation based on underutilized human resources. Underutilized physical resources can exist in the form of underutilized machinery or equipment. In the case where the potential output of the equipment exceeds current output, the underutilized can be utilized by finding new markets for the output of the machines.

However, underutilized resources may also exist when the output of equipment could be used to create more value from the same level of output. For example, if machines produce intermediary inputs, those inputs might be able to create more value if

used as inputs to produce alternative types of final goods. Unlocking new potential from physical resources under these circumstances may require the development of new capabilities that complement existing resources. Another reason that underutilized physical resources will motivate innovation search is that firms will be aware of the fact that they lack complete understanding of all potential applications of their resources. Accordingly, firms will conduct research into existing physical resources to discover more about how they might be productively used (Penrose, 1959). The presence of underutilized physical resources therefore works to increase the extent to which firms are motivated to innovate.

H1b: The level of underutilized physical resources within a firm will be positively related to its level of innovation effort.

2.3.2 Underutilized Resources, Unabsorbed Slack and Innovation Effort

Pitelis (2007) identifies Penrose's *The Theory of the Growth of the Firm* and Cyert and March's *A Behavioral Theory of the Firm* as the two major economic theories that go inside the "black box" of the firm. In doing so, both theories pay substantial attention to the relationship between underutilized firm resources and firm innovation. One of the fundamental differences between the two theories regarding this relationship, he argues, is that while underutilized resources in the TGF both motivate and enable firm innovation, in the BTF, underutilized resources are limited to an enabling role (Pitelis, 2007). According to the BTF, slack enables the firm to develop "innovations that would

not be approved in the face of scarcity” (Cyert & March, 1992: 189). Subsequent research building on the BTF has generally articulated two mechanisms through which slack enables firm innovation: increased resources for experimentation and reduced strictness of monitoring criteria (Lavie, Stettner, & Tushman, 2010).

Organizational slack provides firms with resources that are necessary to pursue organizational learning and new technological opportunities (Cyert & March, 1963). Innovation requires the allocation of resources to develop or acquire relevant knowledge as well as to find ways to integrate that knowledge with existing capabilities. Firms lacking financial resources will be restricted in their ability to engage in these activities. Moreover, the process of innovation often involves engaging in activities that do not have immediate benefit or relevance to current firm activities (Cyert & March, 1963). Slack resources allow firms to pursue projects that may lack immediate benefit but which may nonetheless be promising from the perspective of specific firm stakeholders with knowledge of firm competencies and market opportunities (Levinthal & March, 1981; O’Sullivan, 2000).

Organizational slack also reduces the strictness of monitoring criteria by which allocation of resources to potential projects is judged (Nohria & Gulati, 1996). Development of new technologies is inherently uncertain. Allocation of resources to these efforts does not guarantee immediate returns. Returns are realized in the future, if at all. This uncertainty makes the initiation and continuation of innovation projects susceptible to loss of critical intra-firm support in the event particular resources are determined to have more pressing or directly beneficial applications. More substantial resource levels facilitate organizational support for activities that produce benefits across

time frames and reduce the strictness with which projects with more uncertain or longer-term pay offs need to be controlled and monitored. Slack therefore promotes innovation by reducing the likelihood that innovation projects will be terminated before their true value to the firm can be ascertained (Lounamaa & March, 1987).

Management researchers examining the relationship between organizational slack and innovation tends to emphasize the innovation-enabling properties of slack (i.e. Greve, 2003; Chen, 2008; Chen & Miller, 2007; Kim, Kim & Lee, 2008). By contrast, from the Penrosian perspective, underutilized resources motivate as well as enable development of new capabilities. This suggests the possibility that different types of resources may have combinatorial effects. Because firms will be more likely to innovate when they have both the motivation and the ability to do so, integrating insights from the BTF view on innovation-enabling resources with the TFG view on innovation-motivating resources can provide insights into how the strength with which the presence of the latter within the firm induces innovation varies with levels of the former.

In attempting to integrate the two perspectives on underutilized resources, it is important to make a distinction between resources that can be appropriately classified as being of one type or the other. As discussed above, research studying the effects of innovation-enabling resources has tended to focus on unabsorbed slack—almost always defined in terms of financial resources. In the TGF, however, Penrose does not theorize about resources that could be classified as unabsorbed slack. The TGF is concerned with firm resources that are used directly in production—specifically, human resources and physical resources. Financial resources are not directly used in production and, accordingly, are not attended to. This allows a distinction to be made between

underutilized Penrosian resources—that is, human and physical resources—which have innovation-motivating properties and unabsorbed slack, which in line with the BTF and TGF arguments is limited to having innovation-enabling properties. In this way, the present study distinguishes between Penrosian resources and unabsorbed slack

There are several reasons why the TGF can be augmented by attending to the presence of innovation-enabling resources within the firm. According to the TGF, the motivation for putting underutilized resources to use is that idle resources can create value at essentially zero marginal cost. Underutilized resources have been or are being paid for, but not fully utilized, by the firm. However, this assumption ignores the costs associated with managerial and other employee time and effort necessary to develop and implement ways to allocate and recombine existing resources to create value (Pitelis, 2007). Moreover, when innovation requires the development of new capabilities to innovate and effectively use underutilized resources, that development process also entails costs in terms of financial resources, time and uncertainty. The presence of innovation-enabling resources will mitigate the extent to which these costs constrain decisions regarding resource allocation to innovation. Accordingly, firms that are motivated to innovate by the possession of Penrosian resources will be better positioned to do so when they possess additional resources that enable that innovation.

Another reason that the costs associated with innovation create an important role for innovation-enabling resources is that increasing innovation effort is no guarantee that the potential value embedded in underutilized resources will be realized. The outcomes of innovation projects can be highly idiosyncratic. The process is subject to substantial technological, organizational and market uncertainty (Van de Ven et al., 1999). The

uncertainty surrounding whether or not innovation projects will be successful is complicated by the fact that the process is both lengthy and costly. Successful innovation requires the integration and synthesis of new knowledge with existing firm capabilities and skills. This process takes time, making successful innovation outcomes difficult to accomplish in the short term. The eventual outcomes innovation activities may yield are difficult to precisely specify *ex ante*. Perhaps the only certainty associated with innovation effort is the cost. Organizational learning requires resources, both financial and human. Moreover, these costs are likely to continue over the length of the project and may escalate as new challenges arise during the process.

The costs of associated with innovation persist over time. Because innovation projects take time to produce results, successful innovation outcomes require organizations to maintain a willingness to allocate resources—especially financial resources—to innovation activities (Lazonick, 2007; O’Sullivan, 2000; Van de Ven et al., 1999). Penrose notes that although resources should be allocated to their ‘best’ use (2009: 41), what constitutes the optimal use of resources will be related to the considerations of firm management about issues such as risk and what is appropriate, which can vary from individual to individual within and across firms as well as with changes in circumstances. Firms differ substantially in the extent to which they are constrained to meet profitability or survival objectives (Levinthal, 1992). Moreover, managerial perceptions of risk can constrain firm expansion (Penrose, 1959). If the costs or time frame associated with innovation do not align with more immediately pressing concerns of firm decision makers with respect to firm strategy and resources allocation, firm commitment to innovation is weakened (Lazonick, 2007; O’Sullivan, 2000).

In firms with extensive financial resources, decisions regarding management of underutilized human and physical resources can be made based on how the potential services embodied in these resources are capable of producing the greatest long-term value to the firm with less concern given to the immediate costs associated with different options. Conversely, in firms where unabsorbed slack is limited, even under circumstances where efforts to innovate based upon underutilized resources might represent the potentially most valuable allocation of those resources, financial resource constraints will restrict the extent to which increasing innovation effort is a viable option. This calculus will also be affected by opportunity costs of alternative resource allocations deriving from external demand conditions (Levinthal & Wu, 2010). In other words, in firms with less unabsorbed slack decisions regarding resource allocation will be more restricted with respect to the level of immediate costs associated with those allocations. Given the inherent costs of research and development projects, alternative avenues of growth, such as output increases or diversification, that do not require the development of new capabilities may be more viable.

The reduction in the strictness of controls and monitoring over innovation projects associated with higher levels of unabsorbed slack is also relevant to the strength with which underutilized human and physical resources promote innovation. In the context of low unabsorbed slack, firms will be more discriminating with respect to how resources are allocated. The uncertainty and delayed value creation associated with initiating or continuing innovation projects will be afforded greater consideration when firms have more limited buffering from potential negative developments in the external environment or the firm's competitive position (Bourgeois, 1981; Levinthal & March, 1981; Sharfman

et al., 1988). Allocations of underutilized resources will be more likely to be directed toward endeavors more capable of producing growth and profit in the near-term (Nohria & Gulati, 1996). The freedom to experiment in terms of the development of entirely new capabilities will be less readily available when unabsorbed slack is low (Levinthal & March, 1981). Without such freedom firms will be more constrained to deploy underutilized resources toward more certain and near-term expansion activities. Conversely, in the context of high unabsorbed slack, the relaxations on project initiation and strictness will reduce pressures to focus on near-term considerations. Accordingly, to the extent that innovation represents a potentially valuable way to allocate and build upon current resources, firms will be more likely to engage in innovation under conditions of more extensive unabsorbed slack.

Applying the perspective on organizational slack developed in the BTF to the TGF, therefore, suggests that the extent to which the presence of underutilized resources in the firm promotes the search for innovation will be contingent on the level of unabsorbed slack within the firm. Firms with more extensive levels of underutilized human and physical resources will engage in more intensive search for new innovation when they concurrently possess more extensive financial resources.

H2a: The positive effect of underutilized human resources on firm innovation effort will be magnified when firms have higher levels of unabsorbed slack.

H2b: The positive effect of underutilized physical resources on firm innovation effort will be magnified when firms have higher levels of unabsorbed slack.

2.3.3 Underutilized Resources and the Growth of the Firm

The relationship between resources and growth articulated in the TGF has implications for the timing of innovation search activity. The first reason for this stems from the relationship between managerial services and growth. According to the TGF, although increases in resources and knowledge take place automatically as a function of firm expansion, the process of expansion itself is far from automatic. The details of any firm expansion require consideration and planning from firm management (Penrose, 1959). As managerial knowledge and familiarity with firm resources increases, managers need to consider how to most effectively allocate underutilized resources. This exercise requires the time of firm management. In addition to planning, the successful execution of an expansion plan is also contingent on sufficient attention from management to ensure the plan is executed as intended and that problems that arise in that process are effectively addressed.

Planning an expansion and executing the plan do not take place concurrently but rather in a sequential process that repeats itself. Penrose submits that “as plans are completed and put into operation, managerial services absorbed in the planning processes will be gradually released and become available for further planning” (2009: 45). Increases in operating experience combined with managerial learning result in the freeing up of managerial resources even in the absence of hiring of new managers and without reductions in overall firm efficiency (Teece, 1982).

According to the TGF, the availability and quality of managerial expertise constitute an important constraint on firm growth. Firm growth does not take place

automatically, but rather, must be planned. Accordingly, firms are unable to take advantage of all opportunities for growth. A firm “cannot do so because the very nature of a firm as an administrative and planning organization requires that the existing responsible officials of the firm at least know and approve, even if they do not in detail control all aspects of, the plans and operations of the firm; it will not even try to do so if the officials of the firm are themselves concerned to maintain its character as an organized unit” (Penrose, 2009: 41). In other words, managerial services are required by the firm both to oversee the operations necessary to maintain the firm at its current size as well as to develop and implement expansion plans. This constraint, subsequently termed the ‘Penrose Effect’, implies that a period of strong firm growth will be followed by slower growth in the subsequent period (Mahoney & Pandian, 1992; Marris, 1963). In essence, the Penrose effect describes the limits to endogenous growth (Pitelis, 2007). Support for the Penrose effect has been documented in research studies spanning the decades since the original publication of the TGF. These studies include Penrose (1960), Edwards and Townsend (1961) Richardson (1964), Uzawa (1969), Shen (1970), Rubin (1973), Slater (1980), Tan (2003); Tan & Mahoney (2003) and Zhou (2011).

An implication of the Penrose effect is that achieving an optimal level of firm growth is contingent on firms engaging in both efforts to develop new resources and efforts to deploy those resources toward value creation (Mahoney & Pandian, 1992; Rubin, 1973). As discussed above, innovating to develop new resources involves either conceiving of new ways to combine existing firm resources or engaging in efforts to develop new resources to complement existing resources. Both types of innovation take place during the planning stage. Following periods of successful growth, the pressing

need confronting management shifts from execution of the present growth plan toward conceiving of and developing the next plan for expansion. Accordingly firm innovation effort will be more extensive in periods following strong growth, when firms have the managerial capacity to consider new ways to utilize their underutilized resources.

Another condition articulated in the TGF that is prominent in periods subsequent to strong firm growth is that such periods will be characterized by relatively high levels of underutilized resources. The timing regarding when underutilized resources will be relatively higher or lower has clear implications for the relationship between underutilized resources and firm innovation effort. Penrose (1959) emphasizes that accumulation of both additional resources as well as intra-firm knowledge regarding the resources possessed by the firm and their potential uses is automatic in the process of firm growth. Levels of these resources will, therefore, be higher the stronger the level of growth in the previous period. Moreover, more extensive underutilized resource levels increase the imperative for firms to find ways to utilize those resources.

The extent to which underutilized human and physical resources induce endogenous innovation will be more substantial in periods subsequent to strong firm growth. This follows from the fact that during periods following strong growth firm management has the ability to focus on innovation as a result of the execution of the expansion plan freeing up managerial time to allocate to new planning (Penrose, 1959). At the same time, the levels of resources and knowledge that must be employed to execute the subsequent stage of growth will also be relatively high during such periods as a result of the underutilized resource accumulation that follows from the process of firm growth (Penrose, 1959). Conversely, following periods of slow growth or even decline,

management will more likely be in the stage of shifting focus to execution of new plans to expand and use underutilized resources and resource levels will have been relatively stable. The relationship between underutilized resources and innovation search will be weaker under these conditions.

H3a: The positive effect of underutilized human resources on firm innovation effort will be magnified in periods subsequent to more extensive firm growth.

H3b: The positive effect of underutilized physical resources on firm innovation effort will be magnified in periods subsequent to more extensive firm growth.

2.4 Measures and Methods

2.4.1 Equation Terms and Measures

In order to test Hypotheses H1a and H1b, the following equation is defined:

(Eq. 1)

$$\begin{aligned}
 R\&D\ Intensity_{iklt} = \\
 &\beta_0 + \beta_1 empEXR_{iklt-1} + \beta_2 ppeEXR_{iklt-1} + \sum_{j=3}^{j=6} \beta_j Firm\ Controls_{iklt-1} + \\
 &\beta_7 Industry\ R\&D\ Intensity_{kt-1} + \beta_8 Multinationality_{lt-1} + \\
 &\sum_{y=1}^{y=9} \omega_y Year\ Dummy_t + \varepsilon_{iklt}
 \end{aligned}$$

Equation 1 explains the innovation effort of firm i in industry k based in country l in year t . The i term is an index of sample firms running from 1 to 3,069. The k term is

an index of sample industries ranging from 1 to 133. The l term is an index ranging from 1-18 representing the 18 countries in the sample. Finally, the t term ranges from 1 to 9 and is used to control for time effects during the 1996 to 2005 time period (1996 is the base year).

The dependent variable innovation effort is measured as firm R&D intensity. R&D intensity provides an indication of the extent to which firms allocate resources to innovation relative to their size, facilitating comparison of innovation effort across firms. This measure is commonly employed in research examining firm innovation search (i.e. Chen, 2008; Chen & Miller, 2007; Greve, 2003; Kim et al., 2008). *R&D Intensity* is defined as firm spending on research and development divided by firm sales. In the original sample, the mean value of *R&D Intensity* was 1.36 (standard deviation 44.2). This relatively high value is reflective of the presence of firms in the sample for which innovation itself is the primary objective, rather than the means by which to promote continued growth. Given the explicit focus of the TGF on firms using resources as a means to support firm development and production of new products and services, the sample was restricted to firms whose average level of *R&D Intensity*, was less than 50%. This focus helps to restrict the sample to firms for which innovation is a means to promote firm growth, rather than the primary function of the firm. R&D intensity in innovation specialists may be more consistent and less affected by fluctuations in resource levels. In a study of the relationship between slack and innovation effort employing a multi-industry sample of US firms, Chen and Miller (2007) found similarly high mean levels of innovation and adopted similar sample restrictions. The resulting mean *R&D Intensity* value is 0.048 with standard deviation of 0.158.

Hypotheses 1a and 1b are explicitly based on the two types of firm resources identified by Penrose (1959)—human resources and physical resources. This focus requires that measures of these concepts be explicitly based levels of these two resource types. As such, selling general and administrative expenses (SG&A)—a frequently employed measure of absorbed slack in previous empirical research (see Greve, 2003; Singh, 1986)—is insufficient for the purpose of testing of the hypotheses developed in the present study. SG&A does not provide any indication of physical resource levels within the firm. With respect to human resources, SG&A is an excessively broad measure that includes expenses beyond those related to explicitly to human resources—such as taxes related to firm inputs and outputs. In terms of measuring the cost of employees, SG&A is somewhat indirect as an indication of the human resource levels of concern to this study.

Human and physical resource intensity variables are constructed to provide a measure of the extent to which these resources, respectively, are utilized in firm output. Human resources are measured as the count of the number of employees in the firm while physical resources are the value of firm plant property and equipment. Both measures are scaled by the level of firm sales. Higher values of these measures indicate that more of each resource is being used to produce a given level of output, suggesting the presence of unused services in those resources. Defining underutilized resources based on sales follows previous studies that have scaled SG&A by sales in providing a measure of slack (e.g. Greve, 2003; Singh, 1986; Love & Nohria, 2005; Wiseman & Bromiley, 1996). Specifically, underutilized human resources (*HR Intensity*) is defined as the number of firm employees in year t divided by firm sales in year t . Measures of underutilized

human resources are notably rare in empirical research (Mishina, Pollock & Porac, 2004). Although survey methods have been employed in some studies (e.g. Nohria & Gulati, 1996) such approaches were not available for the present study. However, using the ratio of sales to employees has been employed to measure productivity (e.g. Chakravarthy, 1986; Greenley & Oktemgil, 1998). Using the ratio of employees to sales explicitly has been previously used by Welbourne, Neck, and Meyer's (1999) and follows the logic used by Mishina and colleagues (2004) who use this ratio as the basis of their measure of underutilized human resources.

Measures of underutilized physical resources are similarly rare in extant research linking underutilized resources to innovation activity. To maintain consistency with the underutilized human resource measure, underutilized physical resources (*PR Intensity*) is defined here as the value of firm plant, property and equipment in year t divided by firm sales in year t . The higher the relative levels of resources within the firm, the greater the likelihood that such resources are present in underutilized within a given firm (Love & Nohria, 2005). Hypotheses 1a and 1b argue that underutilized resources will lead firms to increase their efforts to innovate. The coefficients on *HR Intensity* and *PR Intensity* are, therefore, expected to be positive.

Additional right-hand side variables include four country-level controls likely to bear on both firm levels of underutilized resources as well as the intensity of innovation search. As Penrose notes, "the size of the firm is best gauged by some measure of the productive resources it employs" (1959: 21). *Size* is therefore measured as the log of the number of firm employees. The size of the firm can impact its ability to dedicate resources to innovation as well as its flexibility to implement new strategies (Audia &

Greve, 2006). Larger firms typically dedicate fewer resources to R&D relative to their size. The coefficient on size is expected to be negative.

Measures of the two moderating effects in this study are also included as control variables. The firm's current ratio—the ratio of current assets to current liabilities—is used to measure *Unabsorbed Slack* (Chen & Miller, 2007). Firms for which this ratio is greater than one have financial resources in underutilized of what is necessary to maintain current operations, while values below one indicate firms are making greater use of resources than would be expected. Following previous research, unabsorbed slack is expected to have a positive relationship to innovation search.

Firm growth is measured as the difference in the log of firm sales year t and log firm sales year $t - 1$ (Barnett & Carroll, 1987; Barron, West & Hannan, 1994; Podolny, Stuart & Hannan, 1996). Although the effect of underutilized resources on innovation should be stronger following periods of growth, the direct effect of growth itself is less clear. Strong growth is an indicator of strong firm performance. In contrast to the positive effect of growth on freeing up managerial resources for planning, the BTF argues that strong short-term performance reduces pressures to innovate (Cyert & March, 1963). Empirical research on performance driven innovation has provided evidence in support of this direct view of the negative effect of strong performance on innovation effort (Chen & Miller, 2007; Greve, 2003). In line with this research, the coefficient on *Growth* is expected to be negative.

Because of the multi-country nature of the sample it is also important to control for national level factors that may influence innovation effort. Chapter Three of this dissertation argues that features of the institutional environment may influence how

underutilized resources are deployed. Moreover, firms with a wider global presence may be better positioned from a competitive perspective by having different types of firm activities located in institutional environments more supportive of those activities. These efficiencies may in turn lower pressure to engage in R&D. To address these issues, firm multinationality is included as a control variable. *Multinationality* is defined as the ratio of firm sales from foreign operations to net firm sales. It is expected to be negatively related to innovation effort. Measurement of foreign sales excludes firm exports, making this measure indicative of the extent to which the firm has operations outside the home country.

National level differences in the cross-country sample may also be relevant to firm level innovation. In particular, the level of national economic development is likely to be relevant as firms in wealthier countries may have greater levels of technological sophistication, access to more and deeper technological knowledge upon which to innovate, more competition from similarly sophisticated rivals and need to meet demand from a more sophisticated customer base (Porter, 1990). I therefore control for economic development by including a measure of country-level *GDP per capita* (measured in constant year 2000 US\$). *GDP per capita* is expected to be positively related to innovation search.

In addition to firm level controls, industry factors also influence the extent to which firms engage in innovation and are simultaneously likely to play a role in firm performance. The pressure to innovate differs substantially across industries. The innovation effort level of one firm is influenced by the extent to which its competitors are also innovating. I therefore control for industry R&D levels (Audia & Greve, 2006; Chen,

2008; Chen & Miller, 2007; Kim et. al., 2008; Vissa, Greve & Chen, 2010). *Industry R&D* is defined as the average innovation effort of all other firms in the same industry as a focal firm in year t . Industries are defined based on 4-digit SIC codes. *Industry R&D* is expected to be positively related to innovation search.

Finally a set of year dummies indicating years 1997-2005 (1996 is the base year) is used to account for idiosyncratic time effects that may influence the extent to which firms engage in innovation search. Table 1 provides a list of all variables, measures and sources used in the study.

2.4.2 Sample and Data Sources

Firm and industry level variables employed in the analysis are constructed using data from the Worldscope database. Worldscope provides data on listed firms across the globe. Data were collected on a sample of firms over the 1995-2005 time period. This original sample contained sufficient data on 9,472 firms from 40 countries. In addition to the Worldscope data, data provided by the World Bank are used to construct the measure of national GDP per capita. These data come from the World Bank's World Development Indicators database.

Several restrictions based on data availability were applied in constructing the final sample. The sample was restricted based on firms having at least one year for which R&D spending was positive. R&D is, of course, not the only means by which firms innovate. However, according to the TGF, building on underutilized resources for growth itself requires capabilities both in terms of management, employees and physical

resources (Penrose, 1959). Any innovation that takes place in firms that do not have R&D expenditures is therefore, not likely to be technologically based innovation and such firms are not the focus of this study. After these modifications there remained 5,982 firms from 38 countries. Extreme values of the underutilized resource measures (values more than 4 standard deviations from the mean) were also removed. Additionally, any values of multinationality above 1 were also excluded. This reduced the sample to 5,851 firms, again from 38 countries.

The sample was further restricted based on the availability of sufficient data at the industry and country levels. Industries for which fewer than 5 countries are represented in the sample were excluded to ensure that the global sample of industries had a minimum level of variation in terms of countries included and to address potential bias in average industry R&D intensity being overly reflective of individual countries. Countries were excluded if there were fewer than two firms from that country in a given industry (based on 4-digit SIC code). This reduced the sample to 4,468 firms from 18 countries.

Finally, the TGF is explicitly concerned with the potential services embodied in firm human and physical resources. The *HR Intensity* and *PR Intensity* measures themselves are assumed to capture the presence of these unused services to the extent that the larger these values are the more likely at least some of those resources possess underutilized services. Another reason that underutilized human and physical resources may embody potentially valuable services derives from the level of technological sophistication of those resources. Employees working in high value activities such as research and development will be more likely to both possess and likely to increase their levels of specialized knowledge in line with increase in firm size and experience than will

relatively more unskilled labor. Moreover, such employees may be better positioned to communicate that knowledge to colleagues who in turn may be more receptive to considering their opinions and ideas. Similarly, physical resources employed toward more technologically sophisticated activities will have greater potential to be used in high-value creating activities. Accordingly, to increase the extent to which the underutilized resource measures pick up levels of *valuable* potential services in firms capable of innovating based on those underutilized resources, the sample is restricted to focus on firms whose median level of innovation effort over the sample period is in the top two-thirds of the sample. For comparison, results based the bottom third of firms with respect to innovation effort are also provided.

The final sample contains 3,069 firms from 18 countries over the 1996-2005 time period. Firms from the following 18 countries are included in the sample: Australia, Austria, Canada, Denmark, Finland, France, Germany, India, Israel, Italy, Japan, Netherlands, Singapore, South Korea, Sweden, Switzerland, the United Kingdom and the United States. The final sample, consisting of multiple observations on firms over time, is an unbalanced panel. This design is employed to avoid an excessive reduction in the number of firms from countries with relatively fewer firms in the sample, which is important in order to maintain sufficient variation within countries for a sufficient number of countries in the full sample.

2.4.3 Estimation Strategy

Panel estimation techniques are used to estimate the effect of the right-hand side variables on *R&D Intensity*. Specifically, panel models that account for firm fixed

effects are employed. The results of a Hausman test comparing the results of the fixed-effects approach with those of a random effects specification further indicate that the fixed-effects approach is appropriate.

The use of firm fixed effects is especially pertinent given the multi-country, multi-industry context of the sample. Although the direct effects of these factors are not of interest, it is necessary to acknowledge that they constitute important sources of variation that may influence levels of both independent and dependent variables. By using firm fixed effects, this estimation strategy takes advantage of the panel structure of the data to address potential bias resulting from unobserved time invariant firm characteristics which may influence both the independent variables of interest as well as the dependent variable. Neither firm nor industry membership (based on primary 4-digit SIC code as defined in the Worldscope database) change over time in the data. It is therefore not unreasonable to assume that many of the effects of both of these factors influence firms relatively uniformly over time and that inclusion of fixed effects goes at least some way to addressing this issue.

Another advantage of using firm fixed effects stems from the fact that such estimations rely solely upon within firm variation for identification. Thus, high (or low) levels of the underutilized resource measures indicate that human or physical resources are high, relative to levels within the firm at other points in time. Accordingly, this approach allows the *HR Intensity* and *PR Intensity* measures to effectively capture the construct of underutilized firm resources—and, in so doing, the presence of unused potential services.

The primary argument in this study centers on innovation effort being driven by levels of underutilized firm resources. Innovation decisions are made with respect to understanding the levels of resources in the previous time period relative to firm output (sales). Thus other than the level of R&D spending, all other variables are lagged by one year. Additional efforts to address potential issues reverse causality and omitted variables are discussed in the robustness section.

2.5 Results

2.5.1 Descriptive Statistics

Descriptive statistics and pairwise correlations are reported in Table 2. The mean value of the dependent variable *R&D Intensity* is .122, with a median of 0.072. For the full sample (i.e. including firms in the bottom third of innovation effort), those values are 0.09 and 0.039, respectively. These full sample values are in line with those in the sample of strictly US firms used by Chen and Miller (2007), where the values were 0.096 and 0.048, respectively. The slightly higher value for the sample of firms with more innovation resources therefore seems reasonable. Pairwise correlations are for the most part as expected and relatively low. Two slight exceptions are the correlation between *HR Intensity* and *PR Intensity* of 0.32 and that between *Size* and *Multinationality* of 0.38. To exercise caution, the multicollinearity diagnostic procedure developed by Belsley, Kuh, and Welsch (1980) is used to assess variance decomposition proportions. Using the Stata command `coldiag2`, the highest variance condition index value was 24.98. This is comfortably below the condition index of 30 that represents the threshold at which multicollinearity issues become a potential concern (Belsley, Kuh, & Welsch, 1980).

2.5.2 Main Analysis

Table 3 reports the coefficient and robust standard error estimates of the fixed effects regressions used to test Hypotheses 1-3. Stata command “xtreg” was used to for all estimations reported in Table 3. Column 1 reports the results of the model with controls only. Most control variables enter as expected with coefficients indicating relationships to innovation effort in line with prior theory and testing. Levels of innovation effort are higher in firms with more unabsorbed slack (0.008, $p < 0.01$). This result echoes previous research on the impact of unabsorbed slack on innovation effort (Greve, 2003; Kim, Kim & Lee, 2008). Larger firms (*Size* coefficient of -0.025, $p < 0.01$) have lower levels of innovation search. The only control variable estimated with a contrary sign is GDP per capita (-4.27e-06, $p < 0.01$).

In line with BTF arguments regarding performance driven search, the direct effect of stronger growth on innovation effort is negative (-0.013, $p < 0.01$). At first, this finding may seem to conflict with the TGF arguments about growth in that more planning should follow growth periods. However, it is important to keep in mind that the core argument of the TGF regards underutilized resource levels which, while related to growth, can vary substantially across firm achieving similar growth outcomes. Thus even if growth frees up managerial resources, the extent of firm planning for growth—either through expansion, diversification or innovation—remains contingent on underutilized resource levels. Moreover, Greve (2003) points out that underutilized resources constitute stocks that accumulate over time, whereas the immediate effects of growth reference short-term flow changes (Greve, 2003) and as such, the two are distinct concepts.

Column 2 of Table 3 reports the results of the main model including all controls and the two underutilized resource independent variables. Hypothesis 1a argued that firms with greater levels of underutilized human resources will have higher levels of innovation effort. The estimated coefficient for *HR Intensity* is positive and significant (4.255, $p < 0.05$) indicating support for Hypothesis 1a. The standard deviation of *HR Intensity* for the sample is 0.013. This suggests that an increase of one standard deviation in underutilized human resource levels would therefore be associated with an increase in innovation search level of 0.055 (5.5 percentage points). Given the sample median level of innovation effort of 0.072, all other things being equal, compared to a firm at the median value a firm with a one standard deviation higher level of *HR Intensity* would have an innovation effort level of 0.127. Keeping in mind that a one standard deviation in underutilized human resources from the mean would mark an 85% increase in this value, it may be more instructive to assess the effect of a smaller increase. A 10% increase over the sample mean in underutilized employee levels would be associated with an increase in innovation effort of 0.003 or 0.3 percentage point. For a firm at the average level of innovation effort, this would constitute a 4% increase, which can be considered to be organizationally significant in light of the relatively modest increase in the independent variable.

Hypothesis 1b argued that more substantial levels of underutilized physical resources would have a positive effect on innovation search. However, although positive, the coefficient on *PR Intensity* of 0.015 is not significant. Hypothesis 1b is therefore not supported by the analysis.

The focus of the present analysis on firms in the top two-thirds of the sample in terms of median innovation effort levels was based on the argument that underutilized resources in such firms are more likely to provide their highest value through innovation. For comparative purposes, Column 3 of Table 3 indicates the results of the same main model as in Column 2 but for the sample of low median innovation search firms only. As expected, the effect of underutilized human resources (0.107, $p > 0.1$) is no longer significant when focusing on low R&D firms. The effect of underutilized physical resources is somewhat more interesting as the effect of underutilized physical resources is significant for these firms as well as negative. As expected more extensive levels of underutilized resources do not lead to increased innovation effort in firms where such resources are less likely to have high value. However, underutilized physical resource levels are relevant to innovation effort for firms with lower levels of innovation effort as such effort is lower in firms with higher *PR Intensity*. One explanation for this may be that in such firms, emphasizing near term productivity and efficiency, which can be augmented through physical resources, is more relevant to such firms. Consequently, in firms that do not engage in substantial R&D, physical resources may substitute for competing through innovation.

Hypotheses 2a and 2b argued that the strength of the relationship between underutilized resources and the extent to which firms attempt to develop new innovations will be stronger in firms that also have sufficient unabsorbed slack to support increased innovation efforts. These hypotheses are tested by including an additional term that interacts *Unabsorbed Slack* with each of the underutilized resource measures, creating the variables *HR Intensity * Unabsorbed Slack* and

*PR Intensity * Unabsorbed Slack*. Column 4 of Table 3 reports results when these two interaction terms are included in the estimation. The coefficient on *HR Intensity * Unabsorbed Slack* is significant (0.471, $p < 0.05$), providing support for Hypothesis 2a. *Unabsorbed Slack* has a mean value of 2.897 (median 2.047) and standard deviation of 2.923. To assess the practical effect of underutilized resources at high and low levels of *Unabsorbed Slack*, I assess the impact at levels of $\frac{1}{2}$ standard deviation below and above the mean value of *Unabsorbed Slack*. The marginal effect of a 10% increase over the mean value of *HR Intensity* is to increase innovation effort by 0.0028 in low slack firms and 0.0037 in high slack firms. For a firm at median levels innovation effort these values would constitute a 3.8% increase in innovation effort in low unabsorbed slack firms compared to a 5.2% increase in high slack firms.

Hypothesis 2b argued that, similar to underutilized human resources, the effect of underutilized physical resources would also be stronger in firms with higher levels of absorbed slack. Although the main effect of physical resources was not supported it is possible that these resources may be relevant to innovation effort in firms with sufficient unabsorbed slack to support those efforts. Tests of Hypothesis 2b, however, reveal that this is not the case. The coefficient for *PR Intensity * Unabsorbed Slack* is not significant. Hypothesis 2b is not supported.

Hypotheses 3a and 3b argue that the effect of underutilized resources on innovation search will be stronger in firms following periods of strong growth. To test these hypotheses, two interaction terms between growth and underutilized resources—*HR Intensity * Growth* and *PR Intensity * Growth*—are included in the model reported in Column 5. In line with expectations, the sign of the coefficient on

*HR Intensity * Growth* is positive and significant (1.012, $p < 0.01$). Following periods of strong growth, firms make greater efforts to innovate based on underutilized human resources. To assess the organizational significance of this effect, I compare firms at $\frac{1}{2}$ standard deviation above and below the sample mean values for growth. This roughly corresponds to firms at the 10th and the 90th percentile, respectively, of the sample growth distribution. The marginal effect of a 10% increase in *HR Intensity* above the mean *PR Intensity* level corresponds to an increase in innovation effort of 0.525 percentage point in the high growth firm and an increase of 0.457 percentage point in the low growth firm. Although the effect of underutilized human resources is notable in both cases, it is nearly 15% stronger subsequent to a period of very strong growth than it is following a period of very weak growth. This suggests that the practical moderating effect of unabsorbed slack on the strength with which underutilized human resources motivate firm innovation is organizationally significant.

Hypothesis 3b argued that underutilized physical resources would have a stronger positive effect on innovation effort in firms where growth is slowing. Here the analysis provides evidence contrary to the predictions of H3b as the coefficient of -0.009 has the expected sign and is significant at the 1% level. The organizational significance of this effect, however, is minimal. The effect of a full standard deviation increase in *PR Intensity* for a firm at one standard deviation above median growth, would be a decrease in innovation effort of 0.0026 (corresponding to approximately a 1.4% decrease for the median level of *PR Intensity* firm). Conversely, the same standard deviation increase in *PR Intensity* for a firm at one standard deviation below sample median growth would be 0.0172 (an increase of 9.3% for a firm with median *PR Intensity*). A

full standard deviation increase in *PR Intensity*, however, corresponds to over a five-fold increase in this value for the median firm, suggesting that for more reasonable increases in the level of underutilized physical resources, the organizational significance is quite low. Thus despite the statistical significance of this contrary finding, the low organizational significance is more suggestive of a failure to provide support for H3b rather than an indication of an important effect contradicting expectations.

To further test Hypotheses 3a and 3b, an alternative measure of growth is used. This measure is an indicator of slowing firm growth set equal to 1 when firm growth has been positive but declining for two consecutive years (t and $t - 1$), 0 otherwise. This measure is designed to capture the effect of slowing firm growth more effectively than the continuous growth measure. Firms in this stage of growth should have the managerial resources necessary to plan and allocate firm resources toward innovation. Accordingly, the effect of underutilized resources on innovation effort should be stronger when this indicator is positive. Results of replacing the continuous growth measure with this growth indicator are reported in Table 3, Column 6. The coefficient on the indicator -0.02 ($p < 0.01$) is consistent with that on the continuous growth measure in the other columns. Here, the coefficient on the interaction term *HR Intensity * Growth Indicator* (1.919, $p < 0.05$) is positive and significant, indicating that as growth slows, firms with underutilized human resources engage in more innovation effort. By contrast, the coefficient estimate for the effect of *PR Intensity * Growth Indicator* is not significant. These results are consistent with those for the effect of the continuous growth measure reported in Column 5 and provide support for Hypothesis 3a. When firms have

both the motivation and the ability to create value from underutilized human resources through innovation they do so more extensively.

2.5.3 Robustness Analysis

Two potential issues arise with the use of firm fixed effects panel analysis. The first is that it is possible that unobserved factors influencing both the independent and dependent variables change over time. To the extent that this is the case—if for example, there were important variation in national regulatory or economic conditions over the sample time period—the use of firm fixed effects may not sufficiently address the potential for unobserved variable bias. One way to address this issue is through the inclusion of a lagged dependent variable among the right-hand side variables. Given that this variable is itself reflective of all relevant influences in the previous time period, its inclusion can help to address unobserved factors that change over time. Column 1 of Table 4 reports the results of including a lag of the dependent variable in the fixed effects estimation employed for Table 3 Column 2. The coefficient on lagged R&D intensity of is significant (0.12, $p < 0.01$). However, results for the main variables of interest remain unchanged from those reported in Table 3 Column 2. The coefficient on the estimate for the effect of underutilized employee resources remains significant which underutilized physical resources remains insignificant.

A second issue concerns the potential that rather than levels of underutilized resources driving innovation effort, it is the innovation effort itself that drives the need for these resources. If this is the case, the relevant independent variables may not be strictly exogenous and endogeneity may be a problem for the analysis. One way to

address this issue is to include instruments for the relevant independent variables not thought to be strictly exogenous.

The use of dynamic panel analysis can address both of these issues. Accordingly, I use the Arellano-Bond (1991) difference general method of moments (GMM) estimator, which addresses possible endogeneity issues arising from unobserved time invariant as well as time variant unobserved variables. This estimator addresses the issue of unobserved firm effects by removing the firm fixed through first differencing. The inclusion of a lagged dependent variable addresses potential unobserved variable bias stemming from the presence of important time variant variables. This dynamic panel estimator also addresses the potential endogeneity of the independent variables stemming from correlation with unobserved firm effects, such as country or industry effects by instrumenting for the potentially endogenous regressors using lagged values of those regressors as instruments. This approach was first suggested by Holtz-Eakin, Newey and Rosen (1988). Including instruments for potentially endogenous regressors also addresses the potential that endogeneity is introduced into the equation through the first differencing process which causes both the first differenced lagged dependent variable as well as potentially exogenous regressors to be correlated with the now differenced error term.

To employ the Arellano-Bond difference GMM estimator I use STATA add-on “xtabond2”. All firm level variables are considered as potentially endogenous and are entered into the model as endogenous regressors. Industry R&D and GDP per capita are considered exogenous. To address the potential for panel-specific autocorrelation and heteroskedasticity I use the two-step estimation procedure, in which the standard

covariance matrix is robust to these issues. However, because this procedure leads to downward bias in reported standard errors, I also use the robust option which incorporates the Windmeijer correction to address this potential source of bias. STATA output for “xtabond2” includes the Arellano-Bond test for autocorrelation and the Hansen test of instrument validity.

Use of the Arellano-Bond difference GMM estimator requires several assumptions. The first assumption is that levels of the lagged dependent variable are not correlated with the error term. It is therefore necessary to test for autocorrelation, which can be accomplished using the test designed by Arellano and Bond. The null hypothesis of no autocorrelation in the AR (1) process is often rejected, but this is expected for the differenced equation because the previous value of the error term is included in both the current and previous difference error term. Because the concern is for autocorrelation in levels, the AR (2) test is more important and rejection of the null here would be problematic. A second important assumption is that the instruments as a group are exogenous. This can be ascertained by examining the results of the difference in Hansen test of the instruments. The null hypothesis is that the instruments are valid—higher values of this test result are, therefore, supportive of instrument validity.

Employing the dynamic panel approach raises the issue of which lags to use as instruments for endogenous and potentially endogenous variables. Efficiency of the instruments can be improved by using as many valid lags of the variables as are available (Roodman, 2009a). However, this can lead to instrument proliferation which can cause overfitting of endogenous variables and weakening of the Hansen test (Roodman, 2009b).

I therefore estimate the model with several lag structures to provide an indication whether the results are in fact valid.

Results of the dynamic panel estimates are reported in Table 4. Column 2 indicates results with only the second lag of each firm level variable used as instruments for the potentially endogenous regressors (the first lag is correlated with the current error term and cannot be used). Results here confirm the results presented for the fixed effects models. *HR Intensity* is significant at the 10% level (2.472, $p < 0.1$) while *PR Intensity* remains insignificant. *Unabsorbed Slack* also remains positive and significant. Other independent variables maintain the same signs as in the panel fixed effects but at weaker or insignificant level of significance. Results of the test for auto-correlation and exogeneity of the instruments suggest that this specification and instrument set are valid. However, the coefficient for the lagged DV is roughly the same as when the lagged DV is included in the standard fixed effects specification, suggesting that this particular specification may not be sufficiently addressing the potential bias stemming from unobserved firm level heterogeneity.

The fact that *HR Intensity* is only significant at the 10% level may reflect the fact that more information could be included in the instrument set by including additional lags as instruments. The problem with including additional instruments is that it can weaken the tests of their validity. Results of increasing the lag structure to include both second and third lags of the firm level variables are indicated in Column 3. Here, the additional information in the instrument set has resulted in a coefficient on *HR Intensity* of 3.031, which is now significant at commonly accepted levels ($p < 0.05$). The tests of instrument validity indicate that the instruments are again valid. Results of the Arellano-

Bond test for autocorrelation indicated that it is not a problem here. Moreover, the coefficient for the lagged dependent variable of 0.200 is substantially greater than that for the lagged DV in the fixed effects model reported in Table 4 Column 1 (0.113, $p < 0.01$), suggesting that the dynamic panel model employing this lag structure addresses the bias concerns described above. Results from adding a third year of lags (the fourth year lag) are indicated in Column 4. The additional information contained in the instruments increases the significance and size of the *HR Intensity* coefficient further. However, the instruments are no longer valid in this case, suggesting that these results are not sufficiently reliable.

Overall, the results of the dynamic panel estimations produce results very close to those of the fixed effects estimations. In particular, the effect of underutilized human resources remains significant after including the lagged dependent variable and instrumenting to address potential endogeneity concerns. These results confirm those from the original fixed effects panel models providing support for Hypothesis 1a.

The validity of results presented in Table 3 are based on the assumption that the inclusion of firm level fixed effects addresses issues of unobserved firm level heterogeneity in the sample. In particular, it is assumed that industry level effects are relatively stable over time and therefore not a source of potential unobserved variable bias. One way to address this issue is by subtracting the annual industry mean from annual firm level values of the main independent variables (*HR Intensity* and *Intensity* , respectively). Another advantage of this check is that it addresses the potential criticism that the underutilized resources measures do not sufficiently indicate the presence of unused services by providing a measure of resources relative to what

might be necessary for current output levels as compared to other firms in the industry. Mishina and colleagues (2004) adopted this approach in their construction of an underutilized human resources measure, where underutilized human resources was defined as number of firm employees to sales (the *HR Intensity* variable constructed in this study) minus the mean industry level of employees to sales. Thus subtracting the industry mean creates the same variable as used by these scholars.

Results of this modification are included in Table 5, Column 1. Results here are identical to those from Table 3, Column 2, for the two respective underutilized resource measures. Underutilized human resources remains positive and significant (2.788, $p < 0.01$) while underutilized physical resources remains positive but non-significant (0.019, $p = 0.230$). These results suggest that the use of firm fixed-effects are sufficient for addressing unobserved heterogeneity deriving from industry effects.

Finally, this study argued that broad measures of resources that have been used in previous research to measure unabsorbed slack are insufficient for capturing the resource effects argued in the TGF as they apply to firm innovation effort. In most prior studies, the ratio of selling, general and administrative expenses to sales is used to operationalize the absorbed slack construct (Singh, 1986; Greve, 2003). Accordingly, as a final robustness check, the main model reported in Table 3 Column 2 is run again with SG&A /Sales replacing the two underutilized resource measures. Results indicate that this alternative measure has a negative, rather than positive effect on innovation effort, although the relationship is not significant. These findings suggest support the contention of this study that the use of SG&A to sales is inappropriate for the purpose of understanding the effects of Penrosian resources and indicates that the measures of

underutilized employee and physical resources employed are indeed distinct from this broad measure.

2.5.4 Limitations

It is important to recognize several limitations of this study. Two features of the sample bear mentioning in this regard. The sample was limited to publicly traded firms. Publicly traded firms obviously constitute only a subset of all firms. Moreover, such firms tend to share important characteristics that distinguish them from other firms such as being generally larger and older than other firms—two characteristics that have implications for levels of resource accumulation in the context of the TGF. Another limitation associated with the sample was that although the cross-country multi-industry composition has the advantage of enhancing the generalizability of the findings, it also creates challenges in ruling out additional potential sources of firm heterogeneity included in the sample. Two particular sources—country and industry effects—are addressed through the inclusion of firm fixed effects. However, to the extent these effects may be inconsistent over time, fixed effects methods may not sufficiently address this issue. Robustness of results to demeaning industry effects helps address this issue to some extent. However, the time invariant nature of country fixed effects precludes such effects from being independently included in the analysis.

Two additional aspects of the research design should be addressed. First, the extent to which the presence of unused services in the Penrosian view were embodied in the measures of underutilized human and physical resources was implicitly assumed to be a function of their overall technological intensity. Although this measure is admittedly

cruder that would ideally be desired, data limitations prevented the development of more refined measures. Nonetheless, the development of more explicit measures of underutilized resources would be desirable in future work. Another issue concerns the timing of innovation search investment. Although constraints on the time available to the upper management of the firm restrict the ability to engage in both growth and planning simultaneously, Penrose acknowledges that this constraint can be mitigated to some extent by the employment of lower level personnel dedicated to either function. As such, more fine-grained data on personnel assignments within the firm would assist in providing more explicit analysis of the timing of innovation effort.

2.6 Discussion

In this study I proposed that that one reason some firms may engage in more extensive innovation search than others is that such firms have more extensive levels of underutilized human and physical resources than their respective competitors. These firms may therefore possess valuable unused services when resource intensity levels are high. A fundamental component of this argument was based on the innovation-motivating properties of underutilized resources articulated in the TGF. Importantly, these innovation-motivating properties differ from the innovation-enabling properties of underutilized resources described in Cyert and March's *Behavioral Theory of the Firm* (1963). Because most research linking underutilized resources to innovation effort has built on the BTF conceptualization, those studies have primarily focused on the relationship between underutilized financial resources and innovation. This focus created a gap in the literature concerning the role of human and physical resources—and their

innovation-motivating properties—in line with the TGF arguments. At the same time, this divergence of focus on underutilized resource properties allowed for productive integration of the two views to argue that the positive innovation-motivating effects of underutilized Penrosian resources on innovation effort would be strengthened by the innovation-enabling properties of underutilized financial resources. Finally, this study built on arguments from the TGF regarding the cyclical nature of growth whereby periods of high growth are followed by periods of low growth and strategic planning. I argued that efforts to innovate would be most substantial following periods of strong growth as firms have the time to take stock of and consider new ways to utilize the higher levels of underutilized resources that have built up during the growth phase.

Overall results of empirical tests of the arguments presented here were supportive with respect to the effects of underutilized human resources. Firms with underutilized levels of human resources engage in more extensive search for innovation. This positive effect of underutilized human resources on firm innovation effort is stronger when firms also have unabsorbed slack which can be used to support the efforts to develop new capabilities and in periods subsequent to periods of strong growth. This empirical support for the effects of human resources was not replicated with respect to the effects of physical resources. Statistical analysis failed to identify significantly positive effects of underutilized physical resources on innovation effort.

Several important implications follow from these findings. First, the support for a positive effect of underutilized human resources on the level of effort firms put into innovating draws attention to the importance of expanding the focus of analyses of the relationship between slack and firm strategy beyond the effects of financial resources.

Although financial resources align well with the BTF, the lack of alignment of human and physical resources with that theory may have played a part in the lack of attention to these resources in extant management scholarship. By drawing attention to and further refining the theoretical arguments underlying the salience of human and physical resources originally articulated by Penrose, this study builds a case for increased attention to this understudied form of organizational slack.

Empirically, the support for the positive effects of human resources contrasts with the lack of support for any effect of SG&A. This suggests the broad measures that have been used in prior research may not be effectively picking up the effects of this class of underutilized resources. At the same time, the lack of empirical support for the hypothesized effects of physical resources draws attention to the need to distinguish human and physical resources from each other. Although, underutilized physical resources were hypothesized to have similarly positive motivating effects on innovation search, these expectations were not borne out in the analysis.

One possible explanation for this divergence may relate to the process of knowledge gained through experience and learning. Knowledge increases in the process of growth inherently accumulate with the employees who possess it. Although physical resources may have multiple potential productive services embodied within them, their utilization and development is contingent on the knowledge possessed by the firm's employees and management. Thus the relevant levels of unused services in both human and physical resources may to a large extent be embodied in firm human resources. In other words, the level of unused services embodied in physical resources is to a large extent found in the knowledge of employees about those resources and potential

alternative ways of utilizing them. To the extent this may be the case, the effect of underutilized human resources could be expected to be relatively stronger given the critical role of knowledge and experience to the innovation process. This study found that the relationship between Penrosian and financial resources had important combinatorial effects. The possibility that the effect of physical resources on innovation search may itself be contingent on the level of human resources suggests that attention to joint effects of human and physical resources on innovation search may be a valuable topic for future research.

Chapter Three: National Corporate Governance Institutions, Underutilized Resources and Firm Innovation Effort

3.1 Introduction

Theoretical arguments establishing how underutilized firm resources promote firm innovation effort are provided by Penrose's *The Theory of the Growth of the Firm*, (Penrose, 1959) and Cyert and March's *Behavioral Theory of the Firm* (1963). The TGF describes how underutilized human and physical resources motivate innovation search. The BTF, in articulating the innovation-enabling properties of underutilized resources, establishes that underutilized financial resources promote firm innovation as well. It is important to note, however, that the presence of underutilized resources is not the only factor bearing on firm innovation effort.

Because the decision to innovate is, in effect, a decision to allocate firm resources toward this end, factors that influence firm decision making with respect to resource management will bear strongly on the relationship between underutilized resources and innovation effort. In the TGF, Penrose notes that entrepreneurial services are a critical component of the extent to which firms accept "...new ideas, particularly with respect to products, location, and significant changes in technology..." (2009: 29). However, not all firms possess these entrepreneurial resources to equal degrees. Penrose draws attention to traits and preferences of individual employees and firm preferences regarding risk as factors that can influence the extent of entrepreneurial initiative. Other factors are also likely to bear on the extent to which firms engage in the development of new ideas and technologies. The present study focuses on one such factor—characteristics of national regulatory institutions that constrain firm decision making. In particular, I examine how

national institutions that protect shareholder rights and employment constrain firm decision making with respect to innovation strategy.

In the BTF, Cyert and March (1963) emphasize that the firm is not a unitary entity possessing clearly identifiable objectives. Rather it is a collection of stakeholders and stakeholder groups, each of which possess different interests with respect to their relationship with the firm. Moreover, the extent to which the interests of relevant institutional groups bear on firm decision making is not uniform. As O'Sullivan (2000) argues, firm innovation requires commitment from important organizational stakeholders whose interests influence firm decision making. Deeper understanding of the extent to which the presence of underutilized resources in firms precipitates enhanced innovation effort can, therefore, be furthered by paying greater attention to corporate governance—that is the mechanisms that determine the relative power and responsibilities of organizational stakeholders with respect to firm decision making. The more the interests of various stakeholder groups within are afforded consideration within the prevailing governance framework, the more that firm management will be constrained in its decision making to adopt strategies reflective of the interests of those stakeholders.

Differences in characteristics of ownership constitute one aspect of corporate governance that has received attention in empirical research on the relationship between corporate governance and firm innovation search. Divergent interests among owners have been shown to influence the extent and nature of R&D activities in line with which sets of interests are more prominent among firm ownership (David, O'Brien, Yoshikawa, & Delios, 2010; Hoskisson, Hitt, Johnson, & Grossman, 2002; Lee & O'Neil, 2003). Kim

and colleagues (2008) have brought attention to the role of owner interests in moderating the extent to which financial slack promotes innovation effort.

Ownership interests, however, constitute but one, narrowly focused aspect of corporate governance. The number of different stakeholders and stakeholder groups relevant to the ability of the firm to exist as an ongoing viable enterprise is substantial. These stakeholders influence and are influenced differently by firm actions and seek different outcomes in terms of their relations with the firm (Freeman, 1984; Parmar, Freeman, Harrison, Wicks, Purnell & de Colle, 2010). The interests of different stakeholders are frequently inconsistent and may come into conflict with each other. Constraints on firm decision making stemming from the need to address the interests of particular groups are not strictly based on factors internal to the firm. National laws and regulations often mandate that interests of particular stakeholder groups be accounted for in firm decision making through the manner in which those legal provisions protect the interests of those groups.

Constraints on firm governance stemming from the institutional environment are particularly salient given the fact that institutional pressures can lead firms to act in a manner that is considered legitimate in context of the broader external environment, even when such actions fail to enhance firm position from a performance or competitive perspective (DiMaggio & Powell, 1983; Scott, 2001). For example, reduction in employee levels was generally prominent among American firms during the 1990s. This was true even for successful firms for which the necessity of such reductions should have been less pressing (Cascio, 2002; Guthrie & Datta, 2008). At the same time, decisions regarding management of firm resources are often driven more by managerial practices

than competitive or economic circumstances (Cappelli, 2000). To the extent that institutions constrain managerial decision making, institutional characteristics will, to at least some extent, bear on firm management of underutilized resources regardless of the direct effects such decision may have on other aspects of firm performance.

Recently, the role of national institutions in shaping corporate governance has received attention from management scholars (Aguilera & Jackson, 2010). This study focuses on these influences of national corporate governance institutions and their impact upon firm strategic decision making, specifically with regards to decisions pertaining to the level of innovation effort in which firms engage.

3.2 Background and Literature Review

3.2.1 National Institutions and Corporate Governance

Research in the broad stream of corporate governance is generally concerned with organizational decision making. Corporate governance can be broadly defined as the mechanisms that determine the relative power and responsibilities of organizational stakeholders with respect to firm decision making. In contrast to the resource dependence perspective where stakeholder influence is a function of the importance of the resources provided by those actors to the firm (Pfeffer & Salancik, 1978), under the corporate governance perspective, relative influence stems from formal internal policies and external legal constraints that necessarily favor some actors and stakeholder groups over others. Corporate governance, therefore, plays a prominent role in determining how relevant stakeholder groups are within the firm and, in so doing, how reflective organizational decisions are of their interests. Although all firm decisions are influenced

by corporate governance to at least some degree, decisions regarding the allocation of firm resources receive consistent attention in corporate governance research because of their clear centrality to nearly all aspects of the firm (Lazonick, 2007; Morck & Steier, 2005; O'Sullivan, 2000).

Within the corporate governance research stream, two prominent paradigms have emerged—the shareholder perspective and the stakeholder perspective. Their primary divergence is with respect to whether the interests of shareholders or a broader set of organizational stakeholders should be emphasized in decision making. In this sense, they offer alternative versions of what constitute appropriate organizational objectives. Both perspectives claim to outline an appropriate approach to corporate governance that enables firms to achieve superior performance.

The dominant of these two perspectives, particularly within the United States, is the shareholder perspective. The shareholder perspective contends that firm performance is best realized through decisions that aim to maximize shareholder value. The shareholder perspective explicitly assumes that maximization of shareholder value also maximizes the value of the firm to society (Fama & Jensen, 1983; Jensen & Meckling, 1976). Given the prioritization of shareholders, corporate governance rules based on this view emphasize means to incentivize managers to take actions that are in the interests of the firm's shareholders, as opposed to their own interests or those of other stakeholders (Fama, 1980). This perspective is typically approached through an agency theoretic lens, wherein the agents (managers) must be provided with incentives and rules so as to ensure their interests (and actions) are aligned with those of the principals (shareholders).

The stakeholder perspective contrasts with that of the shareholder perspective by arguing multiple stakeholder interests need to be factored into the firm's decision making calculus (Donaldson & Preston, 1995; Freeman, 1984; Hill & Jones, 1992; Jones, 1995; Post, Preston, & Sachs, 2002). The logic behind this perspective centers on the need for multiple organizational actors to make firm specific commitments that are subject to potential hold-up on the part of the employer after investments have been made (Donaldson & Preston, 1995; Freeman, 1984; Hill & Jones, 1992; Jones, 1995; Post et al., 2002). For example, investments in human as well as financial capital are crucial to firm performance (Becker, 1994; Blair, 1995). As such, governance mechanisms that provide greater attention to employee concerns in corporate decisions or ensure employees receive a greater portion of the rents generated by the firm are advocated as a means to encourage employees to make the firm-specific investments in human capital that are necessary for superior firm performance. For example, Wang and colleagues (Wang, He & Mahoney, 2009) show that the value of firm-specific resources is enhanced when employees (as separate from managers) are given stock options. This governance mechanism assures employees a return to the rents generated by the firm from their firm-specific human capital investments and therefore, enables them to overcome hesitation to make those investments deriving from the potential to be held up by the. Firm resources such as knowledge, trust and reputation also require other organizational actors to make firm-specific commitments that require greater value to be placed on non-shareholder stakeholder groups (Barney & Hansen, 1994; Teece, 1998).

Both the shareholder and stakeholder views of corporate governance provide a theoretical basis for how adopting mechanisms that align firm decision making with the

interests of the relevant stakeholders enables superior firm performance. In reality, however, firm level corporate governance does not strictly align with either perspective. The reason for this stems from the fact that differing perspectives over what constitutes “appropriate” corporate governance ultimately reflect preferences regarding the role of the firm at the societal level. As such corporate governance is shaped by institutional forces external to the firm. Because societal preferences reflect compromises across varying perspectives, features of both shareholder and stakeholder perspectives are incorporated into firm governance to at least some extent. This is not to deny the importance of firm level corporate governance features. Indeed, corporate governance mechanisms such as the size and composition of the board of directors, or incentive structures for top management are critical determinants of intra-firm power dynamics and vary substantially across firms. However, forces in the external environments in which firms are embedded shape corporate governance at a broader level and ensure that not all aspects of governance are determined inside the firm.

At a societal level, perspectives on what constitutes appropriate governance hinge on whether the purpose of the firm is broadly seen to be purely economic, in which case the emphasis on shareholder value maximization naturally follows, or whether the firm has a broader societal function which justifies attention to multiple stakeholders (Capron & Guillen, 2009; Fiss & Zajac, 2004). Resolution of this issue is strongly influenced by the institutional environment in which the firm is embedded. That is, the manner in which preferences and views of the society as a whole evolve to define what is acceptable firm behavior shape the broad institutional constraints confronting the firm. These commonly accepted societal norms regarding appropriate firm behavior shape the creation,

development and enforcement of the regulatory institutions that explicitly constrain firms to comply with societal preferences (North, 1990; Scott, 2001).

Societal preferences regarding the role of the firm shape institutional development along multiple dimensions. Cultural differences have received substantial attention in research on comparative corporate governance as an important driver of differences in national corporate governance features (Aguilera & Jackson, 2010). Governance features such as ownership dispersion (Hofstede, 2004) and financial architecture (Kwok & Tadesse, 2006) have been shown to be influenced by cultural institutions. Institutions may also be formalized into codified laws and regulations. As Aguilera and Jackson (2010) note, “the corporation is itself a legal institution, where the rights and responsibilities of different parties are anchored in law and thereby also created and changed through politics.” Even formal laws, however, still reflect societal views about the role of the firm—at least under democratic systems of government. Gourevitch and Shinn (2005) document how prevailing corporate governance mechanisms in different countries are an outcome of contestation among stakeholder groups over having their interests with respect to the firm supported through formal institutions. These contests are won based on the strength of coalitions that emerge both across and within stakeholder groups, with the stronger groups better able to have their interests prevail over those of other stakeholder groups in political contests and policy outcomes. The result is that formal legal institutions of corporate governance emerge reflecting the relative power of the stakeholder group coalitions in the political economy.

The focus of the present study is on these formal legal institutions that influence national features of corporate governance—or “national corporate governance

institutions” (Capron & Guillen, 2009). These institutions constitute the regulatory pillar of institutions described by Scott (2001). Differences in regulatory institutions can be stark across national institutional environments. Comparative corporate governance is a broad research area that crosses multiple disciplines including management, economics, sociology and political science. Research in this stream has documented how the influence of organizational stakeholders over firm decision making and resource allocation differs substantially across countries as a result of national institutional differences (Aguilera & Jackson, 2010).

Comparative corporate governance research frequently distinguishes among institutional regimes through the use of relatively stylized governance system types. Distinctions are based on characteristics such as the degree of coordination between business and government (Hall & Soskice, 2001), whether the system favors shareholders or employees (Dore, 2000) and national legal tradition (La Porta, Lopez-de-Silanes, & Shleifer, 2008). Although few, if any, countries actually conform to these stylized governance system types, these efforts have made important contribution by drawing attention to how institutional features vary across countries and influence corporate governance arrangements.

In addition to corporate governance, national institutional differences are also relevant to innovation. Another stream of research, the national innovation systems perspective, has been explicitly concerned with the impact of institutional environment features on innovation outcomes (Lundvall, 1992; Nelson, 1993). This research takes a holistic approach to studying the national institutions as a set and how they work together to influence national innovation outcomes. Focusing on the interdependencies among

national institutions leads the national innovation systems perspective to offer detailed analysis of the effects of specific institutional configurations—which tend to be unique across countries. Accordingly, research in this stream provides fewer generalizable insights regarding the impact of institutions than research in comparative corporate governance.

While research in both comparative corporate governance and national innovation systems is relevant to the issues of firm innovation discussed here, both streams tend to focus on the direct effects of institutions. However, this focus on national characteristics can mask important firm level heterogeneity. Firm differences may lead to substantially different responses to similar institutional pressures, suggesting that failure to pay attention to these differences can hide important implications for how institutions influence firm level innovation processes. The present study attempts to build on this extant research by articulating how institutional features moderate direct firm level drivers of innovation strategy.

3.2.2 National Institutions and Stakeholder Rights Protection

It is rare that stakeholders other than management participate directly in firm decision making. To the extent that stakeholders do influence decisions, it is primarily through constraining the set of firm decisions that are acceptable with respect to the interests of that stakeholder group. Because the rights and responsibilities of stakeholder groups with respect to the firm are shaped by corporate governance features, the strength of constraints posed by various stakeholder groups—i.e. the degree to which stakeholder perspectives on the acceptability of various decisions are reflected in decision

outcomes—is determined by the specific details of those corporate governance features. In turn, understanding how stakeholders influence firm decision making requires attention to national political economic institutions because of the role played by national institutions in shaping those governance features.

This research focuses on national corporate governance institutions pertaining to two firm stakeholder groups: minority shareholders and firm employees. Subsequent references to “shareholders” refer to minority shareholders unless otherwise specified. Shareholders own equity shares in the firm. It is assumed that the only relationship between this stakeholder group and the firm is through share ownership and that the stakes held are not sufficiently large so as to prevent easy exit from the relationship with the firm. Employees are broadly considered to be any actors employed directly by the firm.

There are several reasons for focusing on these two stakeholder groups. First, shareholders and employees hold the strongest claims to the distribution of firm rents (Blair & Roe, 1999). As such, their influence on different types of important strategic decisions—such as the resource allocation issues associated with R&D activities—is more readily and clearly identifiable. Second, across countries, political attention to and legislation on corporate governance issues is frequently approached with respect to the relationship between these stakeholder groups and the firm. Consequently, national institutions specifically addressing the rights of these two groups can be identified and analyzed. Finally, the interests of shareholders and employees figure prominently in theoretical arguments relating to comparative corporate governance (Aguilera & Jackson, 2003) as well empirical research into how national institutions influence firm strategy.

Previous research has demonstrated that the extent to which national institutions support employees or shareholders influences important outcomes of strategic decision making such as the prominence of employee layoffs, managerial retention and asset sales following dramatic performance drops (Atanassov & Kim, 2009) and the extent of restructuring activities subsequent to takeovers (Capron & Guillen, 2009).

3.3 Theory and Hypotheses

3.3.1 Stakeholder Rights and Decision Constraints

The relationship between the shareholder and the firm is characterized by the legal claim of the former to the assets and residual income of the latter (Alchian & Demsetz, 1972; Demsetz, 1967; Easterbrook, 1991). The value of the shareholder “stake” in the firm is therefore a function of the value of firm assets and income. Although shareholders can appropriate this value through receipt of dividends, the predominant source of value that shareholders appropriate derives from the value from their shares in the firm. In either case, the value of the shareholder stake is directly linked to firm profitability. The primary interests of shareholders with respect to the firm are therefore centered around firm actions that bolster profitability.

Voting is the primary mechanism available to shareholders to constrain firm decision making. Even though ownership broadly entitles shareholders to vote on important company matters, these rights are typically exercised with respect to broad issues such as board representation rather than specific strategic decisions. Research evaluating the strength of shareholder rights focuses on the voting procedures associated with the exercise of ownership rights (La Porta et al., 1998). Regulatory institutions that

increase the strength of shareholder rights include laws that permit proportional representation of board members or that allow shareholders to mail in their votes rather than requiring them to be present at shareholder meetings. These provisions vary substantially across countries. Therefore, the extent to which shareholder interests constrain decision making is strongly influenced by national regulatory institutions.

Legal institutions that facilitate the expression of interests by shareholders are considered to provide stronger shareholder rights (La Porta et al., 1998). The most prominent consequence of national institutions providing stronger shareholder rights is to constrain firms to focus more on profitability—and more specifically, maintaining a strong stock price. There are several reasons underlying this constraint. Stronger shareholder protections at the national level work to increase the number of individual investors holding domestic corporate shares (La Porta et al., 1998). With more shareholders overall at a national level, the liquidity of domestic stock markets increases, easing the process by which a shareholder may profitably and quickly exit from investment in a firm by selling his stake. Greater liquidity and ease of exit reduce the commitment of shareholders to any particular firm and shareholders become more transient. Transient shareholders hold shares for shorter periods of time based on expectations of share price appreciation, especially in the near term (Bushee, 1998). Consequently, because share price appreciation is strongly driven by profitability, maintaining profitability becomes a more important constraint in the presence of stronger shareholder rights.

An increase in the total number of domestic shareholders and decrease in the size of those shareholdings also contributes to a problem of asymmetry of information

between firm decision makers and shareholders. The influences of many firm decisions are uncertain and inherently difficult to value. Moreover, their ultimate access may be contingent on firm or industry specific factors that could be difficult for either ordinary investors or non-firm insiders to understand. A full appreciation of the circumstances justifying such investments may require information the firm cannot or desires not be made public, perhaps for competitive reasons. At the same time, information may be available but difficult to obtain. If accessing the relevant information requires substantial effort on the part of firm outsiders or special skills to understand, investors holding fewer shares in many firms are less likely to be willing to make this effort for any specific firm. Rather, dispersed small shareholders are more likely to turn to the price of firm shares—a direct and visible measure of the value of the shareholder’s stake in the firm and indirect measure of profitability—as an indication of firm performance. The problem of lack of information means that reliance on stock price as the primary, or even sole, barometer of performance is likely to be the case even under circumstances where firm decisions, such as important resource allocations to strategic investments are not fully reflected in the stock price.

The time frame associated with returns to strategic decisions—particularly concerning resource allocation—constrains firm decision making to emphasize not only profitability generally, but short-term profitability in particular. In addition to difficulties of valuation associated with characteristics of investments, the appropriate value of investments may be difficult to discern if payoffs are not expected until sometime in the more distant the future. The longer the time frame associated with stock returns from strategic decisions, the more uncertain those benefits become. Not only might the

investments fail to develop in the manner expected, but the state of the competitive environment has greater potential to diverge from expectations the farther into the future it is projected. Kacperczyk (2009) finds that more focus on share price leads managers to shift attention toward short- and away from long-term strategies.

Another important consequence of stronger shareholder rights at the national level is an increase in the frequency with which takeovers of domestic firms occur (Schneper & Guillen, 2004). The hostile takeover has been argued to be perhaps the most important driver of managerial attention to stock prices (Benner, 2007; Davis & Useem, 2002). Hostile takeovers constitute a challenge to the firm's management that the value of the firm, and thereby the price of its shares, could be higher under alternative leadership. The implication is that if managers fail to manage the firm such that the stock price remains sufficiently strong, the low share price invites a takeover by an alternative management group better capable of creating value from firm resources (Manne, 1965). The fact that stronger national shareholder rights measures increase the prominence of hostile takeovers is important because the potential for a takeover to occur more strongly influences managerial action than the actual occurrence of takeover (Davis, 1991). Research on firms in the US—characterized by relatively strong shareholder rights—documents that the influence of strategic decisions on the price of firm shares is a prominent consideration of managers in the decision making process (Benner, 2007; Davis, 1991; Davis & Useem, 2002; Rao & Sivakumar, 1999; Useem, 1996).

In the context of stronger shareholder rights, managerial decision makers will be limited by stronger constraints to prioritize near-term profitability so as to maintain a strong share price in order to maintain their own employment. At the same time,

managers who are also shareholders may also seek to maintain the share price on account of interests identical to those of minority shareholders on this end. Maintaining or increasing profitability then becomes a more prominent constraint when strong shareholder rights are afforded greater levels of institutional protection.

Employment protection laws regulate the relationship between the firm and individual employees. Such laws cover factors including the conditions under which termination of the employment contract is valid and processes which must be followed in the execution of such actions. Examples of employment protection include restrictions on the dismissal of employees such as the need to notify, and possibly receive approval from, third parties. National legal institutions also influence employment protection through their treatment of the use of alternatives to the standard employment contract. Employment protection regulations may cover not only whether and the extent to which such contracts are permissible, but the extent to which firms are exempt from adhering to features of the standard employment contract such as benefits levels and facility of termination.

In contrast to the manner in which NCGIs bring shareholder rights to bear on firm decision making, the role of institutions that protect the employment relationship is more straightforward. Regulations and laws that protect employment have a clear and direct impact on the flexibility afforded to employers with regard to the manner in which this vital firm resource is used—especially with respect to reductions in employment levels. A firm seeking to reduce costs through the use of temporary workers will be restricted in the extent to which it is able to engage in that strategy when national employment

protection regulations increase the costs of layoffs, time-frame over which layoffs may be implemented or complicate the process of firing workers.

Labor economists have modeled how labor market frictions creating conditions of non-perfect competition have important effects on firm investment. Acemoglu and Pischke (1999a, 1999b) argue that non-perfect competition in labor markets, resulting from factors such as government regulation, creates incentives for employers to invest in upgrading employee skills. They develop a model that accounts for labor market frictions and found that firm-sponsored training of employees is more prominent in the presence of more regulated labor markets (Acemoglu & Pischke, 1999a). Acemoglu and Pischke (1999a) point to the fact that in countries with stronger regulation, such as Germany, firms contribute more toward the training of their employees as being in line with their findings. With respect to capital investment, Risager and Sorensen (1997), develop a model of national employment that accounts for the impact of employment protections on capital investment. These authors find that employment protections do not typically influence capital investment at the national level, except under conditions where product demand elasticity is strong.

Beyond these general findings, research in labor economics has also examined the impact of employment protections on R&D specifically. Saint-Paul (2002) develops a model examining the impact of firing costs on the type of R&D activity conducted by firms, finding that stronger protections lead firms to focus on more incremental rather than radical innovation. Notably, these findings echo those from the varieties of capitalism subfield of political science which has made similar arguments (Hall & Soskice, 2001). Koeniger (2002) focusing on national R&D intensity specifically, notes

that empirical tests show that across countries employment protection is negatively associated with national R&D intensity but that this effect becomes positive when examined within countries over time. Interestingly, Koeniger suggests that firm heterogeneity may be behind this discrepancy, developing a model that shows employment protections have a positive effect on innovation among incumbent firms—who realize stronger benefits from innovation in the context of higher labor dismissal costs—but also work to dampen national R&D by discouraging entry from non-incumbents. This implication that firm-level differences play a role in national innovation outcomes suggests that management researchers are well suited to provide further clarity into this issue.

Management research has, to a limited extent, examined the question of how constraints on employment impact firm performance. Researchers have found that these constraints have important implications for firm strategy and performance (Aguilera & Jackson, 2010; Bendix, 2001; Guillen, 1994). Although layoffs are increasingly seen as a means to improve firm performance (Guthrie & Datta, 2008), stronger employee rights at the national level work to reduce the ability of firms to lay off employees, even in the face of performance declines (Atanassov & Kim, 2009). When NCGIs provide stronger employee rights, restructuring activities following takeovers are less substantial (Capron & Guillen, 2009).

Although management research has begun to address the issue of how the rights provided to stakeholders by national institutions affect these aspects of firm strategy, the issue of how these cross-national differences influence the relationship between underutilized firm resources and innovation effort has not been the subject of substantial

inquiry. In the next section, I apply the findings from previous research on national institutions and corporate governance to firm decisions regarding resource allocation to innovation.

3.3.2 Shareholder Rights, Underutilized Resources and Innovation Effort

Several consequences of stronger institutional protections of shareholder rights limit the extent to which the arguments established in the TGF regarding the innovation-motivating properties of underutilized resources can be expected to hold. The increased focus on near-term performance deriving from NCGIs providing stronger shareholder rights protections runs counter to one of the central assumptions of the TGF underlying why underutilized human resources motivate innovation. Penrose is explicit in her assumptions detailing that firms are motivated to “increase long-term profits” (2009: 25). This long-run emphasis is critical toward motivating the use of underutilized resources toward the development of new capabilities and growth. To the extent that maximization of potential long-term profits ceases to be a firm goal, the motivation to use underutilized resources to build new capabilities to foster growth breaks down (Pitelis, 2007).

Stronger shareholder rights protections also increase the relative importance of shareholders vis-à-vis other firm stakeholder groups. Consequently, firm decision making will be more constrained to reflect the interests of this particular stakeholder group. These conditions conflict with another assumption of the TGH. Penrose notes that “profits are sought for the sake of the firm, that is, to reinvest in the firm rather than to reimburse owners for the use of their capital or their ‘risk bearing’” (2009: 26). Stronger shareholder rights protections shift this motivation underlying profits such that seeking

profits explicitly to reward owners for their ‘risk bearing’ is increasingly prioritized. In so doing, institutional protections of shareholder rights weaken the link between underutilized resources and innovation effort. Penrose herself later addressed this issue, writing in the preface to the third edition of *The Theory of the Growth of the Firm* that these assumptions no longer seemed to hold, “at least in the Anglo-American context...[thereby imposing] a new managerial restraint on the rate of growth in firms” (2009: 236). In light of this statement, the attention of the present study to the effects of NCGIs relevant to these assumptions is warranted.

Two features of innovation activities are likely to conflict with the constraints imposed by stronger shareholder rights at the national level—long time-frames and uncertain outcomes. Stronger shareholder rights constrain firms to favor actions that produce more immediate benefits. This constraint runs counter to the longer time frames associated with successful innovation. Successful innovation requires the integration and synthesis of new knowledge with existing firm capabilities and skills. The process takes time, making successful innovation outcomes difficult to accomplish in the short term. This creates clear conflicts with decision making and resource allocation constraints that shift firm decisions toward near-term performance improvement.

The uncertainty associated with whether or not innovation effort will produce tangible benefits for the firm also works to constrain managers from addressing the presence of underutilized resources by innovating in contexts of strong shareholder rights protection. For innovation effort to be successful, it must overcome challenges associated with both technological and market uncertainty (Lazonick, 2007; Van de Ven et al., 1999). Innovation often involves relatively distant search for new capabilities (March &

Simon, 1993) that have less relation to current competencies and technological expertise (Benner & Tushman, 2002). Making use of underutilized resources through the development of new capabilities therefore entails substantial uncertainty. Even when technological challenges associated with exploration are overcome, firms still face the problem of finding ways to create value from successful innovations. It becomes relatively more difficult to find ways to use capabilities that are novel and take the firm in directions in which it possesses little prior experience.

The long time frames and uncertainty of payoffs to innovation investments need not preclude efforts to create value from underutilized resources through innovation if the value of such investments is reflected in stock prices. However, there are several reasons this may not be the case. Technological and competitive uncertainty inherent to innovation projects complicates the ability of investors to accurately assess the eventual value that will be created through such investments. Valuing innovation investment is also complicated by the fact that understanding the potential for innovation to contribute to competitive advantage requires understanding not only current firm capabilities, but also how those capabilities might be enhanced through innovation. Shareholders owning stakes in a portfolio of firms are less likely to have the incentives or ability to collect and understand available information. At the same time, managers may not wish to disclose all—or any—important technical details of innovation and R&D investment projects for competitive reasons.

Both investors and the analysts that provide them with insights tend to have trouble appropriately valuing new technologies and firm innovations (Amir, Lev, & Sougiannis, 2003; Benner, 2008). To the extent investors are informed about a firm, it is

with respect to current operations and activities. In developing innovations that promote firm growth in new directions, information upon which firm valuations were previously based becomes less relevant. New information and analytical approaches on the part of investors and analysts may be required to assess the value of new innovations. Benner (2008) points out that investors continue to reward firms for producing revenues based on existing capabilities even in the face of changes to the competitive landscape that would seem to call for the development of new capabilities. The fact that the value of innovation investments may not be fully reflected in the price of the firm shares suggests that managers will be constrained from increasing resource allocations to innovation when institutions provide stronger minority shareholder rights.

Greater attention on the part of management to the impact of decisions on the price of firm shares restricts the implementation of longer-term projects. Management scholars have argued that incentivizing managers to share interests with shareholders should produce optimal investment levels (Hoskisson, Hitt, & Hill, 1993; Finkelstein & Hambrick, 1988; Sanders & Hambrick, 2007). However, recent empirical evidence documents that such attention frequently shifts focus to the short-term at the expense of the long-term. Allocations of resources to innovation represent a clear cost to the firm. While the benefits to innovation cannot be easily quantified and are therefore not reflected in the stock price, the associated costs will have a direct negative impact on near-term profitability. When managers are concerned that the market is focused on the price of firm shares they are more likely to forego investments in R&D (Tylecote & Ramirez, 2006). Rather than increase innovation effort, stock price pressures often lead managers to divest from longer-term projects (Bushee, 1998; Gentry & Shen, 2013;

Stein, 1988, 1989). Souder and Bromiley (2012) found that, contrary to expectations, greater use of stock-based managerial compensation reduced the extent to which firms engaged in long-term projects.

In assessing how stronger shareholder rights constrain firm decision making, it is also important to consider the relationship between successful innovation and the scope of firm activities. Innovation involves the incorporation of new knowledge to ends which may only partially be specified in advance and that, in any case, may diverge from the originally intended outcomes. Learning is constantly taking place during the innovation process. Accordingly, the goals, means of achieving and understanding of what is capable of being achieved in that process may all be in flux (Lazonick & O'Sullivan, 1996). The results of innovation development efforts can be unpredictable and idiosyncratic. As such, the results of this process are not only difficult to discern in advance but can take many final forms with only minimal connection to existing firm capabilities—even if such developments were not originally intended.

When innovation produces novel capabilities, creating value from those capabilities will frequently be most effectively achieved through diversification into new lines of business (Teece, 1982). However, diversifying into new areas of business that differ from current firm expertise has, over the last several decades, tended to have negative implications for firm share price. This negative impact of diversification on shareholder value is notably pronounced in firms with stronger shareholder rights protections (Fauver, Houston & Naranjo, 2004; Lins & Servaes, 1999). A common trigger of hostile takeovers has been excessive firm diversification. Moreover, a major reason that managers are concerned with the price of the firm's shares is the threat of a

hostile takeover in the event the value of firm shares falls too low (Davis & Useem, 2002; Manne, 1965). Benner (2007) notes that one of the primary strategies employed by acquirers to increase target value after hostile takeovers is to break the target into smaller more focused business units. In other words, there are market returns to de-diversification (Zuckerman, 2000), which will limit the extent to which firms can benefit from innovation through diversification.

Finance scholars have argued that diversification, particularly unrelated diversification is bad for shareholder value (Amihud & Lev, 1981; Berger & Ofek, 1996). Indeed, the market value of diversified firms tends to be lower than that for non-diversified firms (Lang & Stulz, 1994). Accordingly, diversification tends to have direct and negative linkages to firm share price. This holds even under circumstances where diversification may be strategically warranted. Incumbent firms tend to be rewarded for maintaining a narrow focus—even in the face of technological change that undermines the long term viability of that focus—and penalized for attempting to develop more radical innovations in the new technological space (Benner, 2008). The links between innovation and diversification suggest that stronger institutional protections of shareholder rights will work to constrain firms in the extent to which the presence of underutilized human resources is addressed through increased innovation effort.

This constraint on innovating in response to the presence of underutilized firm resources posed by stronger institutional protections of shareholder rights is strengthened by the fact that minority shareholders may derive greater benefit from efforts manage underutilized resources through their elimination. The presence of underutilized resources, by definition, indicates a surplus over requirements for current firm operations.

Accordingly, reducing the discrepancy between current and requisite resources represents a potentially more expedient means by which to manage the excess in a manner that aligns more strongly with the constraints posed by stronger shareholder NCGIs. To the extent that underutilized resources have accumulated in the process of firm growth, the concomitant learning that also takes place during that process is likely to allow for the release of some resources without loss of organizational efficiency (Penrose, 1959; Teece, 1982). Moreover, the positive performance effects deriving from such reductions can be realized expediently. At the same time, there is relatively little uncertainty associated with the realization of those benefits. Estimations of reductions are calculable and, because the benefits proximate, what is realized should not diverge substantially from expectations. In contexts where shareholder rights are strong, decision making constraints are likely to increase pressure on the firm to manage underutilized resources through by reducing resource levels to a more appropriate level. Firm employees, in particular, are frequent targets for such reductions. Large scale employee layoffs have been found to be more common in countries with strong shareholder rights (Atanassov & Kim, 2009; Guthrie & Datta, 2008). Moreover, investors and markets react favorably to reductions of the firm workforce (Davidson, Worrell & Fox, 1996; Love & Nohria, 2005).

Overall, stronger institutional support for shareholder rights will constrain firms from addressing the presence of underutilized resources by increasing innovation effort.

H4a: The strength of the positive effect of underutilized human resources on innovation effort will be diminished when national corporate governance institutions provide stronger shareholder rights.

H5a: The strength of the positive effect of underutilized physical resources on innovation effort will be diminished when national corporate governance institutions provide stronger shareholder rights.

3.3.3 Employment Protection, Underutilized Resources and Innovation Effort

The constraints imposed when national institutional provide stronger employment protections are differ substantially from those imposed by stronger shareholder rights. Stronger employment protections increase the costs and time-frames associated with reductions in the size of the firm workforce. Accordingly, employment protections constrain the extent to which implementation of strategies involving reductions in the size of the workforce are viable. Given the ability to increase performance through the elimination of unnecessary resources, reduction of underutilized human resources presents a viable strategic option for improving performance. This strategy is especially prominent when pressure to increase performance is arguably highest—when firm performance is weak. Reducing labor costs is a common response from firms suffering weak performance (Guthrie & Datta, 2008). However, in contexts where employment protections are stronger, firms are constrained in the extent to which this strategy is viable. Atanassov and Kim (2009) document that layoffs are a more likely response to performance decline when employee rights are weak.

Although more pronounced under conditions of weak performance, the constraints posed by stronger institutional employment protection regulations will be salient whenever firms possess more human resources than necessary. When firms are constrained in the extent to which they may improve performance by reducing the size of the workforce, the presence of underutilized human resources will create stronger pressure on firms to find ways to productively utilize them. Increasing innovation effort offers one means by which firms can create value from unused human resources. By building on the knowledge and skills of firm employees firms can create new resources and capabilities, increase the efficiency of production processes and create new opportunities for growth.

In the TGF, Penrose does not extensively attend to the possibility that firms might beneficially manage underutilized resources by reducing their presence within the firm. Arguably, part of this might be attributed to the time period in which she was writing—strategic layoffs were less common in 1950s America than they are today. Regardless, because employment protections constrain firms from implementing this alternative strategy for underutilized resource management, the presence of these NCGIs create conditions in which the TGF arguments regarding how underutilized resources motivate firm growth should be more relevant. In other words, the constraints imposed by stronger employment protections will work to broadly strengthen the extent to which firms find new uses for underutilized human resources. In line with the TGF arguments, increased output and diversification, as well as innovation, may be expected to be stronger under such institutional conditions. However, several other features of the effects of

employment protections will work to strengthen the effect of underutilized human resources on innovation specifically.

Stronger employment protections limit the ability of firms to alternative sources of labor to full-time employees, which increases the costs to the firm of those employees that it does employ. These higher costs increase the pressures firms face to fully utilize their human resources. Moreover, because the greatest value to the firm derives from utilizing the most valuable unused services possessed by its employees, there are strong incentives to ensure that the most valuable services possessed by employees are utilized to the greatest extent possible. Although growth may go some way toward accomplishing that objective, when these unused services contain the seeds for the development of new capabilities, their value may be substantially higher. The generation of new resources and capabilities is fundamental to both the development and maintenance of firm competitive advantage (Helfat & Peteraf, 2003). In this sense, increasing innovation effort enables the firm to develop new capabilities that more extensively employ the most valuable unused skills and resources embedded in its employees. Accordingly, managing underutilized human resources through increased innovation effort becomes a greater priority when stronger employment protections increase the costs associated with firm employees.

Using existing but underutilized employee skills to develop new capabilities can also help the firm to access new revenue sources that are unrelated to current revenue streams. This can be important to maintaining firm competitiveness when strong employment protections limit the use of workforce reductions as a strategic approach to dealing with performance fluctuations. Using new capabilities to diversify into new activities can work to reduce the total level of risk to the firm as well as the threat of

failure when specific firm business lines confront challenges with competitive or environmental circumstances (Amihud & Lev, 1981). Should one area of the firm face challenges, layoffs will be less necessary if the firm has other lines of business capable of supporting firm performance and viability while those issues are addressed (Wang & Barney, 2006). Creating value from new innovation capabilities is also likely to lead to firm growth and, in turn, internal advancement opportunities for employees, both of which reduce pressure for employment reductions. Increasing innovation effort, therefore, can help to improve medium- to longer-term firm stability and, in so doing, work to mitigate the constraints posed by stronger institutional support for employment protection.

Stronger employment protections may also increase employee interest in ensuring that underutilized resources and skills are effectively utilized. At least some portion of the skill set of any individual employee is inherently firm-specific. Accordingly, leaving the firm entails some costs as the value of the firm specific-portion of skills is necessarily lowered when employed at any other firm (Williamson, Watcher, & Harris, 1975). Although stronger employment protections lower the likelihood of individual employees leaving the firm, they may work to increase the costs of doing so. Because stronger employment protections work to increase the cost to firms of hiring employees, finding work at a new firm becomes relatively more difficult for the individual employee whose home country has adopted stronger employment protections. Under these conditions, employees tend to be more participatory in internal firm processes (Aguilera & Jackson, 2003). Part of this participation may involve efforts on the part of both the employee and firm management to see that the valuable knowledge and skills possessed by individual

employees are effectively utilized. Again, to the extent that innovation provides the greatest potential value, these actions may promote innovation effort to build on underutilized human resources.

Another important distinction between the constraints imposed by stronger employment protections and those posed by stronger shareholder rights is that the restrictions on managing underutilized human resources through increased innovation posed by the latter are not relevant with respect to the former. Stronger employee rights do not constrain managers in terms of the time frame over which innovation projects must deliver returns. To the extent some of the services associated with underutilized human resources suggest promising innovation projects that may take time to yield benefits to the firm, stronger employment protections will not restrict managers from allocating resources to those projects in the way that stronger shareholder rights would. The uncertainties associated with innovation projects are also less likely to conflict with constraints imposed by stronger employment protections. Assuming the firm is able to meet present employee compensation claims, constraints to maintain employment levels will not conflict with the uncertainties regarding eventual outcomes of potential innovation projects.

Overall, national institutions providing stronger employment protections will work to increase the extent to which underutilized human resources motivate firm innovation effort.

H4b: The strength of the positive effect of underutilized human resources on innovation effort will be magnified when national corporate governance institutions provide stronger employment protections.

Although employment protections create direct constraints on the management of human resources, these NCGIs influence how firms address the presence of underutilized physical resources as well. According to the TGF, the potential services embedded in the human and physical resources of the firm interact with each other to create the productive opportunity of the firm. In other words, the potential services available in a firm's physical resources can create new opportunities for productive utilization of human resources and vice versa (Penrose, 1959). This suggests that when a firm holds underutilized physical resources, alternative allocations of those resources can create new ways to utilize the firm's human resources as well.

As discussed above, stronger employment protections restrict the ability of firms to adopt strategies that involve layoffs. At the same time, stronger employment protections increase the costs of employing human resources. These higher costs can work to increase labor market rigidities and can lead firms to become more cautious in how readily they take on new employees in the first place (Gugler and Yurtoglu, 2004). As a consequence, firms will generally be under greater pressure to find ways to create value from their human resources, whether in underutilized or not. The ability to put physical resources to work in new ways that increase the value of human resources suggests that possession of underutilized physical resources will more strongly promote firm growth in contexts of stronger employment protections.

As with underutilized human resources in the context of strong employment protections, underutilized physical resources under similar institutional conditions will broadly promote firm growth. That is, firms can productively employ underutilized physical resources to new ends through increased output and diversification as well as innovating. However, stronger employment protections are likely to motivate innovation specifically. Using underutilized physical resources to promote growth by increasing output or diversifying may require increased intensity of current resource usage patterns. This may be challenging if firms lack underutilized human resources. By contrast, innovation projects can be designed with conscious effort to develop new ways to deploy underutilized physical resources that create opportunities for the relatively more valuable components of employee skills to be used more extensively—as opposed to requiring more extensive use of the same inputs. In other words, innovating to create more value from underutilized physical resources can be conducted so as to simultaneously increase the value firms produce based on their human resources as well. When institutional conditions increase the imperative to create value from human resources, the potential benefits of managing underutilized physical resources by increasing innovation effort will, therefore, increase.

The extent to which underutilized physical resources induce firms to engage in innovation activities will be strengthened by more stringent protection of employment by NCGIs.

H5b: The strength of the positive effect of underutilized physical resources on innovation effort will be magnified when national corporate governance institutions provide stronger employment protections.

3.3.4 Stakeholder Rights, Unabsorbed Slack and Innovation Effort

Unabsorbed slack is capable of being applied toward a wide range of applications. This ease of reallocation has implications for how shareholder rights and employment protections are likely to moderate the innovation-enabling effects of unabsorbed slack as well as the innovation-motivating effects of Penrosian resources.

Firm decision makers have substantial latitude in deciding how unabsorbed slack is allocated (George, 2005; Sharfman et al., 1988). Unabsorbed slack can be used to support innovation but can just as easily be allocated toward other activities within the firm. By contrast, human and physical resources tend to be allocated to more specific types activities within the firm. Although latitude exists to alter the specific manner in which these resources are used, generally speaking, drastic changes to these allocations are difficult.

The high discretion associated with unabsorbed slack suggests that the extent to which slack is allocated to innovation, as opposed to other objectives, will be affected by the extent to which the constraints posed by NCGIs push firms towards the former rather than the latter. If national institutions provide employees or shareholders with stronger rights and if meeting the constraints created by those institutions requires the use of unabsorbed firm resources, the extent to which unabsorbed slack supports innovation

activities will be weakened. For several reasons meeting the constraints imposed by stronger rights for these two stakeholder groups, is likely to reduce the level of unabsorbed slack available within the firm to support innovation activities. Accordingly, stronger institutional support for both employment protection and shareholder rights are likely to reduce the positive influence of unabsorbed slack on innovation effort.

There are several reasons that the positive influence of unabsorbed slack on innovation will be weaker when shareholder rights are stronger. Innovation requires organizational learning and application of new knowledge (Levinthal & March, 1993; March, 1991). There are uncertainties associated with incorporating and applying any new knowledge to current firm activities and the success of innovation projects is never certain. Even when value is created, the time frame over which benefits are realized is unlikely to be immediate. The stock price impact associated with allocation of unabsorbed slack to innovation effort is unlikely to be substantial or commensurate with the level of resources allocated to the projects.

Alternative applications of unabsorbed slack have a more direct influence on value that minority shareholders receive from their relationship with the firm. Unabsorbed slack could be allocated toward paying higher dividends or share buybacks that raise the share price. Proponents of the maximization of shareholder value as the optimal means by which to maximize firm performance argue that accumulation of slack is something to be explicitly avoided precisely because it can be directed to uses of dubious benefit to the overall financial value of the firm (Jensen & Meckling, 1976; Jensen & Ruback, 1983). From this perspective underutilized financial resources should be redistributed to owners to prevent wasteful allocation. Although examples of such

inefficient allocations often center around managerial direction of such funds to personal benefit, the uncertainty associated with innovation projects may have less near-term value to shareholders than alternative allocations. The ability of unabsorbed slack to be used to the direct benefit of shareholders suggests that managers will be constrained in the extent to which they are able to direct this type of slack toward innovation activities in national contexts of stronger shareholder rights.

Another reason that stronger rights for minority shareholders are likely to limit the extent to which unabsorbed slack is used to support innovation effort stems from how these actors are positioned to understand and benefit from such efforts. Research exploring the links between corporate governance and innovation has emphasized the importance of commitment from key actors toward firm innovation as a necessary condition for the success of such projects (O'Sullivan, 2000). In order for organizational actors to support allocation of resources toward innovation projects, they must have knowledge of the current capabilities of the firm and the market opportunities that it faces in order to understand the benefits developing new complimentary capabilities (Lazonick, 2007). Minority shareholders are unlikely to have such knowledge. These stakeholders typically lack the incentives and the means to become sufficiently informed regarding firm operations because of their small stakes and outsider status. These factors restrict the extent to which shareholders are able to understand how resource allocation to innovation effort may benefit their interests.

Organizational stakeholder support for the allocation of resources to innovation projects is also contingent on their ability to benefit from any value created by allocation of resources to innovation projects (O'Sullivan, 2000). The lack of substantial immediate

benefits to innovation efforts suggests that for innovation effort to be perceived as valuable by organizational stakeholders, there must exist an expectation among those stakeholders that their current relationship with the firm will still be in force at the point in the future when the value created by innovation projects eventually materializes. This condition may not hold for minority shareholders that own shares for relatively short time periods.

The constraints posed by stronger employment protection will also work to limit the extent to which unabsorbed slack can be directed toward innovation effort. Stronger employment protections directly restrict the ability of firms to expediently reduce costs through employment reduction when such strategies might be desirable. Under circumstances where such is the case, any unabsorbed slack the firm has may be required to maintain commitments to employees in the event of unfavorable performance fluctuations. Moreover, under adverse circumstances, unabsorbed slack may be necessary to facilitate the execution of new strategies—a particularly salient point given restrictions on layoffs. Even when competitive and performance circumstances do not warrant reduction in underutilized human resources, the restrictions on strategic latitude imposed by stronger institutional supports of employment protection are likely to require that some level of unabsorbed slack be held to address potential future contingencies. As such, the amount of unabsorbed slack that might be used to support increased innovation efforts will, to some degree, be restricted.

Stronger shareholder rights and employment protections constrain the ability of the firm to allocate unabsorbed slack toward innovation activities. Accordingly, the

innovation-enabling effects of unabsorbed slack will be weaker when NCGIs are more supportive of stakeholder rights.

H6a: The strength of the positive effect of unabsorbed slack on firm innovation effort will be diminished when national corporate governance institutions provide stronger minority shareholder rights.

H6b: The strength of the positive effect of unabsorbed slack on firm innovation effort will be diminished when national corporate governance institutions provide stronger employment protections.

3.4 Measures and Methods

3.4.1 Sample and Measures

The sample of 3,069 firms from 18 countries over the 1996-2005 time period used to test Hypotheses 1-3 in Chapter Two is employed once again to test Hypotheses 4-6 of the present study. All firm level variables are defined identically to the corresponding measures used in Chapter Two and are constructed using data from the Worldscope database. Additional variables and sources are defined below.

Independent Variables

Data on national corporate governance institutions come from the Law and Finance literature. Institutional measures are based on the home country of the firm as defined in the Worldscope database. Data on shareholder rights are based on a review of legal provisions conducted in 2003 by Djankov and colleagues (Djankov, La Porta,

Lopez-de-Silanes, & Shleifer, 2008). Data on employee rights are based on a similar review from 1997 by Botero and colleagues (2004). In both cases the data reflect the specific regulatory environments for roughly the middle of the time period of this study. Additionally, both measures are relatively stable over time, suggesting that the use of time-invariant measures is not problematic. Values of both institutional measures for each country in the sample are listed in Table 6.

The measure of *Shareholder Rights* is based the country anti-director rights index originally developed by La Porta and colleagues (1997, 1998) and later modified by Djankov and colleagues (2008). The latter version corrected some of the shortcomings of the first and is used here. Scores for this index are created by adding 1 for each of the following six provisions when they are present in the company law or commercial code of a given country: 1) shareholders are allowed to mail their proxy vote to the firm; 2) shareholders are not required to deposit their shares prior to the general shareholders' meeting; 3) cumulative voting or proportional representation of minorities on the board of directors is allowed; 4) a mechanism for providing relief to aggrieved minority shareholders exists; 5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10%; and 6) shareholders have preemptive rights that can be waived only by a shareholders' vote. The total score for each country is normalized to create an index running from zero to one, with higher levels in countries with a larger number of these provisions protecting shareholder rights.

The measure of employment protection comes from the index of employment laws developed by Botero and colleagues (2004). It has four components. The first

includes measures indicating the cost of alternatives to standard full time employees. The second component measures the cost of increasing the number of hours worked by employees. The third component measures the cost of firing firm workers. The final component assesses whether each of seven laws or regulations protecting workers from dismissal—such as whether third parties must be notified in the case of firing more than a single worker or if third party approval is needed in such a case—are present in the legal code. The four components are averaged (equal weighting) and normalized to create the measure of employment protection legislation—*EPL*—employed here. *EPL* is an index ranging from zero to one. Countries where national institutions are more protective of employees have higher values. An important characteristic of this index is that it captures the ability (or more precisely, the lack thereof) of firms to use alternative employment arrangements to employing full time workers through such practices as the use of temporary works or flexible working contracts. As such, it captures the extent to which firm employees constitute the indivisible human resources as theorized in the TGF.

Control Variables

Given that the main variables of interest are regulatory in nature, one important source of variation across countries is the extent to which such regulations are likely to be enforced. When specific legal prohibitions fail to be enforced, their existence on the books bears little practical relevance. Accordingly, I control for these cross-national differences by including a national measure of the strength of the rule of law. Data on rule of law are compiled by the World Bank's Governance Matters project (Kaufmann, Kraay & Zoido-Lobaton, 2000; Kaufman, Kraay, & Mastruzzi, 2009). The rule of law measure captures “the extent to which agents have confidence in and abide by the rules of

society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence” (Kaufman, Kraay, & Mastruzzi, 2009). Rule of law is a standardized measure of the strength of the rule of law in country l in year t . Higher values indicate stronger rule of law. Because the second stage equation is cross-sectional in nature, the value of rule of law is averaged over the 10 year sample period creating a single *Rule of Law* measure for each country.

As in Chapter Two, country level economic development is controlled for. However, because of the cross sectional nature of the second stage equation, the measure of *GDP per capita* here is averaged over the ten-year time period of the sample. Economic development and rule of law are highly coordinated. More economically developed countries tend to have more comprehensive and better-enforced laws than developing countries. Given the legal character of the independent variables, it is important to control for the strength of rule of law beyond that which is accounted for by economic development. Consequently, to address issues of multicollinearity arising from simultaneous inclusion of these variables, an orthogonalized version of *Rule of Law* is included. This measure captures the effect of *Rule of Law* that beyond that which is associated with economic development.

3.4.2 Estimation Strategy

Hypotheses 4-6 argue that the nature of the relationship between underutilized resources and innovation effort is contingent on NCGI levels. Analyzing these arguments requires examination of how the strength of the firm level effects of underutilized

resources established in Chapter Two varies across countries with levels of institutional protection afforded to the two stakeholder groups of interest here—firm shareholders and employees. Because the independent variable of interest is measured at a different level (country level) from the dependent variable (firm level) appropriate analysis requires the use of multilevel estimation techniques.

One of the issues inherent to multi-level data is the fact that level 2 variables (here country-level variables) are common to a number of level 1 units (here firms). Introducing level 2 variables as independent level 1 variables violates the assumption of independence of the covariates and produces biased results (Arregle, Hébert & Beamish, 2006; Raudenbush & Bryk, 2001). Accurate estimation of both national and firm level effects is broadly important in management research where employees are nested in firms, firms are nested in industries, etc. (Hofmann, 1997). However, these techniques are especially important to research in IB where national institutions are often the objects of investigation for their effects on firm-level outcomes. Single equation hierarchical linear models have been advocated as one helpful, although currently underemployed, means for IB scholars to employ toward addressing these issues (Peterson, Arregle, & Martin, 2012). This approach estimates a single equation including all level 1 and level 2 variables that addresses the interdependence of variables across levels by explicitly accounting for the nested structure of the data. Specifically, level 1 and level 2 residuals are incorporated into model estimations, which allows for valid statistical inference.

Single equation hierarchical estimations rely on one critical assumption which may limit their applicability in the context presented here. Specifically, these models assume that any unobserved firm-level factors do not simultaneously impact levels of

both independent and dependent covariates. This condition may not be satisfied if unobserved firm level characteristics simultaneously impact both independent and dependent variables, creating potential endogeneity issues if not properly addressed (Hamilton & Nickerson, 2003). A common strategy in empirical management research for addressing this type of endogeneity is through the inclusion of firm fixed effects. This approach was used in empirical testing of the arguments presented in Chapter Two. However, the inclusion of firm fixed effects is not compatible with single equation hierarchical multilevel techniques.

An alternative multi-level approach is to employ a ‘two-step’ framework where the equations containing level 1 and level 2 variables are estimated sequentially rather than simultaneously. This approach has been used in political science research examining how the effects of factors demonstrated to influence individual level outcomes of interest—such as voter preferences—differ across countries based on national characteristics (see Lewis & Linzer, 2005). This approach has clear utility in the context of this study, where I am interested in how the effects of firm level independent variables (underutilized resource measures) differ across national institutional contexts. Accordingly, I employ the ‘two-step’ approach developed by Huber, Kernell, and Leoni (2005) and Jusko and Shively (2005). In this approach, the first step involves estimating the level 1 equation separately for each level 2 unit (country). The coefficient estimates from the level 1 estimation are then used as dependent variables in the second step where coefficients for any level 1 variables can be used as dependent variables in a regression on the level 2—country level—independent variables. The coefficients in the level 2

variables of the second stage indicate how the effect of a given level 1 variable varies with changes in the level 2 variables.

This approach offers several advantages. First, estimates are consistent and efficient (Leoni, 2009). Second, because the first step is estimated separately, fixed effect estimations may be employed to address potential bias stemming from unobserved firm level effects. Additionally, because effects are estimated separately for all firms from a given country, issues of correlation among firms from common home countries are also addressed. Individual estimation of each country separately also allows time dummies to be specific to countries, enabling them to account for national level year effects that may depart from global trends. Another advantage is that because coefficients are no longer constrained to be the same across all countries and because the number of countries in the sample is not excessively large, insights into relationships of firm level variables can be readily discerned and compared across countries. Separate country-level estimations also facilitate visualization of the effects at the country level. Point estimates for values of a firm level variable of interests are produced for each country and these can be easily plotted against values of against any national level variable, which facilitates interpretation of results.

Equation 2 describes the first stage equation used in the present study. This equation is nearly identical to Equation 1 from Chapter Two. However, there are three notable exceptions. First, GDP per capita is now excluded—as a level two variable it is included in the second stage equation. Second, the l index indicating countries 1-18 in the sample is now included with the β coefficients—not the respective variables—because

equation 2 is estimated separately for each of the 18 countries in the sample. Finally, unabsorbed slack is an independent variable in Eq. 2 rather than a control variable.

(Eq. 2)

$$\begin{aligned}
 R\&D\ Intensity_{ikt} = \beta_{0l} + \beta_{1l}HR\ Intensity_{ikt-1} + \beta_{2l}PR\ Intensity_{ikt-1} + \\
 &\beta_{3l}Unabsorbed\ Slack_{ikt-1} + \sum_{j=4}^{j=6} \beta_{jl}Firm\ Controls_{ikt-1} + \\
 &\beta_{7l}Industry\ R\&D\ Intensity_{kt-1} + \sum_{y=1}^{y=9} \omega_{yl}Year\ Dummy_t + \varepsilon_{ikt}
 \end{aligned}$$

Hypotheses 4-6 argue that the effect of underutilized resources on *R&D Intensity* will be different across countries depending on characteristics of the national institutional environment. Accordingly, equation 2 is estimated separately for each of the 18 countries in the sample, creating 18 β coefficient estimates for each of the six right-hand side variables and the constant described in equation 2. The coefficients β_{1l} , β_{2l} , β_{3l} represent estimates of the country level effects of each of the three underutilized resource measures of interests to the present study—human, physical and financial resources, respectively. Each of the three sets of 18 β coefficients is then used as a dependent variable in the second stage estimations.

Ideally, the respective β coefficients would represent the true respective population parameters for the effects of underutilized resource levels on innovation effort in each country— $\beta_{HR\ Intensity\ l}$, $\beta_{PR\ Intensity\ l}$ and $\beta_{Unabsorbed\ Slack\ l}$, respectively. The motivation behind the second stage equation is to regress each of these three sets of β

coefficients on the independent and control variables at the country level. Equation 3 uses the equation for employee underutilized resources as an example:

(Eq. 3)

$$\beta_{HR\ Intensity\ l} = \gamma_1 Shareholder\ Rights_l + \gamma_2 EPL_l + \sum_{m=3}^{m=4} \gamma_m Country\ Controls_l + \varphi_l$$

Here, φ_l is an error term associated with Equation 3 that has variance σ^2 . Using this approach, the coefficients in Equation 3 indicate how the impact of underutilized human resources on innovation effort ($\beta_{HR\ Intensity\ l}$) varies with levels of the NCGI measures. In order for the 2-stage approach to provide valid inferences, it is necessary to address one issue with equation 3. Namely, $\beta_{HR\ Intensity\ l}$ is the true country-level population parameter, whereas equation 2 only provides estimates of that parameter— β_{1l} . β_{1l} —defined in Equation 4—is composed of the true $\beta_{HR\ Intensity\ l}$ and sampling error v_l , the variance of which is ξ_l^2 . Therefore, rather than Equation 3, the second stage equation is defined by Equation 5.

(Eq. 4) $\beta_{1l} = \beta_{HR\ Intensity\ l} + v_l$

(Eq. 5)

$$\beta_{1l} = \gamma_1 \text{Shareholder Rights}_l + \gamma_2 \text{EPL}_l + \sum_{m=3}^{m=4} \gamma_m \text{Country Controls}_l + \varphi_l + \nu_l$$

The two components of the error term in Equation 5, φ_l and ν_l can be combined into the single error term μ_l , yielding Equation 6.

(Eq. 6)

$$\beta_{1l} = \gamma_1 \text{Shareholder Rights}_l + \gamma_2 \text{EPL}_l + \sum_{m=3}^{m=4} \gamma_m \text{Country Controls}_l + \mu_l$$

Valid estimation of equation 6 requires attention to the fact that the error term μ_l has two components φ_l and ν_l and that ν_l derives from error in estimation of β_{1l} . The main problem here is that ν_l may not be constant across estimates of β_{1l} . The variance of the error term in Equation 6, μ_l is composed of σ^2 (assumed constant) and ξ_l^2 . If ν_l is not constant, the variance of ξ_l^2 , and therefore μ_l , is no longer constant, leading to inefficient coefficient estimates and inconsistent standard errors.

Lewis and Linzer (2005) offer several methods for addressing these issues and estimating this equation, three of which are relevant to this study. The first approach is to estimate Equation 6 using OLS with robust standard errors to address the possible violation of the heteroskedastic error variance assumption. However, although this increases the validity of standard error estimates, it remains inefficient because it does not use information known about ξ_l^2 which could be applied in a weighted least squares (WLS) regression to increase efficiency. This leads to the second approach, which is to

use WLS with variable weights set to $1/\xi_l$. However, Lewis and Linzer note that if σ^2 is not sufficiently small as compared to ξ_l^2 , that coefficient estimates are very inefficient and standard errors can be substantially misleading.

The solution to this issue proposed by Lewis and Linzer (2005), and first suggested by Hanushek (1974), is to take advantage of the fact that the dependent variable in the second stage is a regression coefficient, which means we have information about ξ_l^2 . If an estimate of σ^2 , $\hat{\sigma}^2$, can also be made, then efficient estimates of Equation 6 can be obtained by using WLS with the following weights (w_l):

$$w_l = \frac{1}{\sqrt{\xi_l^2 + \hat{\sigma}^2}}$$

Lewis and Linzer (2005) propose a method for deriving $\hat{\sigma}^2$, which I use to implement the WLS approach to estimate Equation 6 and test Hypotheses 4-6. This approach accounts for the fact that the coefficients in Equation 2—which are used as dependent variables in Equation 6—are estimated with error, and uses the precision with which those estimates are made (based on standard error estimates) to weight each country level coefficient estimate. Accordingly, more precise estimates are given more weight in the second stage estimation (of Equation 6). Put differently, imprecise country level estimates, as indicated by large standard deviations, are given less weight in estimating the overall effect of the country level institutional variables on the strength of relationships between underutilized resources and innovation effort at the firm level.

3.5 Results

3.5.1 Main Analysis

Results of first stage panel fixed effects regressions for each individual country are summarized in Table 7. Results of individual country first stage regressions generally align with expectations as well as with results produced by the pooled sample used in part 1. The effect of underutilized human resources is positive across all the countries in the sample except Singapore which is very slightly negative and non-significant. Moreover, the effect is significant across nearly all countries—two notable exceptions being the USA and Japan. The fact that this relationship is so consistent across countries helps to provide additional support for Hypothesis 1a. At the same time, it highlights a potential limitation of using a single country study to test the arguments of Chapter Two. A study including only firms from the US would conclude that the presence of underutilized employee resources was not a significant motivator of firm innovation effort. However, looking at a global sample allows for the consideration of the effect across institutional environments that, as demonstrated here, moderate the strength of its effect in individual countries.

Country level coefficient estimates for the effect of unabsorbed slack also align with the results of Chapter Two. This effect is positive in all but 3 countries (only one of which is significant) and significant across the majority of countries. Results for the effect of underutilized physical resources are more mixed. Several countries are both negative and significant with respect to this relationship—Canada, Germany, Italy and India. Of those countries where the effect is positive only in roughly half of those is the

effect significant. These mixed results may go some way towards explaining the lack of support for Hypothesis 1b and the related interactions in Chapter Two.

Table 8 provides descriptive statistics for the country level variables used in the second stage equations. Mean values of all three country level coefficients are positive and align with the argument that the presence of these underutilized resources has a positive effect on firm innovation effort. However, minimum values of all three are negative indicating that this relationship is not consistent across national institutional environments and providing further evidence of the importance of examining these effects across individual countries. The main NCGI variables, shareholder rights and employment protection, have a range between just above zero and just below 1. Although the top and bottom levels are slightly different the overall range for both is similar at 0.5 for shareholder rights and 0.58 for EPL. Means values of .62 and .48, respectively are at the midpoints of both ranges.

Pairwise correlations are for the most part in line with reasonable ranges with two exceptions. First, *Shareholder Rights* and *EPL* have a high negative correlation of 0.5. This suggests that multicollinearity may be an issue if both measures are simultaneously included in the estimations. Moreover, the number of observations in the second stage estimations is limited to the number of country level coefficient estimates (18 for all three underutilized resource measures of interest) limiting the number of variables that can be safely included in the models and the two control variables are needed here. For these reasons, separate estimations for each underutilized resource measure are run for shareholder rights and employment protection, respectively. The second correlation issue

relates to rule of law and GDP per capita. As described above, this is addressed through the inclusion of an orthogonalized measure of rule of law with respect to GDP per capita.

Estimations of the second stage estimations described in Equation 6 are carried out with the user-written Stata command “edvreg” (estimated dependent variable regression). The “edvreg” procedure implements the two-stage estimator, discussed above, as described by Lewis and Linzer (2005). Results of these estimations are reported in Table 9. Column 1 reports the results of the regression of country level coefficient estimates of the effect of underutilized human resources on innovation effort on shareholder rights, GDP per capita and rule of law. The negative coefficient for shareholder rights (-65.964, $p < 0.01$) aligns with the arguments of Hypothesis 4a and is statistically significant at the 1% level. To provide some insight into the practical significance of this result, I compare two firms. Firm A is based in a country where shareholder rights are one standard deviation higher than those of the home country of Firm B. Assuming all other country-level variables are equivalent in the two countries, the marginal effect of a 10% increase in human resource levels on innovation effort would be approximately 0.7 percentage point lower in the firm based in a country A (where shareholder rights are stronger).

Figure 1 provides a visual representation of how the strength of underutilized human resources on innovation effort varies across countries. The x-axis represents the strength of shareholder rights protection while the y-axis represents the estimated effect of underutilized human resources on R&D intensity at the country level. The table displays a clear downward trend in the strength of this effect as shareholder rights protections increase (moving from left to right).

In contrast to the negative effect of stronger shareholder rights, Hypothesis 4b argues that stronger employment protections strengthen the effect of underutilized human resources on firm innovation effort. Column 2 indicates that the coefficient estimate of 46.363 ($p < 0.05$) for EPL is significant, providing support for Hypothesis 4b. To illustrate, I again compare two hypothetical firms. Firm A is based in a country where employment protections are one standard deviation higher than those of the home country of Firm B. Assuming all other country-level variables are equivalent in the two countries, the marginal effect of a 10% increase in human resources on innovation effort would be approximately 0.6 percentage point higher in the firm based in country A (where employment protections are stronger). This relationship can be seen more clearly in Figure 2, where the effect of employee rights on innovation effort becomes stronger as national level employment protections increase (moving from left to right on the x-axis).

The results of estimates of the effects of shareholder rights and employment protection, respectively, on the strength of the relationship between underutilized physical resources and innovation effort are reported in Columns 3 and 4. Estimates of both effects are insignificant. Contrary to Hypothesis 5a, differences in the extent to which NCGIs protect shareholder rights do not bear significantly on the relationship between underutilized physical resources and innovation effort. Similarly, stronger employment protections do not, as Hypothesis 5b argued, magnify the strength of the relationship between underutilized physical resources and R&D intensity. Hypotheses 5a and 5b are not supported. Figures 3 and 4 visually display how the country-specific effects of *PR Intensity* vary with shareholder rights protection and employment protection, respectively. In neither case is there a clear trend when moving from weak to

strong levels of the NCGI measures. These findings are perhaps not surprising given the results of tests for Hypotheses 1b, 2b and 3b, where no support was found for the relationship between underutilized physical resources and firm level innovation effort. Nonetheless, it is interesting to note that the relationship was significant in over half the countries in the sample. Although the explanations offered in this study do not address this variation, the presence of a significant effect in a number of countries suggests further investigation into drivers of these national differences is warranted.

Columns 5 and 6 report the results of tests of Hypotheses 6a and 6b which argued that stronger levels of both shareholder rights and employment protections would diminish the positive effect of unabsorbed slack on innovation effort. Tests for significance of coefficient estimates for both shareholder rights and employment protection reveal that neither effect is significant. Hypotheses 6a and 6b are not supported. Figures 5 and 6 display the point estimates for each country coefficient estimate of the effect of unabsorbed slack on innovation effort with respect to shareholder rights and employment protection, respectively. Although coefficient estimates are almost entirely positive, there does not appear to be a clear trend in levels with respect to the NCGI variables in either figure. Nonetheless, comparing the countries where the relationship is significant versus where it is not is illustrative. In both tables, the countries where the relationship is significant appear to cluster based on levels of stakeholder rights. Unabsorbed slack tends to be significant in its effect on innovation search in countries with strong shareholder rights and low employment protections.

One possible explanation for this pattern is that, as argued in Hypothesis 6b, stronger employment protections indeed restrict firms from allocating as much

unabsorbed slack to innovation search as they otherwise would because of the fact that maintenance of such protections puts at least some claim on resources that can be easily reallocated. Put slightly differently, the absence of such protections facilitates the allocation of unabsorbed slack toward innovation search. Interestingly, this relationship does not hold in the context of stronger shareholder rights. Despite the increased, and in some ways more direct, claims of these actors to firm resources, managers are still able to direct those resources toward innovation search. Further elaboration of reasons underlying these differences will require additional study.

3.5.2 Robustness Checks

Researchers have argued that aspects of national culture bear on firm R&D strategies (Varsakelis, 2001). Consequently, an important alternative explanation for the arguments that were supported by the empirical analysis (Hypotheses 4a and 4b), is that the results are driven by features of national culture. The cognitive-cultural dimension constitutes another important aspect of any institutional environment (Scott, 2001). Political outcomes, broadly speaking, reflect, to at least some degree, cultural preferences. Collective national perceptions of appropriateness are likely to influence how governments respond with national-level protections of various firm stakeholder groups. In democracies, politics provides a forum for divergent interests over these institutions to be contested, and in so doing drives legislative and regulatory agendas. Gourevitch and Shinn (2005) argue that it is this political process that shapes the governance institutions of focus in this study.

It is therefore plausible that cultural preferences drive the political outcomes that create the institutions and are the real force behind the results supporting Hypotheses 4a and 4b. Consequently, it is important to ascertain whether the NCGIs themselves are driving the national differences in the strength with which underutilized resources motivate innovation or whether the regulations merely reflect broader underlying cultural preferences. Accordingly, I reestimate the second stage regressions for the effect of the institutional measures on the strength of the effect of underutilized human resources, this time including control variables for national culture. To measure culture I employ the four cultural dimensions constructed by Hofstede (1983)—power distance, masculinity, individuality and uncertainty avoidance. Columns 1 and 2 of Table 10 report the results of these estimations for shareholder rights and employment protection, respectively. The coefficients for shareholder rights and employment protection maintain signs, approximate magnitude and significance levels when the culture measures are included. Although not reported, results are also robust to including each of the four culture measures individually. These results suggest that the NCGI effects are indeed separate from cultural forces and that regulations matter in their own right beyond any cultural effects that may have influenced their creation. The results supporting Hypotheses 4a and 4b are therefore robust to this alternative explanation. Interestingly, none of the culture measures are themselves significant. This suggests that although preferences for certain forms of behavior may exist among the local population, firms may be unlikely to respect those preferences in the absence of concrete laws constraining them to do so.

Columns 3-5 of Table 10 report results for an alternative measure of employment protection. The OECD provides an annual measure of employment protection that

includes 17 of the 18 countries in the sample. I take an average of this measure over the 1996-2005 time period and rerun the estimations for each of the three country level resource coefficients. Results for the effect of this alternative measure of employment protection on underutilized human resources are slightly less significant but remain significant at the 10% level. The estimates on *PR Intensity* and *Unabsorbed Slack* maintain the same signs and remain insignificant. The robustness of results to this alternative measure of employment protection indicate that *EPL* does capture the construct it intends to.

Columns 6-8 of Table 10 estimate the same equations as 3-6 using a different type of employment protection—union strength. National regulations that bolster union strength include laws mandating collective bargaining or union influence over working conditions and laws requiring the application of union agreements to parties not involved in the negotiation, such as non-union members (Botero et al., 2004). While, similar to employment protection laws, this measure of union strength also provides an indication of the ease with which firms can reduce underutilized human resources. However, union strength adds another important dimension to labor relations—namely, stronger unions also wield some influence over how resources are used within the firm. Given that the positive relationship between underutilized human resources and innovation effort is contingent on the ability of management to freely allocate those unused services toward their most valuable applications, the power of unions to influence, to at least some degree, how resources are used by the firm will work to curb managerial discretion in this regard. Accordingly, the positive effect of employment protection on the strength of the relationship between underutilized human resources and innovation effort should be

weaker when using this alternative measure. *Union*, the measure of national regulations supporting unions, is based on the collective relations index developed by Botero and colleagues (2004). It focuses on the union strength measure which is calculated by adding 1 when national regulatory institutions 1) establish rights to unionization 2) establish rights to collective bargaining; 3) require employers to bargain with unions; 4) extend collective contracts to third parties 5) allow closed shops; 6) allow employees or unions to appoint members to the board of directors; 7) mandate employee councils. The sum is then normalized to a 0 to 1 index, with 1 representing maximum union rights strength at the national level.

Column 3 reports that when *EPL* is replaced by *Union* the effect of this institutional measure is no longer significant, in line with expectations. One caveat to these findings may be that whereas *EPL* broadly constrains nearly all firms within a national political boundary, *Union* is more limited in the extent to which it only applies to unionized firms and industries. Accordingly, the lack of findings may be affected by the degree of unionization in the country. Nonetheless, this finding does point in the direction of indicating a distinct difference between *EPL* and other measures of employment protection. It also indicates that when NCGIs strengthen the rights of employees, there are different implications for firm innovation effort depending on the freedom firms possess in regards to how those resources may be reallocated.

Additional checks on the robustness of results included estimating Equation 6 with both rule of law and GDP per capita entering separately instead of together as control variables. Results did not change for the main effects of interests. Results of estimations in Table 9 were also run using the alternative growth indicator variable

described in Chapter Two (set to 1 for firms where growth has been positive but lower in consecutive periods, 0 otherwise) in lieu of the continuous growth measure. Results were unchanged from those reported in Table 9 to the use of this alternative control variable. Finally, an alternative measure of rule of law was also used. The World Bank's governance matters project constructed measures of 5 additional aspects of institutional quality in addition to rule of law: voice and accountability, political stability, government effectiveness, regulatory quality and control of corruption. Because these variables are all highly correlated with each other, the six measures were used to create an average measure (equal weighting) indicating overall institutional quality. Results from estimations replacing rule of law with this alternative measure remained unchanged from the previous reported estimations.

3.5.3 Limitations

It is important to address several limitations of this study. First, it is important to recognize that the number of observations is limited to the number of countries in the sample. Because of limitations in the availability of firm-level data when using a broad cross-country sample of the type employed here, the number of countries that could be included in the sample was limited. Although each country level observation was based on a relatively large number of individual firm level observations in each country, the final sample included observations from only eighteen countries. This number is in line with research employing this technique in international political economy and the sample size did not preclude the finding of significant effects. Nonetheless, future research in this area may benefit from the use of alternative data sources enabling a larger country count

in the final sample. A larger sample size may also allow for the inclusion of a more extensive set of country level control variables.

Another limitation stems from the focus of this study on national institutional variation shaping corporate governance. Important governance differences also exist at the firm level. The potential for bias resulting from these firm-level differences was addressed through the inclusion of firm-level fixed effects in the first stage estimations (of Equation 2). Although these effects address potential unobserved time-invariant firm level variation in important governance features, the potential does exist that changes in these variables over time may be relevant. Unfortunately, data limitations precluded the inclusion of such controls. Collection of more fine grained data on firm-level features of corporate governance could not only address this potential issue but also allow for additional research into how stakeholder influence at a firm level shapes innovation strategies.

This study was concerned with how NCGIs moderate the link between resources and innovation. However, innovation is only one potential means firms create value from underutilized resources. An alternative to increasing innovation activity that is mentioned but not empirically addressed in this study is to reduce resource levels to reap near term benefits. A valuable extension of this study, therefore, would be to examine how varying levels of the stakeholder rights measures shape firm decisions with respect to these multiple alternative means for dealing with the presence of underutilized firm resources.

3.6 Discussion

The present study claimed that understanding of the extent to which the presence of underutilized firm resources promotes firm innovation effort is incomplete without attention to features of the national political economy. Specifically, I argued that legal provisions dictating the strength of shareholder rights and employment protections constrain managerial latitude with respect to how underutilized resources are managed within the firm. The results of this study provide support for these arguments. Firms with underutilized human resources engage in more extensive innovation search activities when national institutions provide more extensive protections regarding employment. These protections restrict the ease and speed with which firm cost reductions can be reduced through layoffs and increase the imperative for firms to find alternative means to create value from underutilized human resources. Conversely, stronger shareholder protections constrain firms from increasing innovation effort in response to the presence of underutilized human resources.

The finding that the extent to which underutilized human resources motivate innovation is contingent on features of the national institutional environment contributes to research based on Penrose's TGF by identifying an important boundary condition. This study demonstrates that the extent to which decisions regarding resource allocations diverge from Penrosian predictions is, in part, driven by the institutional context in which the firm is embedded. More specifically, increased employment protections work to increase the alignment of the actual institutional environment confronted by firms with that described in the TGF, whereas stronger shareholder rights have the opposite effect.

Features of corporate governance are increasingly recognized as having important influence on firm innovation strategy (Hoskisson et al., 2002; Lazonick, 2007;

O’Sullivan, 2000). The findings presented here contribute to extant research linking corporate governance and innovation in two respects. First, management research attending to governance features frequently focuses on issues of ownership, so much so that the two are often equated (e.g. Connelly, Tihanyi, Certo & Hitt, 2010; Dalton, Hitt, Certo, & Dalton, 2007; Hoskisson et al., 2002; Kim, Kim & Lee, 2008). The significant moderating effects of employee and shareholder rights presented here provide further evidence that characteristics of regulatory institutions are salient to governance issues. In other words, the power and influence of *any* firm stakeholder group is a function of more than the size of the ownership stake. Legal provisions also create constraints based on stakeholder interests. This dissertation builds on this previous work by demonstrating how the regulatory environment provides another source of influence independent of ownership but with similarly important consequences for organizational decision making. Focusing solely on ownership is likely to provide an incomplete picture of the extent to which firm strategic decision making reflects the priorities of various firm stakeholder groups when national legal provisions constrain decision making in line with the interests of alternative sets of stakeholders.

To the extent that management scholars have attended to the role of regulatory institutions on firm governance generally—and with respect to innovation strategy in particular—the focus of research has been limited to those that bear on the relationship between firm owners and the firm (Lee & O’Neill, 2003; Munari, Oriani, & Sobrero, 2010; Tylecote & Ramirez, 2006). The present study however, draws attention to the fact that features of the national political economy relevant to firm innovation strategy extend beyond this single stakeholder group. The results of this study, however, indicate that

although employees do not have agency in the manner of firm ownership, even under circumstances where employment protections are high, such protections do constrain the firm, to at least some degree, to act in line with employee interests— at least along one dimension. In demonstrating the effect of employee rights, this study draws attention to the fact that considering how the institutional environment shapes the relationship between the firm and stakeholder groups other than ownership can enhance our understanding of how both regulatory institutions and stakeholders influence firm strategy.

The findings of this study regarding the impacts of stronger shareholder and employee rights are somewhat counterintuitive. With respect to stronger shareholder rights, one of the central advantages of stronger shareholder rights according to traditional economic and agency theory perspectives is to allow firms to more easily raise capital, thereby enabling the execution of promising projects for which it lacks sufficient internal funds. Investment in promising innovation projects is typically considered a legitimate reason for firms to seek outside funding. However, these findings suggest that such rights may actually make it more difficult for firms to allocate resources to innovation activities by strengthening the influence of a stakeholder group more likely to benefit from present profitability than future potential. At the same time, it is not infrequently argued that stronger rights for employees work to restrict innovation activities (e.g. Faleye, Mehrotra, & Morck, 2006). However, the evidence presented here suggests that the constraints posed by stronger employee rights can actually promote innovation—at least under certain circumstances. It must be noted that whether the innovation thereby induced is good or bad for firm performance remains an open

question that is not addressed in the present study. Nonetheless, when the adoption of more direct and expedient alternative strategies is restricted, firms may be constrained to increase the extent to which competitive strategies include efforts to innovate.

An important implication of the results presented in this study is that the differential constraints on firm innovation activities stemming from NCGIs may influence the types of firms in which certain innovation activities take place. For example, restrictions on innovation effort in publicly traded firms stemming from stronger shareholder rights may create opportunities in those countries for smaller firms to pick up the slack. Conversely, stronger employment protections may have the opposite effect, limiting the extent to which small firms are a major contributor to national level innovation. This possibility suggests stakeholder rights institutions may influence the extent to which firms engage in internal capability development versus external capability acquisition. Maritan and Peteraf (2011) argue that understanding development of firm capabilities can be enhanced by considering internal and external capability development and acquisition jointly. The present study contributes to this line of research by demonstrating that NCGIs may be one reason for why firms emphasize one over the other. If stakeholder rights restrict publicly traded firms from allocating resources to R&D to the extent that would be expected based on underutilized resource levels, such firms may be forced to find alternatives to internal development of resources. At the same time, if the same institutional constraints also promote increased innovation in smaller firms, then these institutions may be an important driver of why publicly traded firms in some countries obtain capabilities through external acquisition rather than internal development.

National institutions governing stakeholder rights may also influence national level outcomes regarding the technological areas that firms within a country specialize in. Smaller firms typically have less access to capital to engage in more costly types of innovation than do their publicly traded counterparts. In sectors such as energy where innovation requires substantial capital commitments, countries where weaker shareholder and stronger employee rights promote innovation in publicly traded firms that have greater access to larger levels of capital may promote innovation in this specific sector at the national level. By contrast, in sectors such as software or information-technology where innovation has relatively lower capital requirements, strong shareholder rights and weaker employment protections may advantage smaller firms.

The possibility that NCGIs influence what types of firms engage in what types of innovation connects the present study to national innovation systems research where innovation outcomes at the national level are the primary focus (Nelson, 1993; Lundvall, 1992). NIS research does not extensively attend to the details pertaining to how institutions may impact which types of firms do the innovating. In countries where important components of the NIS that support innovation, such as strong universities and research laboratories, are present, the diminishing effects of stronger shareholder rights and weaker employee rights may work to shift innovation to non-publicly traded firms rather than lower overall innovation levels or quality at the national level. The relevant implication of the findings presented here, therefore, is that analysis of national innovation outcomes may be improved by looking beyond aggregate national level measures to consider how national institutional features influence the types of firms in which different types of innovation take place.

It should also be noted that the arguments of this study were only supported with respect to underutilized human resources. Institutional protections of shareholder and employee rights did not significantly moderate the relationships between underutilized physical resources and innovation search. One reason for this discrepancy could relate to how characteristics of the two types of stakeholder rights relate to the specific firm resources. Employment rights protections are clearly directly applicable to firm decisions regarding employment levels and would therefore be expected to be most relevant to decisions regarding human resources. Stronger shareholder rights may also be more relevant to employment levels. In this case, it may be relatively easier to address the presence of underutilized employee resources through reduction of this type of resource than for physical resources. Costs associated with employees are for the most part eliminated if employment is reduced. Physical resources, however, are either paid for or being paid for, in which case, their reduction may not have as direct an effect on cost reduction. At the same time, to the extent that such resources are firm-specific, their sale in external markets may also be difficult. For this reason, near term performance improvements through elimination of physical resources may be difficult to achieve. Under these circumstances the constraints imposed by stronger shareholder rights may be less restricting with respect to finding new ways to employ physical resources than theorized. Indeed, although not significant, the results indicate that the coefficient on stronger shareholder rights is positive with respect to physical resources.

Links between the NCGI measures and firm physical and financial resources are less direct which may go some way toward explaining the lack of significance with respect to those resources. It is not, however, safe to conclude that institutions are not

relevant to how these resources might be used to support innovation activities. Indeed other regulatory institutions such as tax treatment of equipment purchases and the distribution of corporate profits or dividends may be more directly relevant to resource allocations involving these types of resources. Further investigation into relationships focusing on alternative regulatory institutions may yield new insights.

Neither shareholder rights nor employee rights protections were a significant moderator of the effect of unabsorbed slack on innovation effort. This may indicate that although these institutions constrain decision making, they do not provide either stakeholder group with sufficient agency to engage in appropriation of firm resources to their direct benefit—at least to the extent that such reallocations may come at the expense of innovation activities. This may reflect the centrality of innovation to ongoing capability development and competitiveness and an understanding of that importance among stakeholder groups. Alternatively, the conditions under which the stakeholder protections influence the allocation of high discretion slack may be require greater attention to contingencies regarding the specifics of individual innovation projects.

Finally, the empirical approach used to test the hypotheses is worth noting for its potential application to future international business research. The nature of IB research is such that issues at multiple levels of analysis are frequently relevant. IB researchers inherently study drivers of firm behavior and performance across countries. As Peterson and colleagues (2012) note, it is important that IB research accounts for correlation among observations at lower levels of analysis. This is particularly important when country-level variables are the main independent variables of interest. These authors advocate greater use of multi-level modeling techniques by IB researchers. In particular,

they detail the benefits of using mixed liner models. They do not, however, consider the use of two-stage methods employed in this study.

The two-stage estimated dependent variable approach has been used by scholars of international political economy. Two-stage methods are often employed when researchers have individual survey level data from multiple countries and are concerned with how country-level effects influence individual-level outcomes (see Jusko & Shively, 2005; Gingrich & Ansell, 2012; Ansell & Samuels, 2013). This approach has obvious utility in IB research where researchers often have firm-level data across multiple countries and are interested in the effects of country-level variables.

The two-stage approach I have adopted for the present study also offers one benefit as compared to the mixed linear models advocated by Peterson and colleagues. Mixed linear models require strict assumptions regarding the exogeneity of independent variables. In particular, such models require that included firm level variables be uncorrelated with any unobserved firm level effects. As discussed above, this is potentially problematic in the context of relevant but unobserved firm level variables. The two-stage approach does not place any restrictions on estimation techniques that can be used in the first stage of estimation. As such, the two stage model here allows IB researchers to employ techniques such as fixed effects models (or other methods) that address potential issues of unobserved firm level heterogeneity. The use of alternative first-stage models to address unobserved firm-level heterogeneity is not viable with mixed-linear models that require the assumption of exogeneity of the regressors.

The potential utility of the two-stage approach is especially salient to comparative work examining how and why the effects of established drivers of firm behavior and

performance in mainstream management and strategy differ across countries. Indeed, more extensive use of this approach may help to answer calls from IB researchers to revive comparative IB research—an area which logically plays to the strengths of the discipline but which has been relatively downplayed with the excessive focus of IB researches on issues related to the MNE (Shenkar, 2004).

Chapter Four: Conclusion

4.1 Discussion

Why do some firms engage in more extensive efforts to innovate than others? This dissertation focused on one part of the answer to this question by examining the role of underutilized firm resources in motivating firm innovation effort. Specifically, I made two claims. First, firms will engage in more extensive innovation development when they have higher levels of freely available resources upon which to base innovation activities. Second, the extent to which underutilized resources motivate innovation effort is contingent on features of the institutional environment that constrain managerial decision making with respect to allocation of resources to innovation. Evidence from a sample of over 3,000 firms from 18 countries provides support for these arguments. Firms with greater levels of underutilized human resources engage in more extensive innovation search. At the same time, the strength of this effect is stronger in firms based in countries where NCGIs provide stronger employment protections but weaker when minority shareholder rights are afforded more institutional protection. In addition to these institutional effects, the strength with which underutilized human resources motivate firms to innovate was found to be stronger when firms simultaneously possessed excess financial resources that enable the requisite resource allocations and following periods of strong growth—a phase of the firm growth cycle where both underutilized resource levels and managerial time to consider new ways to develop them are likely to be particularly high.

Together, the two studies of this dissertation provide new insights into the relationship between underutilized firm resources and the extent to which firms engage in

innovation search. In doing so, I make several contributions to management research. The first contribution centers on the debate over whether organizational slack promotes innovation. As discussed above, to the extent that management research takes up this question, it is from the perspective of the resource enabling properties of underutilized resources. More resources relax control and oversight over how firm resources are allocated, which promotes innovation in small doses but becomes wasteful after a point. Accordingly, one answer to this question frames the relationship in terms of an inverted-U shape where underutilized resource levels positively affect innovation outcomes up to a point, after which the relationship reverses (e.g. Nohria & Gulati, 1996; Kim, Kim & Lee, 2008).

The results presented in this dissertation suggest that another answer to this question might be found by examining the type of resources that exist in excess within the firm. Here, the innovation-motivating properties of Penrosian resources become vital. According to the TGF, in the process of growth, underutilized resources are not deployed indiscriminately, but rather toward their most valuable potential application (Penrose, 1959). Innovation is but one of multiple possible outcomes including increasing scale or scope based on existing resource configurations and capabilities. According to the TGF, when resources are allocated toward innovation it is because the organizational actors most familiar with the possibilities for realigning resource configurations within the firm have determined that such allocations represent a valuable utilization of these resources. It is not because the pressures to allocate those resources to their most efficient use have been lifted, allowing for indiscriminate engagement in potentially dubious projects. If anything, when firms have underutilized human resources there will be more, rather than

less, pressure to make productive use of them. Conversely, unabsorbed slack can be easily reallocated and is easily divisible, suggesting little of the pressure to employ these resources in new ways associated with the presence of underutilized human resources.

It is important to note here that in allocating resources to innovation, in line with the TGF, firms are motivated by the objective of increasing total profits. Working toward that outcome may not necessarily increase average profitability. Indeed, as Levinthal and Wu (2010) argue, when firms expand in line with Penrosian predictions, the result may increase total firm profits but lead to lower profitability. The latter effect has clearly negative connotations for firm shareholders who derive value from the firm through stock price appreciation—itsself more a function of average profitability than total profit. As Levinthal and Wu (2010) point out, this suggests that the diversification discount so frequently observed in management research may be a function of managerial pursuit increases to total profits rather than negative performance implications of diversification.

The implication here is that in being motivated to allocate resources so as to increase total profits, managers may make decisions that are in the interest of the firm as an ongoing entity rather than for particular stakeholder groups in the near-term. Under these circumstances, building on underutilized human resources through innovation may not be an indication of poor oversight over firm resource allocation but rather a deliberate attempt to strengthen the firm. Distinguishing whether innovation based on underutilized human resources does in fact produce greater long term profit than that based on unabsorbed slack presents empirical challenges. Nonetheless, investigation of how types of underutilized resources influence the extent to which underutilized resources are good

or bad for innovation represents a potentially valuable extension of this research that is discussed further below.

Another contribution of this dissertation is the finding of combinatorial effects of alternative types of underutilized resources. Although research has long distinguished among types of underutilized firm resources, management scholars have not substantially taken up the issue of how the effects of individual variants of slack on firm strategy may be moderated by the presence of alternative forms of slack. In developing the theoretical logic underlying the nature of the relationship between alternative forms of slack and innovation effort, I integrated arguments from two major management theories that go inside the firm to understand how underutilized resources impact firm behavior—Penrose’s *Theory of the Growth of the Firm* (1959) and Cyert & March’s *Behavioral Theory of the Firm* (1963). Pitelis (2007) argues that management researchers have neglected to take advantage of the potential for integration of insights from these two perspectives to make valuable contributions to management research. His paper begins to address this potential by integrating aspects of the two theories to develop theoretical propositions regarding how conditions of intrafirm conflict described in the BTF will affect how organizational slack is managed—specifically, whether it is allocated toward innovation or conflict alleviation.

This dissertation constitutes another example of how integration of the two theories can advance management scholarship. I highlighted how differences in the *properties* of organizational slack emphasized in the two theories lead to differences in the *types* of organizational slack that are relevant to their respective predictions and, in so doing, how the two work together to influence levels of firm innovation effort. The

innovation-motivating properties of the two types of absorbed slack in the TGF conceptualization are stronger in the presence of unabsorbed slack that, from the BTF perspective, works to enable firm innovation. The findings presented here highlight an additional level of nuance regarding the relationship between slack and innovation that should be relevant to future management research into drivers of firm innovation activity.

The findings of this study are also relevant to management scholars who have recently taken up the question of where heterogeneous firm resource positions originate (Ahuja & Katila, 2004; Helfat & Lieberman, 2002; Maritan & Peteraf, 2011; Wernerfelt, 2011). The prominent use by management scholars over the past two decades of the resource-based view of the firm to explain aspects of firm behavior and performance attests to the importance of firm resources to competitive advantage. However, the focus of this research has been predominantly trained on the effects of the resources presently existing with the firm. In other words, research in this stream begins from conditions of firm resource heterogeneity. The question of where firm resources come from has been relatively understudied (Barney, Ketchen & Wright, 2011; Maritan & Peteraf, 2011). To a large extent, firm resources are developed internally (Dierickx & Cool, 1989; Helfat & Lieberman, 2002) frequently through deliberate firm efforts to innovate and develop new capabilities (Teece, Pisano & Shuen, 1997). The results presented here provide evidence of the natural forces within the firm driving these internal capability development efforts. Any successful innovation that takes place within a firm begins with an effort on the part of the firm to innovate. At the same time, any resources developed through innovation will be different from those of other firms. Firms that allocate more effort to innovation will be more likely to develop novel resources and capabilities. Accordingly, by

addressing the question of why some firms make more effort to innovate in the first place, this dissertation provides some insights into one of the forces underlying the development of heterogeneous firm resource stocks.

4.2 Managerial and Policy Implications

The evidence presented in this dissertation regarding the role of underutilized resources in motivating innovation search has several implications for practicing managers that are worth noting. The constraints imposed by NCGIs may appear to be detrimental from the perspective of firm management on account of the manner in which they reduce the set of viable strategies managers may select to implement. Nonetheless, there are several reasons that insightful managers may also be able to use these institutions to more effectively manage the firm. First, to the extent that institutions establish the balance of claims on the firm from multiple stakeholders, they may relieve managers of the responsibility to mediate among competing firm interests. This should allow managers to make decisions based more on optimal firm, rather than stakeholder group, outcomes (given the institutional circumstances).

The influence of NCGIs on firm innovation strategies raises the issue of which institutional configurations are most supportive of the particular innovation activities of individual firms. Broadly, managers need to be aware of the extent to which the national institutions under which they operate may either constrict or enhance the ability of the firm to innovate. To the extent that NCGIs may push the firm into innovation strategies management is less favorably inclined toward, the option to move or increase operations in jurisdictions with more supportive NCGIs may be a

viable consideration. Although the idea of shifting operational locations to locations with more favorable institutions is not new, the arguments for such are usually made based on the ability of such relocation to decrease, rather than increase, organizational constraints. However, this study demonstrates that institutional constraints can facilitate as well as restrict innovation activities. As such, the negative connotations regarding interpretation of institutional constraints may require some revision in the context of innovation strategy. Accordingly, managers must pay close attention to institutional configurations and their ability to facilitate alternative types of resource allocations. These implications echo some of the ideas in the varieties of capitalism literature (Hall & Soskice, 2001) although at much more explicit level in terms of impacts on individual firm behavior.

Another important aspect of the relationship between NCGIs and firm location highlighted by this dissertation concerns the credibility of firm commitment to R&D strategies. Commitment concerns the difficulty with which strategic decisions can be altered or reversed (Ghemawat, 1991). With respect to strategic decisions regarding innovation, Chapter Three suggests that shareholder rights and employment protections have opposing effects on the reversibility of such investments. Starting an innovation project will be more (less) difficult to reverse in institutional environments providing strong employment protections (shareholder rights).

These institutional conditions may be particularly salient in contexts where some firms or entire industries are engaged in R&D races. To the extent that NCGIs affect the ease with which the employees necessary to conducting those races can be dismissed from the firm, the credibility of firm commitment to R&D strategies should

vary across countries. The credibility of commitment to innovation should be stronger for firms based in countries with more extensive employment protections and weaker shareholder rights. At the same time, managers of firms based in countries with weak employment protections and strong shareholder rights may be able to signal their commitment to a particular innovation strategy by establishing the R&D project in a country characterized by NCGIs that support that commitment. Accordingly, this implication suggests the inclusion of regulatory institutional forces in addition to the psychological and sociological drivers of commitment based on organizational inertia identified by Ghemawat (1991).

Although some knowledge of the firm is embedded in its organizational routines (Nelson & Winter, 1982), much remains embedded in the employees who possess it (Pfeffer, 1994). Accordingly human resources are vital to firm innovation (Lepak & Snell, 1999). Moreover, firm employees are best positioned to understand the configurations of firm resources and perceive potential opportunities for valuable innovation. Given the increasing importance of knowledge to firm competitiveness (Grant, 1996; Hitt, Bierman, Shimizu & Kochhar, 2001), the extent to which firms make use of employee knowledge will bear on the ability of the firm to remain competitive. It is therefore important for managers to be aware of how NCGIs constrain decisions with respect to how these resources are used. Institutional pressures can lead firms to decisions that bestow legitimacy but which may not produce optimal performance along all relevant dimensions (DiMaggio & Powell, 1983; Scott, 2001). If stronger shareholder rights constrain the ability of management to use valuable human resources to support innovation, managers may not give

sufficient consideration to the possibilities for using potentially valuable human resources.

Conversely, just as stronger shareholder protections may increase the potential that valuable human resources may not be employed by the firm, stronger employment protections may prevent the firm from implementing appropriate adjustments to employment levels. The performance implications of stronger employee rights may be negative if they constrain managers to increase innovation as a second-best solution to extract value from employees that cannot be laid off. In either case, it is important that managers have awareness of how institutional forces that may be lead them to address the presence of underutilized human resources in ways that may be detrimental to firm performance.

Finally, awareness of the internal forces driving firm innovation can be a source of information regarding the strategic direction of firm competition. Competitors in possession of underutilized resources or located in countries with particular regulatory configurations may be more likely to place a strategic emphasis on innovation. Awareness of these features may provide firm competitors with insights into how their competitors will be attempting to compete. Of course, it is equally important to be aware of the fact that competitors may be just as cognizant of these forces acting on the manger's own firm.

This dissertation draws attention to several important issues for policy makers. First, employment protections and shareholder rights are developed and adopted so as to clarify the nature and strength of relationships between stakeholder groups and the firm. Nonetheless, these institutions have implications for firm strategy. Specifically,

the findings presented in Chapter Three demonstrate how NCGIs influence firm innovation strategies. Given the attention paid by policymakers across the globe to the extent and nature of innovation taking place within their borders, the links between seemingly unrelated sets of regulations and innovation highlighted here suggest the importance of considering unintended consequences of policy adoption. NCGIs themselves tend to be relatively stable over time within countries and major changes are uncommon, especially in developed countries. The latitude available to policymakers to change these policies is likely limited because NCGIs reflect societal preferences over the relationship between different stakeholder groups and the firm. Nonetheless, it is important for policymakers to understand how these choices influence innovation activity in order to better understand how national institutional configurations shape innovation outcomes of interest—even when those influences may be unintended. Moreover, there is no reason to believe that NCGIs are the only policies relevant to innovation strategies. More malleable aspects of policy may also be relevant and this dissertation highlights the importance of considering these follow-on effects.

The findings presented here are also salient to policy makers because of the implication that the impact of NCGIs is heterogeneous across firms. It is important to note that although Chapter Three identified characteristics of NCGIs that increase firm innovation effort, the findings do not provide indications as to the impact of such increases on firm performance. Irrespective of any influence on quantity or quality of innovation, differences in NCGIs are likely to influence the type of innovation conducted by domestic firms. Indeed, research in labor economics (Saint-Paul, 1997,

2002) and international political economy (Hall & Soskice, 2001) has demonstrated how the institutions addressed in this dissertation impact national level specialization in particular types of innovation activities. This dissertation builds on this research, and in doing so contains policy salience, by demonstrating that NCGI characteristics influence the types of firms that engage in innovation as well as the types of innovation that firms collectively emphasize at the national level.

This dissertation focuses on one subset of firms—publicly traded firms with a modest level of R&D capability. For these firms, NCGI measures are a significant moderator of the strength with which higher human resource intensity promotes innovation effort. In other words, heterogeneity with respect to human resource intensity within the firm constitutes one contingency on the extent to which NCGIs are relevant to innovation effort at the firm level. Stronger employment protections or shareholder rights are of less consequence to innovation effort in firms lacking underutilized human resources.

The importance of firm differences is also highlighted in the finding from Chapter Two that firms with low R&D capability respond differently to the presence of underutilized resources. This suggests that even among publicly traded firms the impact of NCGIs will vary. The fact that the sample did not include smaller firms such as start-ups for which innovation intensity may be particularly high suggests another group of firms for which NCGI impacts are likely to be different. At the same time, the results are distinguished from research on national level outcomes that often includes the effects of substantial direct and indirect government support for innovation. Focusing solely on national level outcomes may lead policymakers to

overlook important contingencies relevant to these different groups. Understanding of firm contingencies given domestic NCGI configurations can aid in the design of policy instruments intended to precipitate national level innovation outcomes.

Finally, to the extent that NCGIs influence which domestic firms engage in certain categories of innovation with varying degrees of intensity, changes to institutional stakeholder protections are likely to create opposition as well as support among divergent domestic interest groups. As such, the issue of which firms benefit from changes to institutional protections of stakeholder rights, and other, similarly relevant policies, may be just as—or, more cynically, perhaps more—important to elected policy makers as that of overall national level competitiveness.

4.3 Potential Research Extensions

The results of this study suggest several additional extensions for future research. Chapter Three provides evidence that national regulatory institutions constrain firm decision making with respect to how firms address the presence of underutilized resources. Stronger employment protections and weaker shareholder rights push firms to increase innovation when human resource levels are relatively high. This finding raises the critical question of what impact this increased innovation effort has on firm performance. Allocating resources to innovation does not necessarily lead to improvements in the quantity or quality of innovation outcomes or firm performance. Scholars arguing that slack is negatively related to innovation outcomes emphasize how the loosening of organizational controls that occurs in the presence of slack is likely to lead to allocations to R&D projects of questionable value (Jensen, 1993; Nohria &

Gulati, 1996). The assumption here is that if such investments are actually worthwhile, their adoption should not be contingent on organizational slack. Accordingly, although innovation may represent the best solution given institutional constraints, it is quite possible that absent those constraints the optimal solution with respect to firm performance would be to reduce resource levels rather than to engage in a second-best search for ways to extract valuable from unwanted resources. Conversely, to the extent that underutilized resources are capable of providing valuable services to the firm contingent on firm innovation efforts, institutional constraints may promote the development of important new competitive capabilities that benefit the firm more over the long-term than the short-term efficiency improvements associated with resource reductions.

Answering the question of how NCGIs impact innovation and firm performance constitutes an important direction in which to extend this research. Future research could begin to address this issue by examining firm patenting activity in terms of the quantity and the quality innovation as indicated in firm patent details to see whether the same relationships between institutions and innovation inputs (R&D intensity) also hold for these measures of innovation outcomes. Greater detail regarding the quality and composition of firm human resources could also help address this question. The extent to which underutilized human resources motivate innovation may be stronger with respect to firm employees possessing greater knowledge and input into decision making (such as scientists and engineers) than for employees who lack these characteristics. Accounting for the characteristics of specific human resources being protected by NCGIs could shed additional light on the impact of these institutions on firm performance.

Another extension of this dissertation would be to distinguish innovation enabled innovation from innovation motivated innovation. Although empirically challenging, such a distinction—perhaps made between innovation based on underutilized financial as compared to underutilized human resources—may be able to shed light on the question of whether (or perhaps more appropriately which types of) slack is (are) good or bad for innovation. An argument could be made that the loosening of controls facilitated by unabsorbed slack would be more likely to be used inefficiently and therefore to produce less valuable innovation outcomes than might innovation based on underutilized human resources that motivate attempts to put those resource to most effective use.

The impact of innovation efforts specifically motivated by underutilized human resources on innovation performance may also warrant further investigation. The nature of how underutilized human resource inputs affect innovation outcomes such as speed of development or quality of new technologies could be compared to the results deriving from use of alternative innovation inputs such as scientific knowledge obtained from outside the firm or acquisitions of innovative businesses. Examining the conditions under which building on underutilized human resources augments or detracts from overall firm performance might also be addressed. Similarly, the use of underutilized human resource inputs may be relevant to the direction of the innovation processes. The close familiarity of employees with firm specific processes suggests that more extensive use of underutilized human resources may promote more incremental innovation over radical innovation or innovation more closely tied to existing firm competencies than to entry into entirely new technological domains (Hall & Soskice, 2001). Pursuing this line of analysis will require more detailed measures of the underutilized human resources used

as inputs in the innovation process. However, should such measures be constructed, addressing these questions constitutes one potentially productive extension of the findings presented here.

The present study found that underutilized human resources motivate increased innovation effort. However, remaining within the boundaries of the TGF, innovation to develop new capabilities constitutes only one possible mechanism for achieving firm growth. Deploying underutilized resources toward efforts that increase scale and scope constitute two alternatives that have been more extensively addressed in previous research. A logical next step in understanding how firms deploy underutilized resources would be to examine conditions that lead firms to pursue one alternative over another. Toward that end, focusing on the growth opportunities in existing and potential markets may provide some insights. Levinthal and Wu (2010) argue that the size and viability of various growth opportunities are important influences on the nature of firm diversification decisions. Accordingly, innovation effort is likely to be stronger when opportunities for expansion in current markets or diversifying based on extant capabilities are more limited. In addition to market opportunities, technological opportunities are also relevant. Ahuja and Katila (2004) demonstrate that firms engage in greater innovation search when existing areas of technological competence become more developed—thereby limiting the opportunities for future development in that technology area. The state of existing firm technology capabilities may therefore be another important limiting factor influencing decisions among alternative underutilized resource management strategies.

The positive and negative aspects of shareholder rights described in this study also suggest that another important extension of this research would be to examine potential curvilinear effects of stronger stakeholder rights on innovation in publicly traded firms. It is possible that at low levels of shareholder rights, greater strength of this NCGI may have a positive effect on innovation effort but that the effect declines in strength at excessively high levels.

Finally, this study was concerned with how firm decisions with respect to resource allocation are influenced by national regulatory institutions. This focus on institutional constraints is particularly important with respect to the arguments of the BTF which is explicitly concerned with firm decision making. Research applying the BTF has yet to take into account how cross-national institutional differences may modify its theoretical predictions and establish boundary conditions (Gavetti, Greve, Levinthal & Ocasio, 2012). Although this dissertation represents an important effort to address this gap in BTF research, the tests of institutional moderation of BTF arguments regarding the innovation-enabling properties of underutilized resources were not supported— stakeholder rights were not found to be a significant moderator of the strength with which unabsorbed slack enables innovation. Nonetheless, the findings presented here did demonstrate that firm decision making does vary along with institutional features of corporate governance with respect to decisions regarding some types of firm resources. This suggests that further research may yet identify how BTF arguments are modified by institutional context. In particular, characteristics of governance at the national level may shape firm aspirations. Stronger shareholder or employee rights protections may influence not only what constitutes a performance shortfall that would trigger

performance driven search processes but also the relative importance of particular performance measures. For example, stronger shareholder rights may increase the prominence of short term profitability measures, whereas stronger employment protections increase firm attention to growth targets. Extending the ideas of this dissertation to other aspects of the BTF represents a promising avenue by which to identify important boundary conditions of this important management theory.

4.4 Conclusion

This dissertation examined the effects of underutilized firm resources on firm innovation strategy. I found that underutilized resources matter for the effort firms put forth to innovate. I also found that it is important to distinguish among types of resources—different types of firm resources matter differently to innovation strategy, both individually and in terms of their combinatorial effects. Additionally, this dissertation documents how NCGIs matter for firm innovation effort. Institutional protections for the rights of firm stakeholder groups at the national level influence the extent to which underutilized resources motivate innovation activities. The presence of underutilized human resources within the firm leads firms to increase their efforts to innovate when regulatory institutions provide more extensive employment protections. Conversely, human resource motivated innovation is restricted when national institutions provide stronger shareholder rights. Overall, the results of this dissertation have implications for management scholars, public policy makers and managerial practitioners. Moreover, the impact of this dissertation can be further enhanced by building on the findings presented here in future research work.

Tables and Figures

Table 1. List of Variables

Variable	Measure	Source
Innovation Effort	R&D Intensity: Firm R&D (\$)/Firm sales	Worldscope
Underutilized Human Resources	HR Intensity: Number of firm employees/Firm sales	Worldscope
Underutilized Physical Resource	PR Intensity: Value of firm property, plant & equipment (\$)/ Firm sales (\$)	Worldscope
Firm Size	Size: log of number of firm employees	Worldscope
Unabsorbed Slack	Unabsorbed Slack: Current firm assets (\$)/Current firm	Worldscope
Firm Growth	Growth: log firm sales (\$) in year t - log firm sales (\$) year t-1	Worldscope
International Presence	Multinationality: firm sales from foreign operations (\$) / Firm sales (\$)	Worldscope
Selling General & Administrative Expenses	SG&A: SG&A (\$) / Firms sales (\$)	Worldscope
National Economic Development	GDP Per Capita: Country GDP /Population	World Bank World Development Indicators
Industry R&D Intensity	Industry R&D: (Industry R&D (\$) year t - Firm R&D (\$) year t)/(Industry sales (\$) year t - Firm sales (\$) year t)	Worldscope
Institutions of Shareholder Rights	Shareholder Rights: anti-director rights index	Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2008
Institutions of Employment Protection	EPL: Employment Laws Index	Botero, Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2004
Strength of legal enforcement	Rule of Law index	World Bank Governance Matters
Union Strength	Union	Botero, Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2004
Alternative Employment Protection Measure	OECD EPL: OECD employment protection index	OECD
Culture	Uncertainty Avoidance, Power Distance, Individuality, Masculinity	Hofstede, 1983

Table 2. Descriptive Statistics and Pairwise Correlations

	Mean	Std. Dev.	Min	Max	1	2	3	4	5	6	7	8	9
1. R&D Intensity	0.122	0.151	0	1.934	1								
2. HR Intensity	0.007	0.013	0	0.896	0.16	1							
3. PR Intensity	0.298	1.151	0	77.532	0.07	0.32	1						
4. Unabsorbed Slack	2.897	2.923	0	38.915	0.22	0.01	0	1					
5. Growth	0.027	0.959	-11.163	15.128	-0.1	-0.13	-0.07	-0.02	1				
6. Size	6.568	2.032	0	13.088	-0.3	-0.14	-0.02	-0.23	0.12	1			
7. Multinationality	0.278	0.276	0	1	-0.05	-0.06	-0.03	-0.09	0.05	0.38	1		
8. Industry R&D	0.1	0.1	0	2.236	0.19	0.03	-0.04	0.09	0	-0.19	0.01	1	
9. GDP per capita	32292.627	5252.522	371.807	40617.898	-0.01	-0.07	0	0.06	0.01	-0.08	-0.3	0.02	1
10. Growth Indicator	0.157	0.364	0	1	-0.07	-0.04	-0.01	-0.03	0.08	0.07	0.02	0	0.01

Table 3. Main Results of Fixed-Effects Panel Regressions

	1	2	3	4	5	6
	Controls Only	Low ISE Firms Only	Controls and UR	Interaction UR x Slack	Interaction UR x Growth	Interaction UR x Gr.Ind.
HR Intensity		0.107 (0.07)	4.255** (1.87)	3.268* (1.67)	6.988*** (2.35)	4.351** (1.87)
PR Intensity		-0.002*** (0.00)	0.015 (0.02)	0.012 (0.01)	-0.012 (0.01)	0.016 (0.02)
Unabsorbed Slack	0.008*** (0.00)	0.003* (0.00)	0.007*** (0.00)	0.001 (0.00)	0.007*** (0.00)	0.007*** (0.00)
Growth	-0.013*** (0.00)	-0.003** (0.00)	-0.008*** (0.00)	-0.006** (0.00)	-0.014*** (0.00)	-0.020*** (0.01)
Size	-0.025*** (0.01)	-0.008* (0.01)	-0.030*** (0.01)	-0.030*** (0.01)	-0.035*** (0.01)	-0.031*** (0.01)
Multinationality	-0.006 (0.01)	0.008* (0.00)	-0.008 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.007 (0.01)
Industry R&D	0.002 (0.01)	-0.012 (0.01)	0.001 (0.01)	0.003 (0.01)	0.002 (0.01)	0 (0.01)
GDP per capita	-0.000*** 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
HR Intensity x Unabsorbed Slack				0.471** (0.21)		
PR Intensity X Unabsorbed Slack				0.003 (0.00)		
HR Intensity x Growth					1.012*** (0.39)	1.919** (0.75)
PR Intensity x Growth					-0.009*** (0.00)	0.004 (0.01)
Constant	0.377*** (0.05)	0.098*** (0.04)	0.303*** (0.05)	0.320*** (0.05)	0.291*** (0.05)	0.303*** (0.05)
Year Dummies	***	***	***	***	***	***
Observations	15,588	6,112	15,588	15,588	15,588	15,579
R-squared	0.061	0.029	0.149	0.189	0.18	0.147
Number of Firms	3,069	1,399	3,069	3,069	3,069	3,067

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Robustness Checks: Lagged DV and Dynamic Panel Estimations

	1	2	3	4
	Fixed Effects Lagged DV	Lags: 2nd year	Lags: 2nd, 3rd years	Lags: 2nd-4th years
Lagged R&D Intensity	0.120*** (0.02)	0.113*** (0.04)	0.200*** (0.05)	0.206*** (0.05)
HR Intensity	4.009** (1.84)	2.472* (1.31)	3.031** (1.54)	4.387** (2.07)
PR Intensity	0.015 (0.01)	0.055 (0.04)	0.021 (0.03)	0.004 (0.03)
Unabsorbed Slack	0.007*** (0.00)	0.013*** (0.00)	0.013*** (0.00)	0.012*** (0.00)
Growth	-0.016*** (0.00)	0 (0.00)	-0.008* (0.00)	-0.009** (0.01)
Size	-0.028*** (0.01)	0.037 (0.02)	0.015 (0.02)	-0.013 (0.02)
Multinationality	-0.01 (0.01)	0.012 (0.06)	-0.007 (0.05)	-0.034 (0.04)
Industry R&D	-0.001 (0.01)	-0.004 (0.01)	-0.006 (0.01)	-0.001 (0.01)
GDP per capita	-0.000* 0.00	-0.000* 0.00	-0.000** 0.00	0 0.00
Year Dummies	***	*	***	***
Observations	15,579	12,278	12,278	12,278
Number of Firms	3,067	2,678	2,678	2,678

# Instruments	73	128	176
AB AR(1)	0	0	0
AB AR(2)	0.069	0.138	0.15
Sargen Over-ID	0	0	0
Hansen Over-ID	0.341	0.188	0.019
Hansen Test Excluding Group	0.653	0.333	0.034
Difference in Hansen	0.062	0.073	0.103

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Robustness Checks: Alternative Measures

	1	2
	Industry Demeaned UR Measures	SG&A Replaces UR Measures
HR Intensity (Industry Demeaned)	2.788*** (1.02)	
PR Intensity (Industry Demeaned)	0.019 (0.02)	
SG&A/Sales		0 0.00
Unabsorbed Slack	0.007*** (0.00)	0.008*** (0.00)
Growth	-0.009*** (0.00)	-0.014*** (0.00)
Size	-0.028*** (0.01)	-0.026*** (0.01)
Multinationality	-0.008 (0.01)	-0.006 (0.01)
Industry R&D	0.018 (0.01)	0.002 (0.01)
GDP per capita	-0.000** 0.00	-0.000*** 0.00
Constant	0.339*** (0.05)	0.389*** (0.05)
Year Dummies	***	***
Observations	15,579	14,911
R-squared	0.125	0.063
Number of Firms	3,067	2,934

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6. County Level Variable (for 2nd Stage) Descriptive Statistics

Country	Shareholder Rights	Employment Protection	Rule of Law	GDP per capita	Union Rights	OECD EPL
Australia	0.67	0.35	1.72	21,152	0.29	1.07
Austria	0.42	0.5	1.83	23,035	0.43	2.14
Canada	0.67	0.26	1.7	22,635	0.14	0.75
Denmark	0.67	0.57	1.86	28,984	0.71	1.88
Finland	0.58	0.74	1.89	22,508	0.43	2.14
France	0.58	0.74	1.4	21,139	0.67	2.95
Germany	0.58	0.7	1.62	22,348	0.71	2.68
India	0.83	0.44	0.16	452	0.14	2.77
Israel	0.67	0.29	0.95	18,689	0.29	1.37
Italy	0.33	0.65	0.63	18,713	0.43	2.88
Japan	0.75	0.16	1.31	36,676	0.71	1.64
South Korea	0.75	0.45	0.88	11,224	0.71	2.32
Netherlands	0.42	0.73	1.72	23,032	0.43	2.47
Singapore	0.83	0.31	1.55	23,167	0.14	
Sweden	0.58	0.74	1.81	26,906	0.62	2.68
Switzerland	0.5	0.45	1.84	33,882	0.33	1.14
United Kingdom	0.83	0.28	1.65	24,458	0	0.65
United States	0.5	0.22	1.54	33,779	0.14	0.21

Table 7. Country Level Coefficient Estimates from 1st Stage Panel Fixed Effects Regressions

	Australia	Austria	Canada	Denmark	Finland	France	Germany	India	Israel
HR Intensity	4.96*** (1.19)	17.41*** (5.45)	1.63*** (0.62)	25.95 (25.01)	6.41** (3.03)	2.86*** (0.90)	24.09*** (8.40)	0.09 (1.85)	4.5 (4.65)
PR Intensity	0.26*** (0.07)	0.01 (0.06)	-0.01*** (0.00)	0.07 (0.15)	0.25** (0.11)	0.03*** (0.01)	-0.08** (0.04)	-0.25* (0.13)	0.1 (0.14)
Unabsorbed Slack	0.03* (0.01)	0.02 (0.02)	0.01 (0.01)	-0.05 (0.05)	0 (0.01)	0.01 (0.01)	0.01 (0.00)	-0.08** (0.04)	0.01*** (0.00)
Constant	0 (0.15)	0.69 (0.39)	0.13* (0.07)	1.59*** (0.19)	1.19*** (0.26)	0.40*** (0.09)	0.36*** (0.07)	0.98** (0.36)	0.19* (0.10)
Num. Obs.	78	45	289	64	98	393	634	34	80
	Italy	Japan	Netherlands	Singapore	South Korea a	Sweden	Switzerland	United Kingdom	United States
HR Intensity	53.73*** (7.67)	0.42 (1.04)	46.56*** (11.55)	-0.69 (0.95)	22.49*** (1.61)	29.90* (14.90)	9.72*** (2.68)	9.21*** (1.59)	1.25 (0.86)
PR Intensity	-0.60*** (0.18)	0.03 (0.03)	0.24*** (0.06)	0.03** (0.01)	0.12*** (0.02)	0.04 (0.05)	0.07 (0.07)	0 (0.02)	0.01 (0.01)
Unabsorbed Slack	0.03** (0.01)	0.01** (0.00)	0 (0.01)	0.03** (0.01)	0.04*** (0.00)	0 (0.01)	0.01 (0.01)	0.03** (0.01)	0.01*** (0.00)
Constant	0.42* (0.23)	0.04 (0.06)	1.00*** (0.32)	-0.11 (0.12)	-0.31*** (0.04)	0.38* (0.21)	0.29*** (0.08)	0.22*** (0.07)	0.28*** (0.03)
Num. Obs.	89	3140	71	31	55	101	236	1395	11133

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Descriptive Statistics and Pairwise Correlations for 2nd Stage Country Level Variables

	Mean	S.D.	Min	Max	1	2	3	4	5	6
1. Country β: HR Intensity	14.474	16.308	-0.689	53.735	1					
2. Country β: PR Intensity	0.018	0.195	-0.595	0.257	-0.32	1				
3. Country β: Unabsorbed Slack	0.005	0.028	-0.078	0.036	0.12	0.09	1			
4. Shareholder Rights	0.62	0.149	0.333	0.833	-0.62	0.19	-0.21	1		
5. EPL	0.477	0.202	0.164	0.744	0.62	-0.05	-0.16	-0.5	1	
6. Rule of Law	1.448	0.486	0.159	1.889	-0.03	0.61	0.24	-0.22	0.14	1
7. GDP per capita	22932.19	8283.541	452.333	36675.78	-0.05	0.27	0.26	-0.27	-0.19	0.7

Table 9. Results of Second Stage Country Level Estimated Dependent Variable Regressions

	1		2		3		4		5		6	
	<u>HR Intensity</u>		<u>PR Intensity</u>		<u>Unabsorbed Slack</u>		Shareholder	Employment	Shareholder	Employment	Shareholder	Employment
	Rights	Protection	Rights	Protection	Rights	Protection	Rights	Protection	Rights	Protection	Rights	Protection
Shareholder Rights	-65.964*** (20.90)		0.201 (0.25)						0.001 (0.04)			
EPL		46.363** (17.68)					-0.113 (0.19)					-0.022 (0.03)
GDP per capita	-4.343 (2.82)	0.611 (2.95)	0.049 (0.04)	0.036 (0.04)	0.001 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)
Rule of Law	-1.06 (2.82)	-3.349 (3.23)	0.085** (0.04)	0.090** (0.04)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)	0 (0.01)
Constant	52.626*** (13.56)	-9.803 (8.41)	-0.099 (0.16)	0.08 (0.09)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)
Observations	18	18	18	18	18	18	18	18	18	18	18	18
R-squared	0.423	0.338	0.304	0.297	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.044

Table 10. Robustness Checks of Country Level Second Stage Estimation

	1	2	3	4	5	6	7	8
	Culture Controls		OECD EPL			Union Rights		
			HR Intensity	PR Intensity	Unabsd Slack	HR Intensity	PR Intensity	Unabsd Slack
Shareholder Rights	-68.758**							
	(29.45)							
EPL		55.981**						
		(23.99)						
Culture: Uncertainty Avoidance	-0.047	-0.117						
	(0.18)	(0.19)						
Culture: Power Distance	-0.08	-0.336						
	(0.24)	(0.24)						
Culture: Individuality	-0.078	-0.028						
	(0.18)	(0.18)						
Culture: Masculinity	-0.128	0.025						
	(0.20)	(0.23)						
OECD EPL			9.631*	-0.022	-0.004			
			(4.73)	(0.05)	(0.01)			
Union Rights						23.607	0.08	-0.006
						(15.90)	(0.14)	(0.02)
GDP per capita	-3.67	-1.21	2.688	0.033	-0.001	-1.854	0.042	0.001
	(3.71)	(3.67)	(3.76)	(0.04)	(0.01)	(3.50)	(0.04)	(0.01)
Rule of Law	-2.713	-6.834	0.566	0.083**	0	0.235	0.084**	0
	(4.29)	(4.58)	(3.35)	(0.04)	(0.01)	(3.61)	(0.04)	(0.01)
Constant	72.663*	7.721	-4.655	0.07	0.018	2.871	-0.005	0.013
	(32.63)	(25.20)	(8.99)	(0.09)	(0.01)	(7.07)	(0.07)	(0.01)
Observations	18	18	17	17	17	18	18	18
R-squared	0.468	0.468	0.249	0.303	0.031	0.144	0.306	0.007

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Variance in effect of underutilized human resources on innovation effort across countries with respect to shareholder rights

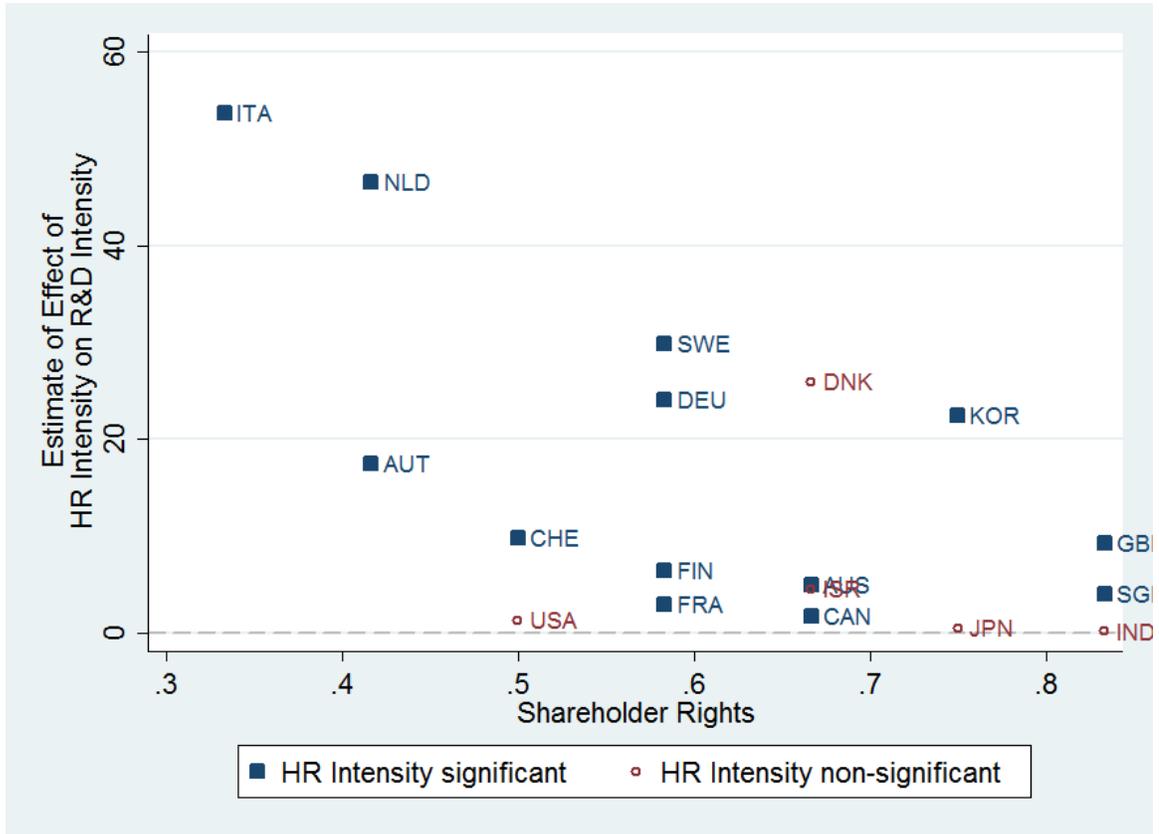


Figure 2. Variance in effect of underutilized human resources on innovation effort across countries with respect to employment protection

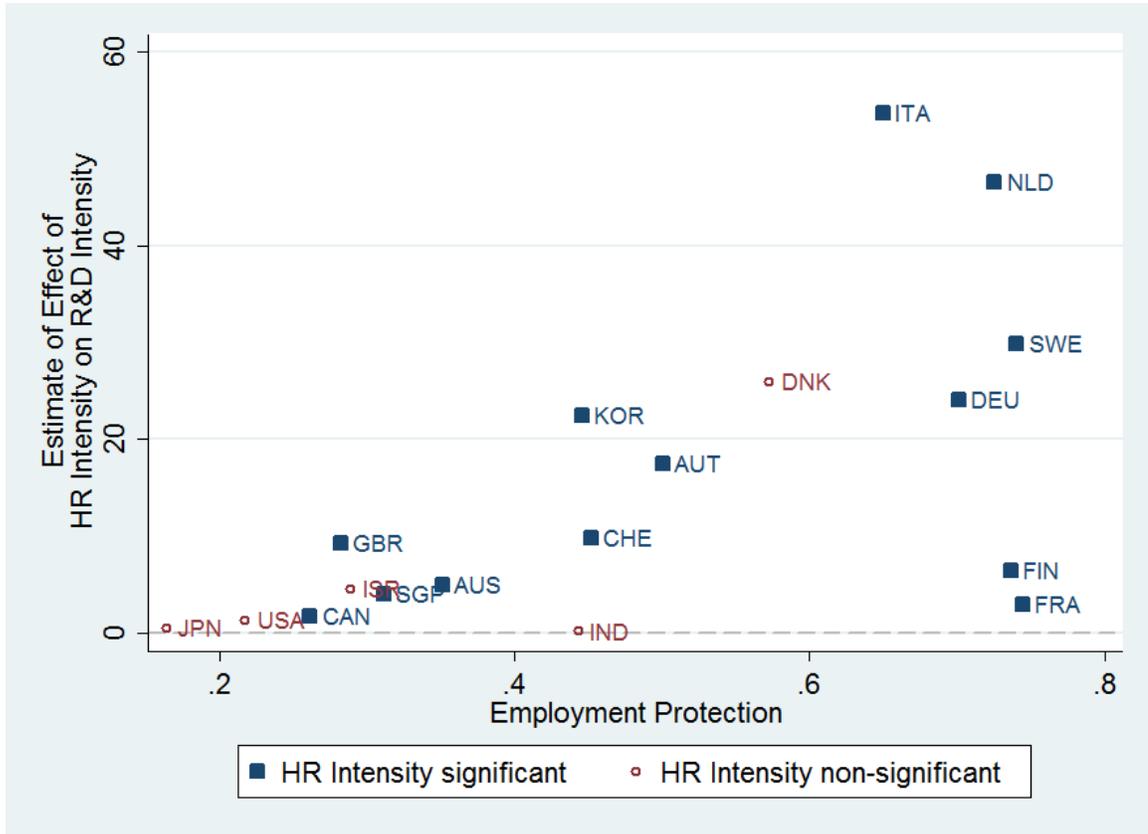


Figure 3. Variance in effect of underutilized physical resources on innovation effort across countries with respect to shareholder rights

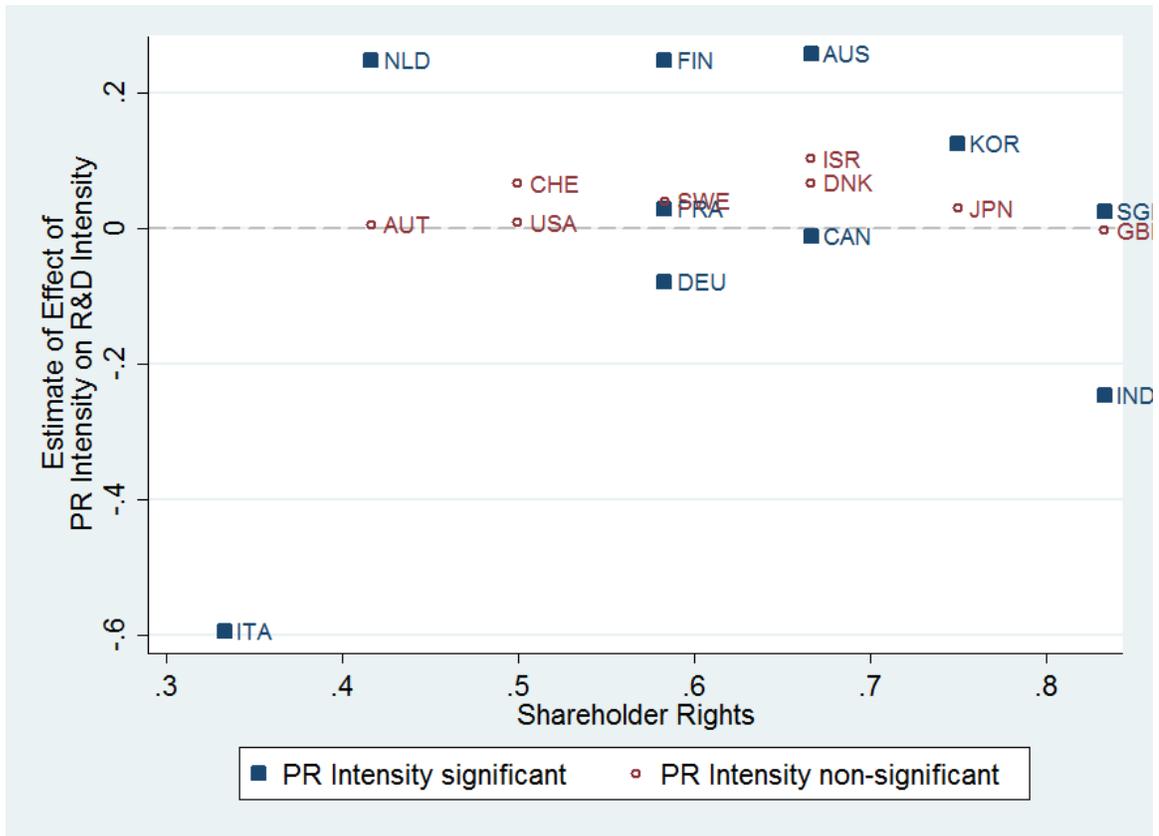


Figure 4. Variance in effect of underutilized physical resources on innovation effort across countries with respect to employment protection

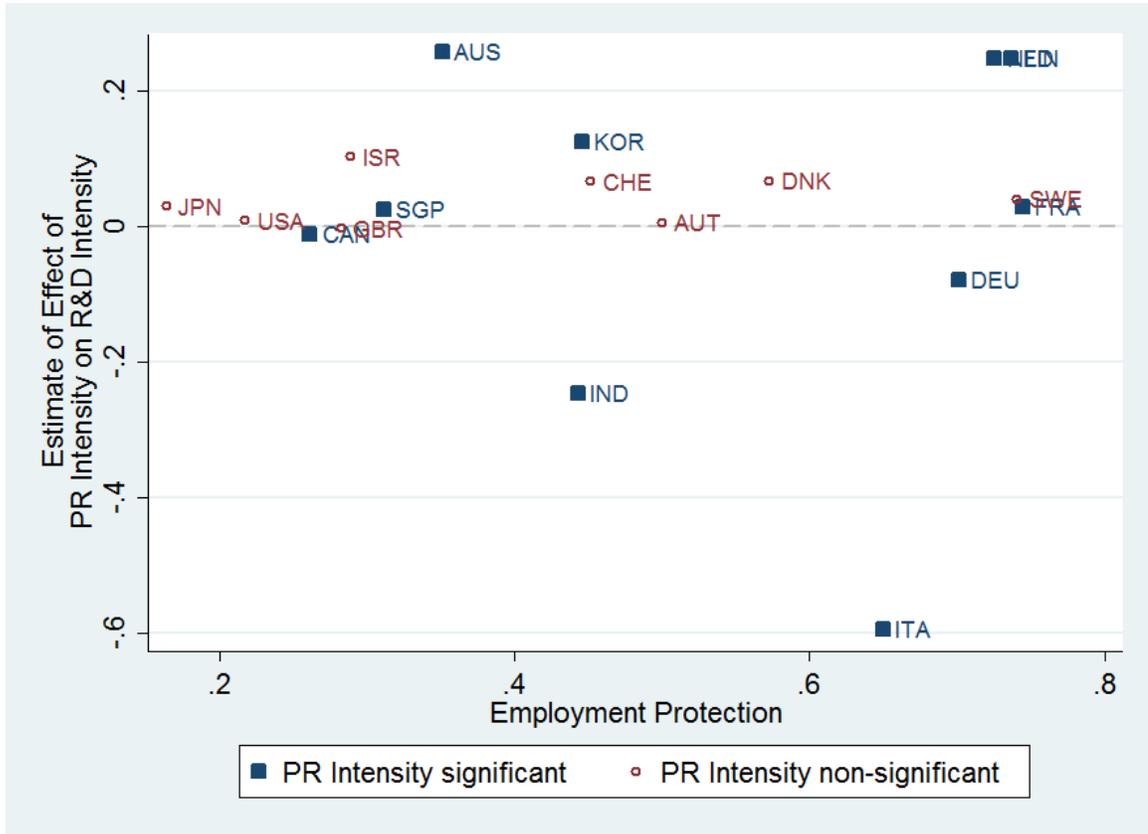


Figure 5. Variance in effect of unabsorbed slack on innovation effort across countries with respect to shareholder rights

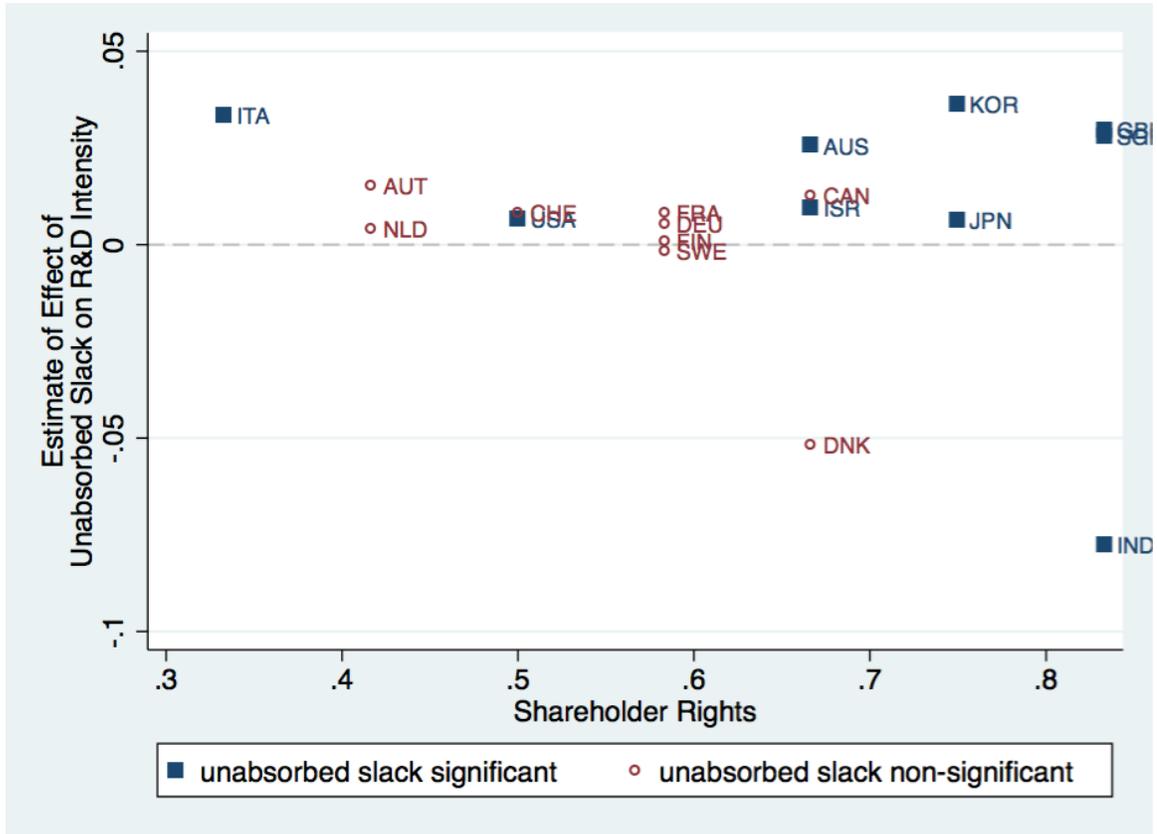
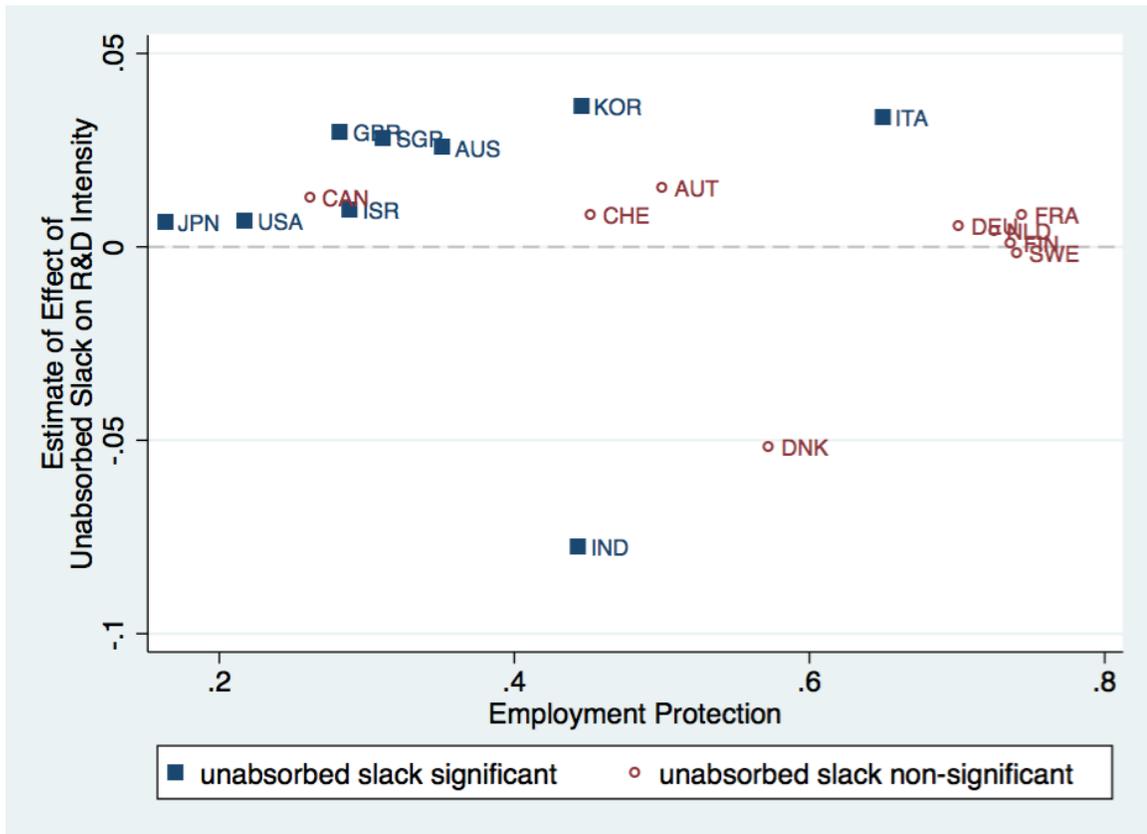


Figure 6. Variance in effect of unabsorbed slack on innovation effort across countries with respect to employment protection



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