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MOTIVATING AND ENABLING FIRM INNOVATION EFFORT: INTEGRATING PENROSIAN AND BEHAVIORAL THEORY PERSPECTIVES ON SLACK RESOURCES

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Abstract

This paper investigates why some firms make more effort to innovate than others. Building on ideas articulated by Edith Penrose in *The Theory of the Growth of the Firm* (2009), I develop a theoretical framework articulating how the intensity with which firms engage in innovation development to heterogeneity in levels of human and physical resource that motivate such activities. The distinction between these forms of absorbed slack and unabsorbed slack, allows us to integrate a Penrosian logic on innovation-motivating forms of slack with a logic on slack-enabled innovation articulated in the behavioral theory of the firm research tradition (Cyert & March, 1992). Empirical tests examining the R&D intensity of 2, 231 US manufacturing firms between 2000 and 2014 provide support for the arguments. Greater levels of human and physical resource slack are associated with increased firm innovation effort. These effects are magnified when firms simultaneously possess more extensive unabsorbed financial slack.

I. *Introduction*

Management research has long attended to the role played by organizational slack, that is resource levels "in excess of the minimum necessary to produce a given level of organizational output" (Nohria & Gulati, 1996, p. 1246), in promoting firm innovation (e.g. Damanpour, 1991; Greve, 2003; Mellahi & Wilkinson, 2010; Nohria & Gulati, 1996). Scholarship studying the relationship between slack and innovation has built extensively on the conceptualization of slack as articulated in Cyert and March's *A Behavioral Theory of the Firm* (1992). According to the behavioral theory of the firm (BTF) organizational slack promotes innovation by providing firms with "a source of funds for innovations that would not be approved in the case of scarcity" (Cyert & March, 1992, p. 189). In other words, slack *enables* firms to innovate (Pitelis, 2007).

However, the ability to innovate represents only part of the reason why firms might actually attempt do so. Although the BTF is silent as to why firms might be motivated to use slack for innovation, this question was taken up by another fundamental management theory

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developed around the same time. In *TheTheory of the Growth of the Firm* (TGF) (2009), Penrose details why the presence of underutilized resources leads firms to increase the extent of their innovation activities and general search for knowledge. Like Cyert and March, Penrose was concerned with the relationship between slack resources and firm strategy. However, the TGF does not attend to the protection from performance fluctuations and freedom for exploration afforded by organizational slack. Rather, according to Penrose, underutilized firm resources present a challenge to firm management to find ways to make more effective use of those resources. Acquiring resources entails costs to the firm. Accordingly, managers fall under pressure to conceive of new approaches, processes and activities capable of more effectively extracting value from resources that are not being used to their full capacity. According to Pitelis (2007), from the perspective of the TGF, these characteristics of slack resources motivate the search for innovation.

Research into the relationship between slack and innovation has focused predominantly on the enabling properties of slack articulated in the BTF. The motivating properties of slack detailed by Penrose have been largely overlooked. As a consequence, theory detailing the nuances and boundary conditions of how and when slack enables innovation has missed the opportunity to improve our understanding of this important phenomenon by integrating these two theories.

This study attempts to address this gap in research on firm slack and innovation by adopting a Penrosian perspective on slack-motivated innovation. I develop a theoretical framework detailing how possession of excess levels of the two types of Penrosian resources — human and physical — motivates firm innovation effort — that is, external search for or internal development of new products and processes promoting longer-term firm survival, growth and profitability. I then augment the framework with insights from the BTF to explain how the extent to which absorbed Penrosian slack precipitates increased innovation effort is contingent on the presence of unabsorbed financial slack.

I test the arguments using a sample of 2,231 US manufacturing firms over the 15-year time period from 2000 to 2014. In doing so this study makes an empirical contribution to research on slack and innovation by introducing a measure of physical resource slack. I employ and then build on a measure of human resource slack used in prior studies (e.g. Lecuona & Reitzig, 2014; Mishina, Pollock, & Porac, 2004) to define a related measure of physical resource slack. Extant studies have not distinguished among types of absorbed slack in examining its impact on innovation effort. Extant studies of organizational slack tend to employ measures such as the ratio of firm selling, general and administrative expenses to firm sales or assets to capture absorbed slack (e.g. Greve, 2003; Singh, 1986). However, these measures do not effectively separate the Penrosian concepts of excess human and physical resources as theorized in the TGF. Employing explicit measures of the two types of Penrosian resources provides an advance on extant studies of firm slack and innovation that fail to distinguish between types of absorbed slack.

Taking advantage of the panel structure of the data set to account for potential biases stemming from unobserved firm-level heterogeneity, I find support for the main arguments. Greater levels of human and physical resource slack are associated with statistically significant and practically substantial increased levels of firm innovation effort — measured as R&D intensity. Moreover, I find that the effect sizes of both relationships are magnified when firms simultaneously possess more extensive unabsorbed financial slack as well.

The TGF and BTF are fundamental theories in management research. However, despite their mutual focus upon how slack is used within the firm, researchers have largely neglected the opportunity to use these theories to inform each other so as to better understand how firms manage organizational slack. Ability and willingness are both important determinants of strategic choice. By integrating the logics of these two theories, this paper makes an important theoretical contribution to management research and at the same time addresses the call from Pitelis (2007) for management researchers to take advantage of the potential insights to be gained from synthesis of these fundamental management perspectives.

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 practicing managers as well. For example, the results suggest that even if a competitor is flush in cash, discerning the extent to which such resources are likely to be used toward developing new capabilities requires attention to the extent to which that firm simultaneously possesses excess employees or equipment as well.

II. *Theory and Hypotheses*

According to Penrose, the firm itself is a "collection of productive resources" (2009, p. 21). According to the TGF, firms naturally acquire resource in the process of growth. Because acquiring resources entails costs to the firm, firms have incentives to extract as much value from their resources as possible. Excess resources are capable of providing value to the firm at near-zero marginal cost if the firm can devise new ways to put them to use. In other words, underutilized resources "facilitate the introduction of new combinations of resources—innovation—within the firm" (Penrose, 2009, p. 76).

Resources include "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, p. 60). In other words, firms consist of 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, p. 21). It is typically challenging for firms to repurpose employees or equipment toward new activities. Because such realignment typically requires time an effort in terms of training or reconfiguration, excess Penrosian resources therefore align with contemporary definitions of absorbed slack, which is tied to specific organizational activities and difficult to quickly allocate to alternative uses (e.g. George, 2005; Singh, 1986). By contrast, 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, Wolf, Chase, & Tansik, 1988). Unabsorbed slack aligns more closely with the BTF concept of organizational slack. I first focus on the relation between Penrosian forms of slack and innovation effort, after which I synthesize TGF and BTF logics to explain how unabsorbed slack moderates the absorbed slack-innovation effort relationship.

1. Human Resource Slack and Innovation Effort

The innovation-motivating properties of underutilized resources derive in large part from knowledge that accumulates within the firm regarding those resources. Additions to firm knowledge originate in the actions of the employees who possess it (Becker, 1964). Although some of this information may be easily codified, a substantial portion inherently remains with the employees themselves (Pfeffer, 1995). The ability of firms to innovate is, therefore, closely tied to human resources (Lepak & Snell, 1999). Firm resources are capable of providing any number of useful services to the firm, allowing each resource to be used in multiple applications and in multiple ways. Increases in firm knowledge expand the range of potentially valuable activities in which a firm might profitably engage these resources (Teece, Pisano, & Shuen, 1997). However, the variety of applications for firm resources is limited by the range of ideas possessed by firm employees for using those resources (Penrose, 2009).

Employees gain increasing knowledge of firm activities for several reasons. Any increase in firm experience with operations and production entails allocation of tasks and specialization of activities, which precipitate learning about opportunities to improve firm performance (Arrow, 1962). 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, & Junttila, 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). 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. When firms believe that increased knowledge about the resources they possess can improve firm efficiency and profitability, underutilized resources will promote a search for new knowledge to capitalize on those opportunities (Penrose, 2009). 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. Finally, underutilized human resources may also promote innovation through informal channels when enterprising employees experiment on their own without the awareness of management (Burgelman, 1991).

Regardless of the source, new knowledge creates possibilities for using resources in novel ways to create more value from those resources. New knowledge is often most useful for developing valuable capabilities related to an entirely new line of business (Penrose, 2009). Firms innovate more when competitive advantages are contingent upon the development of new capabilities (Danneels, 2002).

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, 2008). 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 another 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. Kor and Mahoney (2004) find that higher levels of firm-specific knowledge increase the value of firm R&D investments. In short, the firm-specific nature of much organizational knowledge motivates innovation because value created by organizational knowledge is greater when developed within the firm.

Inherently, some applications for firm resources have more potential value than others. Firms must therefore make choices regarding how slack is used. Firms will direct resources towards more valuable applications (Penrose, 2009). The motivation of the firm to use resources more effectively provides the economic incentive underlying much firm innovation (Kor & Mahoney, 2000). The important role of knowledge in generating new ideas, the firm-specific nature of that knowledge and the fact that most of that knowledge is held by employees suggest that the degree to which firms engage in innovation development will be higher in firms with more extensive levels of underutilized human resources.

Hypothesis 1. More extensive human resource slack within a firm will have a positive influence on innovation effort.

2. Physical Resource Slack and Innovation Effort

As the firm grows, 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, p. 70). The potential for physical resource use is shaped by the knowledge and experience of the people using them. In turn, the knowledge of employees using physical resources is shaped by that use as well as the character of those resources. 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). As knowledge and experience grow, so too do the possibilities for using resources in new ways extending beyond the intended use 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 slack physical resources for reasons similar to those motivating innovation based on slack human resources. Physical resource slack 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, physical resource slack 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 in the production of 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, 2009). The presence of physical resource slack therefore works to increase the extent to which firms are motivated to innovate.

Hypothesis 2. More extensive physical resource slack within a firm will have a positive influence on innovation effort.

3. Integrating TGF with BTF Perspectives on Slack Resources

In contrast to the TGF emphasis on the innovation-motivating properties of slack resources (Pitelis, 2007), the BTF focuses on how slack enables the firm to develop "innovations that would not be approved in the face of scarcity" (Cyert & March, 1992, p. 189). 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 within the firm of the latter promotes innovation varies with levels of the former.

Synthesis of the two theoretical perspectives is facilitated by divergent emphases in their respective conceptualizations of relevant slack constructs. As discussed above, research investigating the effects of innovation-enabling resources tends to focus on unabsorbed slack — almost always defined in terms of financial resources. The TGF, however, 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 characterized by innovation-enabling properties.

Research building on the BTF tenet that unabsorbed slack enables innovation 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). 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 sufficient financial resources are 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, 1992). 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).

Unabsorbed slack also reduces the strictness of monitoring criteria by which allocation of resources to potential projects is judged (Sharfman et al., 1988). 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. As potentially detrimental near-term adverse performance consequences of project failure become less of a concern, pressure on firm managers to be diligent in approval and monitoring is reduced. Consequently, firms are able to pursue projects, such as R&D, that may be more speculative (Levinthal & March, 1981). Even under circumstances where R&D is used to develop innovations, such as process improvements, capable of producing more immediate benefits, firms lacking sufficient slack may be forced to give priority to activities that boost near-term efficiency rather than to R&D. 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).

The role of unabsorbed slack resources in enabling firm innovation effort has important implications for the extent to which the Penrosian logic built upon absorbed slack resources motivating innovation is likely to hold. According to the TGF, the motivation for putting underutilized resources to use is that idle resources can create value at essentially zero marginal cost. 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 do so when they possess additional resources that enable that innovation.

Another factor potentially limiting the extent to which Penrosian slack motivates innovation is that the outcomes of innovation projects can be highly idiosyncratic. The process is subject to substantial technological, organizational and market uncertainty (Van de Ven, Polley, Garud, & Venkataraman, 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. 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, p. 41), what constitutes the optimal use of resources will be related to the considerations of firm management about issues such as the level of appropriate risk, which can vary from individual to individual within and across firms as well as over time. Firms differ substantially in the extent to which they are constrained to meet profitability or survival objectives (Levinthal, 1994). Moreover, managerial perceptions of risk can constrain firm expansion (Penrose, 2009). 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 resource 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 strategies. Conversely, in firms where unabsorbed slack is limited, even under circumstances where efforts to innovate based upon underutilized resources might represent the most valuable allocation of those resources, financial resource constraints will restrict the extent to which increasing innovation effort is a viable option.

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

Hypothesis 3a. The positive effect of human resource slack on firm innovation effort will be magnified when firms have higher levels of unabsorbed slack.
Hypothesis 3b. The positive effect of physical resource slack on firm innovation effort will be magnified when firms have higher levels of unabsorbed slack.

III. *Measures and Methods*

1. Sample and Data

Firm and industry level variables employed in the analysis are constructed using data from the Compustat North America database. Complete data are available for a gross sample of 3, 681 US manufacturing firms (4-digit SIC code between 2000 and 3999). Because propositions grounded in the TGF and BTF are constructed with respect to larger, established firms with multiple levels of management, I include only firms with at least US$500,000 in annual sales. Both the TGF and BTF treat innovation activities as a means for the creation of new firm products and services, rather than as an end in itself. To avoid including R&D specialists, I exclude firms with R&D expenditures exceeding 50% of annual sales. I require that firms have no extreme values of the main independent variables — more than four standard deviations from the gross sample mean value of the measures human and physical resource slack. Finally, to avoid biases in the industry-level measures, I include only firms from industries with at least ten firms. These restrictions follow previous research examining drivers of firm innovation search (e.g. Chen & Miller, 2007) and provide a final sample of 2,231 firms from 112 US manufacturing industries over the 2000-2014 time period.

2. Variables

Dependent variable. The dependent variable innovation search 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 frequently employed in studies examining firm innovation search (e.g. Chen, 2008; Chen & Miller, 2007; Kim, Kim, & Lee, 2008). *R&D Intensity* is defined as firm

spending on research and development divided by annual firm sales (million US dollars).

Independent variables. Human and physical resource intensity variables are constructed to provide a measure of the extent to which these resources are utilized in firm output. *Human Resource Slack* is measured as the total annual number of firm employees divided by annual firm sales. *Physical Resource Slack* is the value (million US dollars) of firm plant property and equipment, also divided by annual 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 (Love & Nohria, 2005). These measures are similar to those used in related research on firm slack and firm behavior (Lecuona & Reitzig, 2014; Mishina et al., 2004).

Control variables. Additional right-hand side variables include three firm- and two industry-level controls likely to bear on firm resource levels as well as the intensity of innovation search. I include a measure of financial slack to distinguish the effects of excess resources that motivate innovation search from those that only enable innovation search. *Financial Slack* is measured using the firm's annual current ratio — current assets divided by current liabilities.

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). I measure size as the log of annual firm sales. Larger firms typically dedicate fewer resources to R&D relative to their size. Firm performance may influence both resource levels and decisions about R&D. I address this possibility with two controls. First, I control for absolute performance. *Performance* is measured as annual firm return on sales. Second, differences in actual versus expected performance are an important influence on R&D in BTF research. I therefore measure *Performance Discrepancy* as the difference between current year and prior year return on sales (ROS) for the firm.

Because the sample includes firms from a range of US manufacturing industries, it is important to address the possibility of industry effects. The empirical estimation approach (detailed below) includes firm fixed effects to control for possible unobserved, time-invariant factors — including industry influences — that could bias the results. In order to address possible industry influences that change over time, I add two additional controls to the analysis. *Industry R&D Intensity*, the mean level of R&D intensity for all other firms within a given firm's primary industry (4-digit SIC code) accounts for annual cross-industry differences in levels of innovation search. To the extent that broader industry conditions may also influence R&D decisions, I also include a measure of *Industry Growth*, defined as the percentage change in total industry sales compared to the prior year — again, of all other industry firms within the primary 4-digit SIC code.

Finally, a set of year dummies indicating years 2001-2014 (2000 is the referent year) is used to account for idiosyncratic time effects that may influence the extent to which firms engage in innovation search.

3. Equation Terms and Measures

In order to test the above Hypotheses, the following equation is defined:

$$R\&D\ Intensity_{ikt} = \beta_0 + \beta_1 Human\ Rasource\ Slack_{ikt\text{-}1} + \beta_2 Physical\ Resource\ Slack_{ikt\text{-}1} +$$

$$\beta_3 Financial\ Slack_{ikt\text{-}1} + \sum_{j=4}^{j=6} \beta_j Firm\ Controls_{ikt\text{-}1} + \sum_{j=7}^{j=8} \beta_j Industry\ Controls_{kt\text{-}1} + \sum_{y=1}^{y=14} \omega_y Year\ Dummies_t + \varepsilon_{ikt}$$

(Equation 1)

Equation 1 explains the innovation search effort of firm i in industry k during year t. The i term is an index of sample firms running from 1 to 2,231. The k term is an index of sample manufacturing industries ranging from 1 to 112. The t term ranges from 1 to 15 for each year in the sample. c_i represents unobserved, time-invariant firm-specific effects controlled for in fixed effects panel estimation and e_{ikt} is the error term. All RHS variables are lagged by one year.

4. Estimation Strategy

Testing of the hypotheses through estimation of Equation 1 is conducted using a fixed effects panel estimation strategy (Wooldridge, 2002, p. 265). Estimations employing a fixed effects strategy rely solely upon within-firm variation for identification. Firm-level in *R&D Intensity* at one point in time is compared only to *R&D Intensity* within the same firm at other points in time. This estimation strategy therefore takes advantage of the panel structure of the data to address potential bias resulting from unobserved time invariant firm-level characteristics which may influence both RHS values and *R&D Intensity*. The use of a fixed-effects panel estimation approach is particularly salient for addressing a potential concern specific regarding the research design — namely that the main slack measures are not defined in a relative sense with reference to an "appropriate" level of slack. Because the fixed effects approach does not employ variance from the cross section for estimation, slack measures effectively capture the intended constructs. Hausman test results confirm the appropriateness of a fixed-effects estimation strategy.

IV. *Results*

Descriptive statistics and pairwise correlations are reported in Table 1. The mean value of the R&D Intensity (0.09) is consistent with the sample used by Chen and Miller (2007). Pairwise correlations are for the most part as expected and relatively low. One exception is the bivariate correlation of 0.64 between performance and performance discrepancy. Although the relationship between these two variables leads us to expect such a relationship, 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 12.35. This is comfortably below the condition index value of 30 that represents the threshold at which multicollinearity issues become a potential concern (Belsley et al., 1980).

Table 2 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 2. 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

TABLE 1. DESCRIPTIVE STATISTICS AND PAIRWISE CORRELATIONS

	Median	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8
1. R&D Intensity	0.069	0.090	0.092	0	0.499	.							
2. Physical Resource Slack	0.168	0.236	0.234	0	2.19	-0.09	.						
3. Human Resource Slack	0.004	0.005	0.003	0	0.029	-0.06	0.15	.					
4. Financial Slack	2.433	3.314	3.083	0.034	63.565	0.27	-0.05	0.02	.				
5. Performance	0.037	-0.036	0.596	-29.47	34.73	-0.1	-0.01	-0.13	0.05	.			
6. Performance Discrepancy	0.002	0.003	0.791	-34.744	64.2	-0.02	-0.02	-0.01	-0.01	0.64	.		
7. Size	5.561	5.700	2.377	-0.637	13.061	-0.23	0.22	-0.34	-0.28	0.19	0.01	.	
8. Industry R&D Intensity	0.069	0.083	0.066	0	0.473	0.51	-0.07	-0.01	0.2	-0.03	0	-0.2	.
9. Industry Growth	0.060	0.059	0.160	-0.69	1.072	0	-0.01	-0.02	0.01	0.04	0.02	0.01	-0.04

TABLE 2. RESULTS FROM FIRM-LEVEL FIXED-EFFECTS PANEL REGRESSION OF R&D INTENSITY ON HUMAN AND PHYSICAL RESOURCE SLACK, 2000-2014

	1	2	3	4	5
Human Resource Slack		1.4824**	0.549	1.5085**	0.6701
		(0.5300)	(0.5620)	(0.5250)	(0.5590)
Physical Resource Slack		0.0381**	0.0377**	0.0274**	0.0281**
		(0.0070)	(0.0070)	(0.0070)	(0.0070)
Financial Slack	0.0020**	0.0021**	0.0008	0.0014**	0.0004
	(0.0000)	(0.0000)	(0.0010)	(0.0000)	(0.0010)
Performance	-0.0044 †	-0.0029	-0.0029	-0.0029	-0.003
	(0.0030)	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Performance Discrepancy	0.001	0.0004	0.0005	0.0005	0.0005
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Size	-0.0070**	-0.0039*	-0.0040*	-0.0039*	-0.0040*
	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Industry R&D Intensity	0.0583 †	0.0484	0.0472	0.0499	0.0487
	(0.0340)	(0.0340)	(0.0340)	(0.0340)	(0.0340)
Industry Growth	-0.0077**	-0.0065*	-0.0066*	-0.0065*	-0.0066*
	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Human Resource Slack x Financial Slack			0.2473*		0.2215*
			(0.1110)		(0.1070)
Physical Resource Slack x Financial Slack				0.0023**	0.0021**
				(0.0010)	(0.0010)
Constant	0.1077**	0.0722**	0.0778**	0.0752**	0.0799**
	(0.0110)	(0.0120)	(0.0120)	(0.0120)	(0.0120)
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	15,269	15,269	15,269	15,269	15,269
R-squared	0.021	0.046	0.048	0.048	0.05
Number of Firms	2,231	2,231	2,231	2,231	2,231

Note: Robust standard errors in parentheses. ** $p<0.01$, * $p<0.05$, † $p<0.1$

with prior theory and testing. For example, levels of *R&D Intensity* are lower in larger firms where the coefficient on *Size* is negative and statistically significant (-0.007, $p<0.01$). Conversely, *R&D Intensity* is higher in firms in industries where R&D is more extensive (0.058, $p<0.1$), in line with expectations that firm-level innovation search decisions are at least partially dictated by industry demands.

Column 2 of Table 2 reports the results of tests of the direct effects of Penrosian slack resources on innovation search effort. Hypothesis 1 argued that firms with greater levels of underutilized human resources will have higher levels of innovation effort. The estimated coefficient for *Human Resource Slack* is positive and significant (1.482, $p<0.01$). To interpret the practical significance of this effect, I can assess the effect size of a one standard deviation (0.003) increase in *Human Resource Slack*. Such an increase would be associated with an increase in innovation search level of one half of one percentage point ($1.482*0.003 \cong 0.005$). Relative to the sample median level of *R&D Intensity* 0.069, a one standard deviation increase in *Human Resource Slack* would be associated with a 7.2 percent increase in R&D Intensity, a difference which can be deemed organizationally significant. Hypothesis 1 is therefore supported.

The coefficient on *Physical Resource Slack* in Column 2 is positive and significant (0.038, $p<0.01$). This comports with Hypothesis 2, which argued that innovation effort would be higher when firms possess higher levels of underutilized physical resources. Here, a one standard deviation (0.234) increase in *Physical Resource Slack* would lead to an increase in firm *R&D Intensity* of nearly one percentage point ($0.038*0.234 \cong 0.009$). Compared to the sample median level of *Physical Resource Slack* (0.168), this one standard deviation increase would be associated with an increase in innovation search effort of more than five percent.

Hypotheses 3a and 3b synthesized arguments from the TGF and BTF to argue that firm innovation search effort would be stronger when firms possessed greater levels of resources that both motivate and enable innovation. To test these arguments, I include interaction terms representing the moderating effect of *Financial Slack* on *Human Resource Slack* and *Physical Resource Slack*. Results of estimations including these interaction terms are included in Columns 3-5. The interaction term for *Human Resource Slack* and *Financial Slack* in Column 3 is positive and significant (0.247, $p<0.05$). This term is also positive and significant in Column 5 (0.221, $p<0.05$) where both interaction terms are included simultaneously.

We can interpret the practical significance of this result by comparing the effect of a one standard deviation increase in *Human Resource Slack* in two hypothetical firms: one with high and one with low levels of *Financial Slack*. I define high and low *Financial Slack* to be 6.397 and 0.231, respectively — that is one standard deviation (3.083) above/below the sample mean level of financial slack of 3.314. Based on the coefficient estimate for *Human Resource Slack* in Column 3 (0.549), the a one standard deviation increase in *Human Resource Slack* in a firm with low financial slack would be associated with an increase of 0.2 percentage point in *R&D Intensity* — $(0.549 + 0.247*0.231)*0.003 \cong 0.002$. The same effect would lead to an increase of 0.6 percentage point — $(0.549 + 0.247*6.397)*0.003 \cong 0.006$ — in the firm with high levels of *Financial Slack*. Compared to the sample median level of *R&D Intensity* of 0.069, a one standard deviation increase in *Human Resource Slack* would increase *R&D Intensity* by less than 3 percent in a firm with low *Financial Slack*, but by nearly 9 percent in a firm with high financial slack. In other words, the extent to which the presence of excess human resources leads firms to increase innovation search effort is nearly 3 times as strong when firms have high levels of financial resources that also enable that search. This effect can be seen in Figure 1 where levels of *Human Resource Slack* are plotted on the x-axis against predicted levels of R&D intensity on the y-axis. The slope of the solid line, representing the effect of *Human Resource Slack* in a firm with high *Financial Slack*, is notably steeper that that for the dotted line representing the same effect in firms with low *Financial Slack*. These results provide strong

FIGURE 1. EFFECT OF HUMAN RESOURCE SLACK ON R&D INTENSITY IN HIGH- AND LOW- FINANCIAL SLACK FIRMS

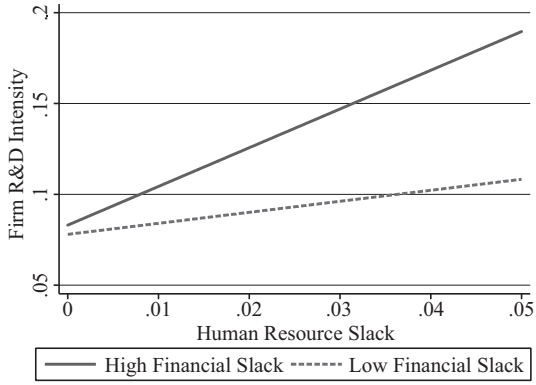
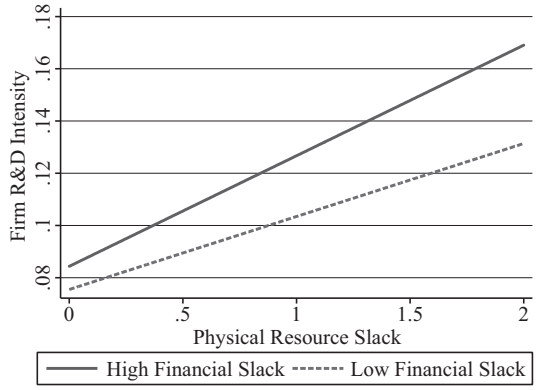


FIGURE 2. EFFECT OF PHYSICAL RESOURCE SLACK ON R&D INTENSITY IN HIGH- AND LOW- FINANCIAL SLACK FIRMS



support for Hypothesis 3a.

The coefficient estimate for the interaction term between *Physical Resource Slack* and *Financial Slack* in Column 4 is positive and significant (0.002, $p < 0.01$), as argued by Hypothesis 3b. Here, a one standard deviation increase in *Physical Resource Slack* would be associated with slightly more than a ½ percentage point increase in *R&D Intensity* in a firm with low *Financial Slack* — (0.027 + 0.002 * 0.231) * 0.234 ≅ 0.006. That same increase in *Physical Resource Slack* would be associated with a one percentage point increase in a firm with high levels of *Financial Slack* — (0.027 + 0.002 * 6.397) * 0.234 ≅ 0.010. Relative to sample mean levels of R&D Intensity (0.069), these values would represent increases of roughly 8 percent and 15 percent, respectively. This difference supports Hypothesis 3b by indicating that the effect of greater *Physical Resource Slack* is practically, as well as

statistically, significant. These trends can be seen in Figure 2. Although not as dramatic as the difference in slopes in Figure 1, the slope is visibly steeper in for the solid line indicating a firm with high *Financial Slack* levels.

V. *Discussion*

This study proposed that one reason some firms may engage in more extensive efforts to innovate than others is that such firms have more extensive levels of slack human and physical resources. This argument was based on the innovation-motivating properties of slack resources articulated in the TGF. Empirical tests examining the R&D intensity of 2, 231 US manufacturing firms between 2000 and 2014 provide support for the arguments. R&D intensity was found to be higher in firms with more extensive levels of human and physical resource slack. The approach of this study contrasted with extant studies that frequently employ a BTF conceptualization of slack and focus on how slack financial resources enable innovation. This divergence of focus from the innovation motivating properties of slack detailed by Penrose allowed for productive integration of the two views. I augmented the theoretical framework by articulating how the innovation-motivating effects of human and physical resource slack on innovation effort are magnified in firms with more extensive innovation-enabling financial resources. These arguments also received support from the empirical analyses. The effects of human and physical resource slack were nearly three and two times as strong, respectively, in firms that had high (as compared to low) levels of financial slack.

These findings draw 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 slack aligns with the logic of slack-enabled innovation detailed in the BTF, the lack of alignment of human and physical resources with that theory may have played a part in the lack of substantial attention to these resources in extant management scholarship. By drawing attention to and further refining the theoretical arguments regarding slack human and physical resources originally articulated by Penrose, this study builds a case for increased attention to this understudied form of organizational slack. In this way I build on studies that have examined how absorbed and unabsorbed slack can have different impacts on innovation (e.g. Chen & Huang, 2010; Chen, Yang, & Lin, 2013; Greve, 2003) by demonstrating the additional insight to be gained through more fine-grained distinctions regarding types of absorbed slack.

Another contribution of this study is the finding of combinatorial effects of alternative types of underutilized resources. Although research has long distinguished among types of slack, 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. Pitelis (2007) argues that management researchers have neglected to take advantage of the potential for integration of insights from these two perspectives. His paper begins to address this potential by developing theoretical propositions regarding how conditions of intrafirm conflict described in the BTF will affect whether organizational slack is allocated toward innovation or conflict alleviation. This study contributes to this research stream by demonstrating 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 results bring to light an additional level of nuance regarding the relationship between slack and innovation that should be relevant to future management research on firm innovation.

This study is 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 prominence over the past two decades of the resource-based view of the firm attests to the importance of firm resources to competitive advantage. However, 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 et al., 1997). The results presented here provide evidence of forces existing 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, 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 study provides some insights into one of the forces underlying the development of heterogeneous firm resource stocks.

The findings presented here also hold important implications for firm managers. According to the TGF, firms allocate resources to innovation because they are motivated to increase total profits. However, working toward that outcome will not necessarily increase average firm profitability. Indeed, as Levinthal and Wu (2010) argue, when firms expand in line with Penrosian predictions, the result may be to increase total firm profits but lead to lower overall profitability. The latter effect has clearly negative connotations for important firm stakeholders such as shareholders who may be more concerned with profitability than total profit. Accordingly, managers motivated to make the use of valuable resources through increased innovation effort should be aware of the effects such efforts may have on multiple measures of firm performance.

This issue of whether increased innovation effort is good or bad for the firm represents a potential valuable direction for future research. Some scholars argue that slack is negatively related to innovation outcomes, emphasizing how the freedom to experiment that occurs in firms with slack leads to R&D projects of questionable value (Jensen, 1993; Nohria & Gulati, 1996). Future research might attempt to link specific types of slack to measures of innovation performance — both of the firm and of the innovations themselves.

Innovating to develop new capabilities constitutes only one possible strategy for achieving the overall objective of firm growth at the heart of the TGF. Deploying slack resources toward efforts that increase scale and scope constitute two alternatives that have been more extensively addressed in previous research (Teece, 1982). A logical next step in understanding how firms manage slack 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. 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. Although pursuing the above research questions will require more detailed measures of slack resources than those employed here, making these refinements to studies of the firm slack-innovation effort relationship would constitute meaningful extensions to findings presented here.

References

Ahuja, G., & Katila, R. (2004). Where Do Resources Come from? The Role of Idiosyncratic Situations. *Strategic Management Journal, 25*(8-9), 887-907.

Arrow, K. J. (1962). The Economic-Implications of Learning by Doing. *Review of Economic Studies, 29*(80), 155-173.

Audia, P. G., & Greve, H. R. (2006). Less Likely to Fail: Low Performance, Firm Size, and Factory Expansion in the Shipbuilding Industry. *Management Science, 52*(1), 83-94.

Augier, M., & Teece, D. J. (2008). Strategy as Evolution with Design: The Foundations of Dynamic Capabilities and the Role of Managers in the Economic System. *Organization Studies, 29*(8-9), 1187-1208.

Barney, J. B., Ketchen, D. J., & Wright, M. (2011). The Future of Resource-Based Theory: Revitalization or Decline? *Journal of Management, 37*(5), 1299-1315.

Becker, G. S. (1964). *Human Capital : A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: National Bureau of Economic Research ; distributed by Columbia University Press.

Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression Diagnostics: Identifying Influential Observations and Sources of Collinearity*. New York: John Wiley and Sons.

Burgelman, R. A. (1991). Intraorganizational Ecology of Strategy Making and Organizational Adaptation: Theory and Field Research. *Organization Science, 2*(3), 239-262.

Chen, C.-J., & Huang, Y.-F. (2010). Creative Workforce Density, Organizational Slack, and Innovation Performance. *Journal of Business Research, 63*(4), 411-417.

Chen, W. R. (2008). Determinants of Firms' Backward- and Forward-looking R&D Search Behavior. *Organization Science, 19*(4), 609-622.

Chen, W. R., & Miller, K. D. (2007). Situational and Institutional Determinants of firms' R&D Search Intensity. *Strategic Management Journal, 28*(4), 369-381.

Chen, Y.-M., Yang, D.-H., & Lin, F.-J. (2013). Does Technological Diversification Matter to Firm Performance? The Moderating Role of Organizational Slack. *Journal of Business Research, 66*(10), 1970-1975.

Cyert, R. M., & March, J. G. (1992). *A Behavioral Theory of the Firm* (2nd ed.). Cambridge, Mass., USA: Blackwell Business.

Damanpour, F. (1991). Organizational Innovation - A Metaanalysis of Effects of Determinants and Moderators. *Academy of Management Journal, 34*(3), 555-590.

Danneels, E. (2002). The Dynamics of Product Innovation and Firm Competences. *Strategic Management Journal, 23*(12), 1095-1121.

Dierickx, I., & Cool, K. (1989). Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science, 35*(12), 1504-1511.

Dyer, J. H., & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review, 23*(4), 660-679.

George, G. (2005). Slack Resources and the Performance of Privately Held Firms. *Academy of Management Journal, 48*(4), 661-676.

Gerwin, D. (1993). Manufacturing Flexibility — A Strategic Perspective. *Management Science, 39*(4), 395-410.

Greve, H. R. (2003). A Behavioral Theory of R&D Expenditures and Innovations: Evidence from Shipbuilding. *Academy of Management Journal, 46*(6), 685-702.

Helfat, C. E. (1997). Know-how and Asset Complementarity and Dynamic Capability Accumulation: The Case of R&D. *Strategic Management Journal, 18*(5), 339-360.

Helfat, C. E., & Lieberman, M. B. (2002). The Birth of Capabilities: Market Entry and the Importance of Pre-history. *Industrial and Corporate Change, 11*(4), 725-760.

Jensen, M. C. (1993). The Modern Industrial-Revolution, Exit, and the Failure of Internal Control-Systems. *Journal of Finance, 48*(3), 831-880.

Kim, H., Kim, H., & Lee, P. M. (2008). Ownership Structure and the Relationship between Financial Slack and R&D Investments: Evidence from Korean Firms. *Organization Science, 19*(3), 404-418.

Kor, Y. Y., & Mahoney, J. T. (2000). Penrose's Resource-based Approach: The Process and Product of Research Creativity. *Journal of Management Studies, 37*(1), 109-139.

Kor, Y. Y., & Mahoney, J. T. (2004). Edith Penrose's (1959) Contributions to the Resource-based View of Strategic Management. *Journal of Management Studies, 41*(1), 183-191.

Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and Exploitation Within and Across Organizations. *Academy of Management Annals, 4*, 109-155.

Lazonick, W. (2007). The US Stock market and the Governance of Innovative Enterprise. *Industrial and Corporate Change, 16*(6), 983-1035.

Lecuona, J. R., & Reitzig, M. (2014). Knowledge Worth Having in 'Excess': The Value of Tacit and Firm-Specific Human Resource Slack. *Strategic Management Journal, 35*(7), 954-973.

Lepak, D. P., & Snell, S. A. (1999). The Human Resource Architecture: Toward a Theory of Human Capital Allocation and Development. *Academy of Management Review, 24*(1), 31-48.

Levinthal, D., & March, J. G. (1981). A Model of Adaptive Organizational Search. *Journal of Economic Behavior & Organization, 2*(4), 307-333.

Levinthal, D. A. (1994). Surviving Schumpeterian Environments: An Evolutionary Perspective. *Evolutionary dynamics of organizations, 167*, 178.

Levinthal, D. A., & Wu, B. (2010). Opportunity Costs and Non-Scale Free Capabilities: Profit Maximization, Corporate Scope, and Profit Margins. *Strategic Management Journal, 31*(7), 780-801.

Lounamaa, P. H., & March, J. G. (1987). Adaptive Coordination of a Learning Team. *Management Science, 33*(1), 107-123.

Love, E. G., & Nohria, N. (2005). Reducing Slack: The Performance Consequences of Downsizing by Large Industrial Firms, 1977-93. *Strategic Management Journal, 26*(12), 1087-1108.

Madhok, A., & Tallman, S. B. (1998). Resources, Transactions and Rents: Managing Value through Interfirm Collaborative Relationships. *Organization Science, 9*(3), 326-339.

Mahoney, J. T. (2005). *Economic Foundations of Strategy*. Thousand Oaks, CA: Sage.

Maritan, C. A., & Peteraf, M. A. (2011). Building a Bridge Between Resource Acquisition and Resource Accumulation. *Journal of Management, 37*(5), 1374-1389.

Mellahi, K., & Wilkinson, A. (2010). A Study of the Association between Level of Slack Reduction Following Downsizing and Innovation Output. *Journal of Management Studies, 47*(3), 483-508.

Mishina, Y., Pollock, T. G., & Porac, J. F. (2004). Are More Resources Always Better for Growth? Resource Stickiness in Market and Product Expansion. *Strategic Management Journal, 25*(12), 1179-1197.

Nelson, R. R., & Winter, S. (1982). *An Evolutionary Theory of Economic Change*. Cambridge, MA: The Belknap Press.

Nohria, N., & Gulati, R. (1996). Is Slack Good or Bad for Innovation? *Academy of Management Journal, 39*(5), 1245-1264.

O'Sullivan, M. (2000). The Innovative Enterprise and Corporate Governance. *Cambridge Journal of Economics, 24*(4), 393-416.

Penrose, E. T. (2009). *The Theory of the Growth of the Firm* (4th ed.). Oxford ; New York: Oxford University Press.

Pfeffer, J. (1995). *Competitive Advantage through People: Unleashing the Power of the Work Force*: Harvard Business Press.

Pitelis, C. N. (2007). A Behavioral Resource-based View of the Firm: The Synergy of Cyert and March (1963) and Penrose (1959). *Organization Science, 18*(3), 478-490.

Schroeder, R. G., Bates, K. A., & Junttila, M. A. (2002). A Resource-based View of Manufacturing Strategy and the Relationship to Manufacturing Performance. *Strategic Management Journal, 23*(2), 105-117.

Sharfman, M. P., Wolf, G., Chase, R. B., & Tansik, D. A. (1988). Antecedents of Organizational Slack. *Academy of Management Review, 13*(4), 601-614.

Singh, J. V. (1986). Performance, Slack, and Risk-Taking in Organizational Decision-Making. *Academy of Management Journal, 29*(3), 562-585.

Teece, D. J. (1982). Towards an Economic-Theory of the Multiproduct Firm. *Journal of Economic Behavior & Organization, 3*(1), 39-63.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509-533.

Van de Ven, A. H., Polley, D. E., Garud, R., & Venkataraman, S. (1999). *The Innovation Journey*. New York: Oxford University Press.

Wernerfelt, B. (2011). The Use of Resources in Resource Acquisition. *Journal of Management, 37*(5), 1369-1373.

Williamson, O. E. (1981). The Economics of Organization - The Transaction Cost Approach. *American Journal of Sociology, 87*(3), 548-577.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.