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BRIDGING MICRO AND MACRO HUMAN RESOURCE MANAGEMENT  
THROUGH HUMAN CAPITAL RESEARCH

DISSERTATION

Presented in Partial Fulfillment of the Requirements for  
the Degree Doctorate of Philosophy in the Graduate  
School of The Ohio State University

By

Janice C. Molloy, M.B.A.

\*\*\*\*\*

The Ohio State University  
2008

Dissertation Committee:

Professor Jay B. Barney, Adviser

Professor Howard J. Klein

Professor Robert L. Heneman

Professor Sharon A. Alvarez

Approved by

---

Adviser

Labor and Human Resources Program

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## ABSTRACT

This dissertation focuses on a deceptively simple question: “To what extent are received micro and macro HRM theories reconcilable?” The premise underlying each of the following chapters is that perhaps the human capital theories micro and macro scholars use are a viable mechanism to bridge the micro and macro traditions. However, the essential elements (e.g., constructs) and structure (i.e., theory) required to test such a premise do not exist and must be created. Therefore, each chapter either creates a required element or contributes to the required structure.

Chapter One provides an overview and specifies four assumptions underlying micro and/or macro theory that must be adapted to create an integrated theoretical model. Chapter Two creates the theory for the disaggregation of HRM systems into functional constructs. In Chapter Three, a definition of human capital is created that integrates micro and macro traditions. An initial test of the integrated theory is completed by subjecting a proprietary industry-specific dataset to hierarchical linear modeling.

The focus of Chapter Four is: Does the human capital context of an organizational unit (e.g., an establishment) alter the assumed single-level human capital-performance relationships (e.g., a team human capital to team performance relationship) embedded within the organizational unit? The data support that human capital context sometimes moderates single-level human capital-performance relationships.

The studies provide a starting point for future research on the extent to which human-capital research may serve as a mechanism to bridge micro and macro HRM. Such research is important because ecological fallacies may result if only micro theory is used to predict the performance of collectives and if the hierarchical structure in which human capital is embedded is not considered.

This dissertation was written in loving memory of my Dad,  
Edward William Molloy, Jr.



## ACKNOWLEDGMENTS

*“It has been said that all writing is autobiographical. If true, then one’s research—because it is such an intense and focused form of writing—must be a particularly intimate form of autobiography. In this sense, all scholarship is self-revelatory. It is as if there is embedded, within the body of one’s published work, a hidden Rorschach test that reveals more than even the author sometimes knows.”*

— Excerpt from Jay Barney’s autobiography in *Great Minds in Management* (2005)

Jay Barney clearly played the starring role in my graduate experience. After the excerpt from Jay’s intellectual autobiography (above), Jay goes on to discuss how interesting and rewarding an academic career can be if one’s research is indeed autobiographical. When I first started working with Jay, he shared that he “didn’t see the “me” in my research.” There simply are not words for how deeply I appreciate this insight which was bundled with wisdom, confidence, patience, and foresight. These gifts manifested as Jay “held a space” for autobiographical ideas to grow into, thus creating conditions for just that to happen. These gifts, when combined with Jay’s ineffable sixth sense for how to “corral” students while somehow upholding their spirit, are rare and inimitable characteristics.

The opportunity to work with Jay not only altered how rewarding I find my research but also my career trajectory (and, like all of Jay’s students, how I write introductions!). By observing Jay in action, I have learned that there are nontrivial differences between what an academic and a scholar choose to do, think, write, and value. I am eternally grateful to Jay for his scholarly and personal investments in me and his many gifts, only some of which I have noted here.

***Sustaining Roles.*** I am convinced that behind every flourishing graduate student is a cadre of scholars who quietly and effectively provide day-to-day sustenance and scholarly essentials that every growing student requires. In particular, three faculty and one staff member generously nurtured my academic growth by sharing their knowledge, patience, time, and energy.

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role model of how a classy, emerging scholar participates in—and can indeed ultimately shape—a field.

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## VITA

- March 8, 1969 ..... Born—Port Clinton, Ohio
- June 9, 1991 ..... B.S.B.A.—Human Resource Management; College of Business; The Ohio State University
- May 24, 1997 ..... M.B.A.—Marketing and Organizational Economics; Simon School of Business; University of Rochester
- September 1, 2003-Present ..... Graduate Teaching and Research Assistant; The Ohio State University
- May 16, 2008-Present ..... Assistant Professor of Human Resource Management; School of Labor and Industrial Relations; Michigan State University

## PUBLICATIONS

- Dulebohn, J. H., Molloy, J. C., Pichler, S. M. (in press). Employee benefits as signals of organizations' employment policies: Historical and contemporary perspectives. *Human Resource Management Review*.
- Molloy, J. C. (2005). Development networks: A coping tool in an age of employability. *Career Development International*, 10(6), 536-547.

## FIELDS OF STUDY

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## CHAPTER 1

### INTRODUCTION AND OVERVIEW

Human resource management (HRM) is a multidisciplinary field. As such, scholars have the opportunity to adopt one or more of the many research traditions accepted. These traditions manifest in the paradigms scholars use to define the research target, the objective of HRM, and what are considered desirable outcomes. Two examples of strong research paradigms include the micro (i.e., psychology-influenced research focused on the individual) and macro (i.e., economics-oriented research focused on organizational units and firms) paradigms. Some (e.g., Wright & Boswell, 2002) have gone so far as to suggest that these two paradigms are so strong, that in some ways the scholarly HRM community may be seen as “segregated” into two relatively isolated groups of scholars.

However, this “segregation” of HRM scholars within their research traditions leaves unanswered a deceptively simple question: “To what extent are received micro and macro HRM theories reconcilable?” The purpose of this dissertation is to provide an initial assessment of the extent to which received theory and research are internally consistent. The premise underlying each chapter in this dissertation is that perhaps the human capital theories used by micro and macro scholars are a viable mechanism to

bridge the traditions. However, the elements (e.g., constructs) and structure (e.g., theory) required to test such a premise do not exist and must be created.

### **Objectives of the Dissertation and Chapter 1**

***Dissertation.*** The purpose of this dissertation is to create three of the requirements needed to test the premise that perhaps human capital theories are a mechanism to bridge micro and macro HRM. In turn, these elements, when integrated with the emerging research of others (e.g., John Boudreau, Rob Ployhart) and my post-dissertation research, may someday partially inform our understanding of the extent to which micro and macro HRM theories are reconcilable.

***Chapter One.*** The purpose of this chapter is to provide an overview of the chapters included in this dissertation. At the outset, the chapter characterizes HRM as a multidisciplinary field. In turn, the implications of the field's multidisciplinary status for the accumulation of knowledge are discussed.

Next, it is suggested that although there has been persistent “segregation” of the HRM field into micro and macro traditions, perhaps one mechanism through which the HRM field may be “desegregated” is through human capital research. There are many possible means to examine the viability of human capital research as a bridging mechanism. The path pursued in this dissertation is through theory. More specifically, three theoretical assumptions that underlie the HRM literature are identified, and the dissertation chapter(s) in which each theoretical assumption is discussed is noted. Finally, to provide background not stated in other chapters, specific the data acquisition details are discussed. The chapter continues with a description of HRM as a multidisciplinary field is provided.

## Characterization of the HRM Field

Human resource management (HRM) is a broad multidisciplinary field in which scholars draw upon social science and management theories to better understand employment relationships. The array of literatures HRM scholars draw upon is diverse, including, for example, labor economics, industrial relations, business strategy, anthropology, and industrial-organizational (I/O) psychology (Kaufmann, 2002). All types of employment relationships are studied, including both collective employment relationships, which are negotiated through unions, and individualized relationships between an individual and a firm (Heneman, 1964).

Table 1.1 provides a contrast of HRM research across levels of analysis (See Appendix A). A summary of the levels of analysis considered in HRM (firm or organizational unit, team, and individuals) is detailed. Scholars may study one or more of a wide range of research targets, including the individual, workgroups, teams, organizational units within a firm (e.g., departments), and the firm itself. As noted in the table, each target is associated with distinct literatures. For example, the study of individuals in organizations has benefited from the work of scholars specializing in industrial-organizational and individual-differences psychology (e.g., Guion, 1987). In contrast, the study of HRM at the firm-level firms has benefited from anthropologists' study of culture (e.g., Schein, 1985) and strategy's depiction of the resources required to achieve competitive advantage (e.g., Barney, 1991; Porter, 1985).

Table 1.1 provides other contrasts among research traditions. The valued resource of interest at each level is detailed; human capital is a common theme across levels. Thus the focus is on human capital theories as a potential mechanism to bridge micro and

macro HRM. Table 1.1 also includes representative predictor, mediating, and dependent variables. Of note regarding the variables is that the macro HRM tradition assumes that employee abilities and “workforce characteristics” (Delery & Shaw, 2001) mediate the relationship between HRM systems and organizational performance. One notes that at the individual level it is these same human capital characteristics that are studied—it is this link between the micro and macro HRM traditions that enables the integrated theoretical frameworks presented in Chapters Three and Four. Finally, Table 1.1 also provides representative questions asked in each tradition. The wide range of research questions, as well as research targets and theoretical orientations, contribute to the complexity of the field.

### **Implications of the HRM Field’s Multidisciplinary Nature**

The breadth of the HRM field and the vast number of literatures from which HRM scholars draw is at once an asset and a liability to the field. A benefit is that the multiple research traditions within HRM provide for an enriched understanding of employment relationships. A challenge is that the existence of multiple research traditions within a field does not ensure the integration of these research traditions. Indeed, for decades scholars have noted the apparent lack of integration within the HRM field, suggesting that the field would be well-served by integration of the disciplines along with the collaboration of scholars trained in different disciplines (e.g., Cappelli & Sherer, 1994; House, Rousseau, & Thomas-Hunt, 1995; Ployhart & Schneider, 2004; Rousseau, 1985). Each manuscript that addresses the segregation of the HRM field highlights the potential benefits of synthesis and “cross-fertilization” for our understanding of employment relationships. And yet such segregation persists.

***Why Might Such Segregation Persist?*** Although HRM scholars have examined the factors underlying the scholar-practitioner divide (e.g., Rynes, Colbert, & Brown, 2007), factors underlying and maintaining the (perceived) segregation of the HRM field have not been articulated. There are many possible explanations for the divide. For example, given the immense challenge of mastering even a single discipline, doctoral programs may focus on a single tradition; or early-career scholars embracing multiple research traditions may face time-compression diseconomies in the high-stakes worlds of tenure and promotion. An inadvertent focus on the differences between (rather than commonalities among) the econometric and psychometric analyses used in the various traditions may also contribute to the continued segregation of the field.

The philosophy of science literature suggests a different possible explanation: Research traditions use different paradigms and constructs, which hinders cross-fertilization across disciplines (e.g., Kuhn, 1962). Collaborating with scholars sharing the same dominant paradigm (vs. scholars with a different paradigm) would likely have productivity benefits. For example, effective communication is facilitated by shared theoretical assumptions and a common vernacular. This ability to effectively communicate with collaborators is essential and, as the following example indicates, perhaps a hindrance of cross-tradition collaborations is the conflicting vernaculars and differing theoretical assumptions among the research traditions comprising HRM.

***An Example.*** Thought experiments provide the opportunity to model scenarios and better understand the complexities underlying complex issues. This thought experiment begins with the assumption that scholars from different research traditions can come to a shared agreement about the nature of the HRM field. More specifically,

imagine that scholars from labor economics, I/O psychology, and business strategy come to the following agreement about the HRM field: HRM involves the study of how various aspects of the employment relationship are associated with performance. However, even if these scholars agree that there is a shared focus on performance, as Kuhn (1962) and others (e.g., Tucker, 1999; Weick, 2001) suggest, differences in research paradigms and terminology may undermine the three scholars' attempts to communicate effectively about even this general topic of shared interest.

Why should this be the case? First, the labor economics paradigm defines performance from the *individual's* perspective. An overriding research question within this paradigm is "How do variations in employment relationships influence the performance outcomes that individuals achieve?" This focus is clear in the dependent variables most often studied in labor economics, namely, an individual's salary and one's earnings over their career (Kaufmann, 2006). For example, common operationalizations of performance in the selection literature include a supervisor's appraisal of an employee's fulfillment of the *behavioral requirements* (e.g., complete x sales calls, manufacture y amount of product) associated with specific jobs (Campbell, 1989; 1999; Campbell et al., 1993; Guion, 1998; Sackett & Lievens, 2006).

As noted, the focus in selection research is on *behaviors*. Indeed, the *results* are not the criterion as the individual cannot control contextual factors. For example, although one could study results such as sales achieved, profit or loss, throughput obtained, defects per million products or services created, or customer satisfaction levels, there may be exogenous factors (e.g., economic conditions, other resources the firm controls and may "bundle" with labor, product offerings) that may covary with results

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achieved. Therefore, from a selection perspective, use of results achieved as a dependent variable would be fundamentally flawed through use of a contaminated criterion (Campbell, 1999; Campbell et al., 1993).

In turn, this view hinders a selection scholar's ability to effectively "desegregate" HRM and collaborate with, for example, a strategy scholar. Why? It is the results achieved which selection scholars view as contaminated (Campbell, 1999; Campbell et al., 1993; Guion, 1998; Sackett & Lievens, 2006) that are of interest to strategy scholars. More specifically, dependent variables commonly studied in strategy focus on results achieved aggregated to the organizational unit or firm level. Indeed, strategic HRM scholars specifically study associations between (a) the employment relationships created by different types of HRM systems, and (b) organizational unit and firm results achieved through those employment relationships. The quantity and quality of results achieved is of great interest to both strategic HRM scholars (e.g., MacDuffie, 1985) and business strategy scholars (e.g., Porter, 1985) alike.

### **Dissertation Purpose**

The thought experiment detailed above is but one of many possible examples of how paradigm and terminology differences between the research traditions underlying HRM complicate attempts to "cross-fertilize" and synthesize theory across paradigms. Yet given that each discipline involves examination of how employment relationships are associated with outcomes at the individual, subgroup, and/or firm levels, it seems intuitive that collaboration to synthesize across research traditions might benefit the HRM field by enriching our understanding of employment relationships. To pursue this logic, one must identify a mechanism through which theoretical and empirical synthesis



may potentially occur. Although there are many possible paths to such synthesis, human capital theory is the path chosen here for three reasons. First, people, and the human capital embodied within them, are central to even the title of the field: *human resource management*. Second, there is shared interest to micro (labor economic and I/O psychology) and macro (strategic HRM and business strategy) scholars. Finally, robust research exists at the individual level, and although not tested at collective levels, human capital is also central to macro theories.

Before delving into human capital as a mechanism to bridge micro and macro HRM, it is important to clarify the desired outcomes of this dissertation. First, the purpose of this dissertation is not to bridge micro and macro HRM. Rather, the purpose of this dissertation is to identify and test one potential mechanism (of many potential mechanisms) to bridge micro and macro HRM. Second, pursuit of a “bridge” between micro and macro HRM involves the identification of central theoretical assumptions underlying research traditions—and how such assumptions would need to be adjusted for integrated research. If the assumptions do not hold up to empirical examination, this does not suggest that it is not possible to bridge micro and macro HRM. Instead, if assumptions are not supported this simply points to theory development opportunities.

Finally, this dissertation includes only three of the many empirical studies that would be required to create an integrated theory of human capital. Moreover, it is not clear (and will not be clear for many years) to what extent the theoretical assumptions underlying micro and macro HRM are internally consistent. Thus, dissertation is seen as only a starting point for future research. The discussion continues with identification of

three assumptions which are central to micro and/or macro HRM research and which are examined in this dissertation.

Theoretical Assumption Used in This Dissertation	Comparison with Assumptions Underlying Received Theory	Application
1. Nesting within a firm's hierarchical structure "matters"	<ul style="list-style-type: none"> <li>Although the distinguishing feature of organizations is that there are hierarchies used to organize firm resources to formulate and implement strategies, such nesting is often not addressed by either micro or macro HRM scholars (Rousseau, 1985; 2000).</li> </ul>	Discussed in Chapters 2, 3, and 4
2. Unit of analysis for HRM practices is one of three functional dimensions (not the entire HRM system or a single practice)	<ul style="list-style-type: none"> <li>Macro scholars explicitly assume HRM system is a unidimensional construct (Delery, 1998).</li> <li>Micro scholars focus on a single functional HRM practice (Wright &amp; Boswell, 2001)</li> </ul>	Discussed in Chapter 2
3. "Better employees" are <i>not necessarily</i> associated with "better" organizational performance	<ul style="list-style-type: none"> <li>Macro scholars explicitly assume that "better employees" are associated with "better" firm performance (e.g., Delery &amp; Shaw, 2002).</li> <li>Micro scholars imply that "better employees" are associated with "better" organizational performance (e.g., Ployhart, 2006).</li> </ul>	Discussed in Chapters 3 and 4
4. Human capital constructs at the individual level may be aggregated to collective levels; within-level relationships (e.g., team-team; establishment-establishment) are homologous and mirror the individual level	<ul style="list-style-type: none"> <li>Macro scholars explicitly assume that "better employees" are associated with "better" organizational performance (e.g., Delery &amp; Shaw, 2002).</li> <li>Micro scholars imply that "better employees" are associated with "better" organizational performance (e.g., Ployhart, 2006). However, multilevel scholars are conflicted. Chan et al. (2007) suggest homologous relationships are likely, while Bliese (2001) suggests pure homology is unlikely.</li> </ul>	Underlies Chapters 3 and 4

**TABLE 1.1: Theoretical Assumptions Underlying HRM Field**

A fourth assumption that does not currently underlie HRM but is required (from a theoretical and psychometric perspective) to integrate micro and macro HRM is also detailed. The assumptions used in the studies are listed in Table 1.1. Information

regarding the extent to which the assumption is used in received theory and the chapter(s) with discussions of each assumption are noted.

### **Revisiting Theoretical Assumptions**

**“Nesting Matters.”** Human capital garners the attention of scholars in many disciplines and is essential to both micro and macro HRM research (See Molloy, Campbell, & Barney, 2008 for a detailed discussion). The mechanism examined in this dissertation as a potential bridge between micro and macro HRM is not simply *human capital* but rather is *human capital nested within the hierarchical structure of a firm*. Indeed, organizations are inherently multilevel systems (Klein & Kozolowski, 2000; Roethlisberger & Dickson, 1939; Rousseau, 1985). Although there are risks associated with treating human capital as though it is not nested within an organizational system, such research persists in both micro and macro HRM (Rousseau, 2000). Although some of this research does not likely lead to ecological fallacies or misinterpretations of results; the concern is that portion of research that does. As Kozlowski and Klein (2002) note:

*Despite the historical tradition and contemporary relevance of organizational systems theory, its influence is merely metaphorical. The organizational system is sliced into organization, group, and individual levels, each level the province of different disciplines, theories, and approaches. The organization may be an integrated system, but organizational science is not (p. 3).*

As detailed in Chapter Four, disregard of the hierarchical structure within organizations may result in ecological fallacies and the over-generalization of research findings. Thus, the first assumption underlying all chapters in this dissertation is that how and where human capital is nested within a firm’s hierarchy is important to consider—“nesting matters.” Such a view is central to organizational systems theory (e.g., Boulding,

1956; Bertalanffy, 1968; Homans, 1958; Katz & Kahn, 1978), a theory which some also apply to the study of HRM practices.

***Unit of Analysis: HRM Practices or Systems?*** Macro HRM scholars study the collection of HRM functional practices (e.g., selection, training, compensation) a firm uses. An explicit assumption in this literature is that consistent with systems theory, HRM practices are better examined as cohesive systems than as independent HRM practices in isolation. Indeed, this macro tradition of analyzing the full array of HRM practices as a unidimensional HRM system construct is so clear that it has been used to differentiate between macro and micro HRM research (Wright & Boswell, 2002). More specifically, micro HRM scholars study HRM practices in isolation (e.g., the association between variations in selection practices and performance). In contrast, macro HRM scholars study the HRM system due to the belief that there is equifinality among HRM practices and thus the use (or lack of use) of a specific HR practice is in itself not meaningful (e.g., Delery, 1998).

For example, macro HRM scholars would argue that selection and training practices may be substitutes for each other as firms may select experienced individuals from the external labor market—or rather, firms may choose to “create” experienced employees through an internal labor market characterized by extensive training. As such, study of only whether or not a firm uses selection tests (without consideration of the HRM practices relating to training) may, depending on the research question, lead to different research findings and implications.

In Chapter Two, the explicit macro HRM assumption that HRM practices are best examined as a cohesive system is examined. It is argued that specific aspects of HRM

systems may be vital to different parts of the human capital acquisition, maintenance, and retention processes. Moreover, such a conceptualization may aid calls to better standardize HRM offerings and address the missing data which plagues macro HRM research (e.g., Delery, 1998; Kalleberg et al., 2001). That is, by specifying the HRM system dimensions associated with human capital attraction, retention, and motivation a theoretical framework is provided which may increase the likelihood that required HRM practice data is gathered that is required to test human capital theories as a mechanism through which to bridge micro and macro HRM and enrich our understanding of employment relationships and organizational performance.

***“Better Employees” Are Associated with “Better” (Organizational)***

***Performance*** An assumption implied in micro HRM and made explicit in the macro HRM literature is that organizations with “better employees” than rivals outperform them. However, this fundamental assumption has never been tested leaving HRM scholars in the awkward position of suggesting managers hire “better employees” (such as those who are highly conscientious and intelligent) with the *expectation* that there will be benefits to organizations (but no empirical evidence that supports this logic) (Ployhart, 2006; Ployhart & Schneider, 2004; Ployhart, Weekley, & Baughman, 2006). There are many challenges involved in testing such an assumption, including the need to develop theory, methods, refine methods, validate psychometric properties of collective constructs, and secure datasets with multilevel performance, individual human capital, and organizational hierarchy information. The purpose of Chapter Three is to begin to test the assumption that “better employees are associated with better (organizational) performance.” Specifically, received HRM theory is discussed and an integrated

theoretical model tested. There are at least three contributions of this chapter including identification of implied and explicit assumptions underlying HRM, the offering of initial results for future scholars to refine, and demonstration of how data made available through HRM outsourcing may be used to examine research questions of interest to both micro and macro HRM scholars. In addition, a foundation is provided for the creation of an integrated theory of human capital and performance.

### **Collective Human Capital Constructs**

Central to this integrated theory of human capital and performance are collective human capital constructs—for example, team human capital, establishment human capital, and firm human capital. Although research of psychological characteristics at the team level has begun, research of psychological characteristics at more aggregate levels is limited. Collectives are “any interdependent and goal-directed combination of individuals, groups, and departments” within organizations (Morgeson & Hofmann, 1999). As depicted in Figure 1.2, the human capital and performance constructs studied here may be aggregated to within-firm collectives such as teams, establishments, and regions. The term “collective” is used to refer to any of these levels of aggregation.

Following the literature (Klein & Kozlowski, 2000; Morgeson & Hofmann, 1999) both the function and structure of aggregate human capital constructs needs to be clarified. Collective constructs emerge through “bottoms-up” processes through the interaction of individuals (Klein & Kozolowski, 2000). It is not the collective construct that determines the behavior of individuals—rather it is the individuals (or collective) who determine the collective construct, and through their actions, influence the behavior of others in the collective (Ployhart, Weekley, & Baughman, 2006). All collective

constructs have both functions (i.e., outputs or effects in the organizational system) and structures (i.e., processes and interactions that underlie the construct) (Morgeson & Hofmann, 1999). Finally, the aggregation approach for all types of human capital characteristics (i.e., experiential, educational, and psychological) is assumed to be the same (Chan et al., 2007).

***Types of Emergence.*** Multilevel scholars consider both compilation and combination processes of emergence. Although “pure” forms of such emergence are often discussed, the reality is that no process is likely to be a pure combination or compilation process (Bliese, 2001). For example, a pure combination process would suggest that both the function and structure of human capital would be parallel (homologous) at the individual level and each collective level. Such parallelism in not only the direction and significance of relationships—but also the relative magnitude of relationships—across levels is unlikely. However, this model is still tested in Chapter 3 and underlies Chapter 4, given the extent to which it is a taken-for-granted assumption underlying the HRM field. This assumption that what is beneficial at the individual level will ultimately benefit organizational units is reflected in counsel given to managers to implement certain HRM practices (Rynes, Brown, & Colbert, 2007), the use of utility analysis (e.g., Boudreau & Ramstad, 2003), and the logic underlying the staffing literature (See Ployhart, 2004).

Given that the purpose of this paper is to test such assumptions for collectives, one could measure human capital at the individual level, and form additive collective constructs. Since the construct conceptualization is not based on agreement, such constructs would not require justification of aggregation (as evidenced by consensus

among the lower level units); the level of within-unit individual-level agreement is not of theoretical or operational concern (i.e., aggregation is not based upon such hypotheses). Such composition or consensus models are discussed in the following section.

***Composition (consensus) models.*** The emergence of aggregate human capital constructs from lower-level constructs is critically important as it provides a theoretical basis for understanding the relationships between aggregated human capital and performance (Morgeson & Hofmann, 1999; Ployhart, Weekley, & Baughman, 2006). Composition models of emergence focus on consensus and suggest that within-unit (e.g., team, establishment, firm) observations will be similar such that they can be adequately aggregated and represented by a unit's mean score.

That such composition models apply to personality has been established by Ployhart, Weekley and Baughman (2006). Their study suggests that individual personality attributes are aggregated to form higher-level constructs (e.g., team, establishment, and firm conscientiousness) and that such aggregates can be represented by using the mean of the lower-level construct (e.g., individual conscientiousness ratings). Such an approach allows the comparison of organizations at the same sampling level (e.g., teams, firms) (e.g., the average conscientiousness rating for members of team A can be compared to the average conscientiousness rating for members of team B) and examination of the extent to which well-established human capital-performance relationships at the individual level hold at aggregated levels of analysis. It is important to note that such aggregated means are not measures of collective personality, nor members of a group's perceptions of how much human capital they believe the collective has. Rather, such a measure, consistent with human capital measures at the individual



level, focus on quantities of human capital. In the following section, the samples utilized in the study are discussed.

### **Samples Utilized**

**Datasets.** Three distinct datasets are used in this dissertation. Chapter Two uses two datasets from the National Organizations Study (NOS) which is a panel study of U.S. employers regarding their HRM practices and organizational performance (Kalleberg et al., 2000). Two years of data (a 1997 dataset and a 2002 dataset) are used to first test, and then replicate, findings.

**Proprietary Industry-Specific Dataset.** The third dataset is used in Chapters Three and Four. The author constructed this multilevel dataset in order to specifically test human capital as a bridging mechanism between micro and macro HRM. The dataset consists of proprietary data from a management consulting firm and publically available data regarding unemployment and other labor market conditions. As suggested by Schneider, Smith, and Sipe (2000) and Ployhart (2004), the advent of HRM outsourcing often yields integration of data in an enterprise-wide resource planning system (ERP). Such outsourcing contracts involve the use of comprehensive enterprise-wide resource planning systems that integrate human resource data (including information on payroll and wages, performance bonuses received, and selection test results) with data from other business processes (e.g., the metrics used to determine sizes of bonuses to be paid). Another benefit of such data is that the data is gathered as part of the regular business operations; therefore the validity issues associated with simulations do not apply to this data.

In addition, the publically available data was secured through the U.S. Bureau of Labor Statistics (BLS) and Statistics Canada. This data included county-level unemployment data for the U.S. and for territories, provinces, and communities in Canada. This unemployment data related to unemployment for what is called semi-skilled jobs in the U.S. and production jobs in Canada (these job categories contain the focal job of Chapters Three and Four).

Data from all three sources is archival and de-identified relative to individuals and firms. Data from the management consulting firm is in accordance with firm standards, and the BLS and Statistics Canada data is publicly available.

### **Industry Context and Requirements to Test for Human Capital Advantage**

The shipping industry, more specifically the delivery of documents and small packages through air and freight couriers (NAICS code 492110), is the context for this study. The U.S. and Canadian operations of four firms provide the sample; together these four firms capture 94% of their geographic markets (IBIS, 2006).

Many attributes make the air and freight courier industry a viable context in which to examine human capital advantage. First, each firm provides a specific service—delivery of parcels—within a defined period of time. Therefore, each firm faces similar challenges in moving parcels from the point of drop-off to delivery. The industry is competitive and each firm is vulnerable to the threats of suppliers, buyers, and substitutes. Second, to accomplish the movement of parcels, firms have a hierarchical structure of geographically dispersed regions, with “establishments” or distribution centers nested within each region. Third, given the competitive nature of the industry, firms tend to follow each other into geographic markets, so within a single metropolitan

area, multiple firms are likely to have establishments (allowing for between-firm comparisons in the same labor market).

Fourth, teams (in which individuals work together for extended periods of time on specific tasks such as packing trucks) nest within such establishments, and in turn individuals nest within teams (See Figure 3.1). Fifth, each firm employs package handlers, thus providing a job which may be compared across organizations and is included in occupational directories of each country (e.g., U.S. O\*Net position 43-5053.00). This elaborate hierarchical nesting structure within firms provides the necessary conditions to examine the extent to which predictor-performance relationships at the individual level aggregate and function in the same manner at other organizational units (e.g., team, establishment, and region levels).

Sixth, selection tests are commonly used in this industry (Hewitt Associates, 2007; Wilk & Cappelli, 2003). Moreover, national wage and salary surveys are conducted for this position in both the United States and Canada (e.g., Hewitt Associates, 2007). For this compensation survey, job analysis was conducted by HRM consultants using a consistent process. Seventh, given that employment in package sorter jobs involves physical activity and machinery, federal agencies in each country regulate the work environment (e.g., the Occupational Health and Safety Administration). As such, institutional pressures create some consistency between job design and work processes between firms.

Finally, to remain viable, firms within the courier industry have long made intensive investments in information systems to track packages throughout each firms' value chain. Such systems create precise business process measures of performance for

regions, establishments, and teams working within the firms. (Indeed, precise measurement of packages, delivery times, and misplaced deliveries are no longer considered differentiating services, but rather are required for competitive parity.) Such measures provide objective performance data that may be used to compare organization units within and between firms.

Taken together, these characteristics create a degree of conformity between firms within the industry, thus making this context an effective setting to test for the existence of human capital advantage.

### **Data Access**

**Observations.** One might ask “how was this proprietary data source secured?” The author became aware of shipping industry dynamics while serving as a management consultant to two of the four organizations. At one firm (“Firm A”), the author was part of an extensive HRM strategy reformulation. As part of this project, the author facilitated seven days of focus groups at seven different U.S. locations, which are included in this study. Many of the individuals engaged in the focus groups were package handlers. In contrast, at “Firm B” the author was involved in an examination of the types of employment relationships the firm used to define employment relationships and team incentives.

In addition, as part of the dissertation process, during the summer of 2007, the author worked the night shift as a package sorter at “Firm C” for five shifts and at “Firm B” for three shifts. In addition, a shift was worked at “Firm A” during April 2008.

**Quantitative Data.** The consulting firm for which the author worked now is the HRM outsourcing partner of four firms within the air and freight courier industry

(including Firms A and B). As such, the human capital and performance data required to deliver HRM services is compiled on the consulting firm's systems. Note that the firm does not conduct industry analyses in the course of business. Rather, the firm provided system access during nights and weekends. Before accessing the data, approximately four full workdays were invested in creating a data map of how to structure the database so that the subtleties of the dataset would be captured (e.g., the hierarchical nestings in which each employee's human capital is applied). With this database specification complete, a total of approximately 10 full workdays were spent downloading the data available from the consulting firm. An additional 12-14 workdays were spent integrating data from publically available data (i.e., programming the linkage of county-level unemployment data with zip codes to control for labor market conditions) with the proprietary data.

### **Summary**

The purpose of this chapter was to provide an overview of the dissertation and provide a sense of how the chapters tie together and lead to future research. As discussed, this dissertation is viewed as an important starting point for the testing of implied and explicit assumptions underlying micro and macro HRM. In addition, it is hoped that the results of the three studies have implications that shape my future research in two domains. First, these dissertation studies will enrich my assessment of human capital research as a potentially viable bridging mechanism linking micro and macro HRM. Second, these three studies will undoubtedly inform the explication of an integrated theory of human capital emergence which ties in findings from micro research to address macro-level questions such as: "Where does human capital come from?" and "How does

human capital emerge?” The following chapter works toward this objective by assessing the viability of viewing HRM systems as multidimensional constructs.

## CHAPTER 2

### ARE HRM SYSTEMS UNIDIMENSIONAL OR MULTIDIMENSIONAL CONSTRUCTS?

There is a long history of viewing some human resource (HRM) practices used to hire, reward, and retain employees as more “progressive” or “sophisticated” than others (Jacoby, 2004). Such practices have been called “high-commitment” (e.g., Collins & Smith, 2006), “high-performance work systems” (e.g., MacDuffie, 1985), and “best practices” (e.g., Huselid, 1995). Each of these constructs has been conceptualized as a unidimensional construct which is consistent with systems theory (e.g., Simon, 1973) and reflects “significant investment in employees and management philosophies that view employees as assets not costs” (Valentine, 1914; p.14). Such systems include, for example, HRM practices focused on extensive investment in employee training, provision of above-market rewards, or job security (e.g., Dunlop, 1959).

Although the names of the systems differ, one could argue that each construct reflects the extent to which an internal labor market (e.g., Doeringer & Piore, 1989) exists within the firm. Even if beneficial, it is well documented that firms are no longer likely to have internal labor markets for all employees (Dulebohn & Werling, 2007; Rousseau, 1985; Hall, 2001). In this age of “employability” some firms are thought to not even use internal labor markets for employees in core jobs (Cappelli, 1985; 1995). Indeed, studies

are showing that overtime, use of HRM practices has been on the decline and today only a small minority of employers use such systems—and typically only for a subgroup of highly-valued employees (Kalleberg, Berg, & Aaron, 2001).

Such a fundamental shift in the conceptual domain of the construct (the content) suggests that a gamma shift has occurred in HRM systems. Although not explicitly stated, some recent research implies such a gamma change has occurred because whereas early factor analyses of HRM practices yielded one dimensions, recent work (e.g., Gibson, Porath, Benson, & Lawler, 2007; Sun, Aryee, & Law, 2007) is discovering multiple construct-valid dimensions. Although such research clarifies the dimensions that might exist, an unanswered question is: “What are the determinants of such dimensions?” Research focused on determinants has been, as Delery (1998) said, “notable by its absence.”

The purpose of this paper is to enrich our understanding of these HRM system shifts through two means. First, a disaggregated model of HRM systems is created by identifying, and then altering, the theoretical assumptions underlying unidimensional conceptualizations. Second, the conditions in which use of various dimensions of the HRM system are likely to create (or destroy) value are discussed. In turn, these conditions define likely determinants of HRM dimensions. In sum, the premise of this paper is that HRM systems are comprised of various elements firms choose to use based upon the incentive issues that arise from specific job conditions. Data representing a broad sample of public and private employers is used to test the model. The paper continues with a discussion of the HRM system construct.



## Theoretical Assumptions

***Traditional Views of the HRM System Construct.*** Throughout the strategic HRM literature, there is general agreement that HRM systems represent “the collection of HRM practices a firm uses (i.e., HRM actions a firm takes) to attract, retain, and motivate employees” (Wright & Boswell, 2002). However, the specific HRM “best practices” vary among studies (Huselid & Becker, 1996; Lepak et al., 2006).

***Utilization of HRM “Best Practices.”*** Given extensive research suggesting that there is an association between use of such HRM best practices and firm performance (e.g., Combs, Liu, Hall, & Ketchen, 2006), one would expect that most firms utilize best practices. However, research has consistently revealed that very few firms fully implement HRM systems best practices. Osterman found the prevalence in 1987 at 18%, and a 2001 prevalence of 16%. A puzzle is why firms are not moving toward HRM “best practice” systems. HRM scholars have used theories such as innovation diffusion (e.g., Dyer & Nobeoka, 2000) and institutional theory (Pauwwe & Boselie, 2005a) to explain heterogeneity in HRM systems. Consistent with this research, as a starting point for this argument:

***Hypothesis 1: The HRM “best practice” system will be in use by a minority of U.S. firms.***

Given the limited prevalence of extensive HRM best practice systems, scholars have frequently tested relationships between individual HRM practices (e.g., provision of job security) with firm performance (e.g., Wright, Gardner, Moynihan & Allen, 2005; Delery & Doty, 1996; Snell, Lepak & Youndt, 1999). However, such analyses consistently demonstrated that relationships between best practices and firm performance

disappear when examined as disaggregated HRM best practices (rather than an aggregated HRM system). Such results have been taken as reinforcement of the need to take a “systems perspective” (Delery, 1998) and examine aggregated HRM systems (Huselid, 2001; Lepak & Snell, 2001; Wright & Snell, 1998; 1991).

This continued focus on HRM systems leaves unanswered the question regarding determinants of HRM systems within U.S. firms. Whereas research has continued regarding the mechanism through which HRM systems may operate (e.g., Bowen & Ostroff, 2004; Delery & Shaw, 2001; Lepak et al., 2006; Schneider, Smith & Sipe, 2000) and how HRM systems may underlie competitive advantage (Boselie, 2003; Huselid, 1998; Lepak & Snell, 1999; 2001; Wright & Boswell, 2002), research regarding HRM determinants has been “notable by its absence” (Delery, 2001; p. 164). Given that managers are not using “best practice” systems, what determines the systems they are using? An important role of HRM theory is not only predicting correlates of types of HRM systems, but also explaining determinants of HRM systems. That extant theory explains the emergence of HRM systems within only a portion of U.S. firms is problematic— and points to a theory development opportunity.

### **Assumptions Underlying Traditional HRM System Construct**

As a paradigm such as strategic HRM evolves, theoretical assumptions are often taken for granted. In order to create a disaggregated model of HRM systems, the theoretical assumptions underlying traditional conceptualizations of HRM systems are examined. There are at least three assumptions; the assumptions discussed in this paper are listed in Table 2.1.

**“More is Better.”** Underlying the “more is better” notion is the premise that firm performance suffers when prescribed HRM systems are not used. There are two strategic HRM theories, with different suggestions regarding if “more is better.” On the one hand, the “universal” theory suggests that those HRM systems characterized by intensive investment in employees (e.g., through training and internal promotion) enable the universe of all firms to gain potential competitive advantages (e.g., Arthur, 1992; 1994; Huselid, 1995; MacDuffie, 1995). On the other hand, the “best fit” or contingency theory argues that HRM systems should not be universally prescribed across firms, but rather should depend on a firm’s strategy. Advocates of this view argue that for each of several firm strategies (e.g., Miles & Snow, 1978; Porter, 1985) there is a corresponding HRM system that may yield potential competitive advantage (Sonnenfeld & Peiperl, 1996). This view has received little empirical support (Delery & Shaw, 2001). Therefore the “best practice” paradigm dominates strategic HRM research (Becker & Huselid, 2006; Combs, Liu, Hall & Ketchen, 2006).

There is, however, an irony at the heart of both these theoretical approaches. In particular, both cite resource-based theory (RBT) (e.g., Barney, 1991; Penrose, 1959; Wernerfelt, 1984) as a justification for their conclusions (e.g., Delery, 1998; Pauwwe & Boslie, 2005b; Wright & McMahan, 1992). However, a number of the suppositions interwoven throughout these literatures are inconsistent with RBT. For example, both theories prescribe specific types of HRM systems as a means to differentiate a firm from its rivals and achieve competitive advantage. Yet the adoption of such prescriptions would lead all firms (for the “best practices” approach) or all firms pursuing similar strategies (for the contingency approach) to adopt the same or similar HRM systems.

Moreover, the ample literature in academic and trade journals on high-commitment HRM systems (as well as the specific HRM practices which comprise such systems) is not consistent with the notion that they both rare and difficult to duplicate. Thus, the “best practice” and “best fit” prescriptions, if followed, would ensure that HRM policies would *not* be a source of competitive advantage. Indeed, it is established that “rules of riches” are not viable given that potential sources of competitive advantage arise from resource heterogeneity between firms (Dierickx & Cool, 1989; Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Williamson, 1985). At least two conclusions can be made from this logic. First, the HR-competitive advantage puzzle really is not understood that well, and/or, second, the diffusion of HRM practices may be complicated by factors influencing how managers subjectively use HRM practices to create and capture economic value.

In order to be consistent with resource-based logic, strategic HRM theory could focus on the subjective use decisions that managers make. Indeed, when compared to other theories of the firm, resource-based theory gives a central role to managers (e.g., Penrose, 1959). It is the subjective use decisions that managers make about how to bundle and use firm resources to formulate and implement strategies ultimately enable competitive advantages. Some resources, such as “best practice” HRM systems, are costly to implement and may not be warranted in all conditions within the firm. And consistent with economic research on factors of production, intensive use of firm resources such as HRM systems may be associated with diminishing returns. Therefore, as reflected in Table 2.1, the assumption used in this paper is that “more” intensive use of HRM “best” practices may either create or destroy value. Indeed, relative to the second

assumption, the breadth of employees covered by the HRM systems is associated with enhanced performance, one could argue that covering all employees with best practice HRM systems would destroy value. Indeed, consider the legacy costs of General Motors and Eastman Kodak. Moreover, as suggested in Table 2.1, there are specific job conditions that create dysfunctional incentives which require elements of HRM systems to better align the interests of the employee and the firm. Such conditions are discussed in the following section.

***HRM System Constructs.*** HRM systems have been conceptualized as unidimensional, firm-level constructs. This implies a one-to-one correspondence between HRM systems and firms (see Lepak and Snell (1999, 2002) for notable exceptions). As such, past research has examined the firm's HRM system (e.g., Delery, 1998) as the unit of analysis. However, scholars have found that HRM systems vary within organizations (e.g., Locke, 2001; Mangum et al. 1985). Further, although ultimately an empirical question, there may be *systematic variation* of HRM systems within firms (Becker & Huselid, 2006; Lepak & Snell, 2002). Specifically, what seems to be a disorganized (unstructured) phenomenon may be an organized (structured) phenomenon. Therefore, although firm-level theories and research may provide some insights, examination of "lower level" constructs may further illuminate our understanding of HRM system determinants.

Further, the use of firm-level constructs relies on firm-level strategy theories such as RBT to explicate the nature of the HR-system-to-firm-performance relationship. However, as suggested earlier, extant macro-HR theories (i.e., "best fit" and "best practice" theories) are inconsistent with RBT (e.g., Barney, 1991). Indeed, adoption of

such prescriptions (or “rules for riches”) leads to homogeneity in HRM systems between firms either theoretically or within a strategy class (DiMaggio & Powell, 1983). Yet it is established that “rules for riches” are not viable given that potential sources of competitive advantage arise from resource heterogeneity between firms (Dierickx & Cool, 1989; Penrose, 1959; Petaraf, 1993; Rumelt, 1984; Wernerfelt, 1984, 1989; Williamson, 1985). Thus theoretical and empirical grounds exist to consider disaggregation of HRM systems. But if not the firm, what unit of analysis should be used?

***Variation by Job Families.*** Firms group such employment relationships into job families by: (a) the type of contributions (i.e., work) required, (b) the skills, education, training and credentials required, and (c) the inducements required to fill jobs (Milkovich & Lawler, 1986).

HRM systems balance the “inducements-contributions” exchange (Barnard, 1938; Katz & Kahn, 1978; March & Simon, 1958) in which the labor market defines what types of inducements the firm needs to offer for a job. This theory suggests that firms offering competitive inducement-contributions exchanges are able to fill jobs. In contrast, if firm’s inducement offerings are below market, individuals will be reluctant to accept the job or, consistent with equity theory (Adams, 1963), reluctant to fill all expected contributions (such as developing firm-specific skills). Therefore, since jobs vary in their contributions required, the assumption in this paper is that the inducements, or HRM practices used to govern employees within a job, also vary.

Consequently, as noted in Table 2.1, the assumption that deviation from prescribed HRM systems has negative firm performance consequences is replaced with

the assumption that *firms maximize value creation by aligning job families (i.e., groups of jobs with similar human capital requirements and strategic value) with HRM systems which differ in their costs and intended effects*. In contrast to extant theory that suggests HRM systems are nested in firms, this revised assumption suggests that HRM systems are nested within the job families that are nested within firms. Further, a focus on job-families as the unit of analysis brings to light theories which differ from firm-level theories (i.e., job-level theories, employment relationship theory, labor market theories) as well as richer consideration of contextual factors (i.e., job characteristics model, labor market dynamics) to explain determinants of such systems.

This focus on job groups as the unit of analysis allows for the following theoretical assumptions: First, instead of within-firm HRM system homogeneity, HRM systems are unrestricted and permitted to vary. Second, not only does the potential for within-firm heterogeneity exist in the strategic value of work and in the contributions expected of employees, but such within-firm heterogeneity also likely exists in the inducements required to attract and retain qualified employees (Barnard, 1938; March & Simon, 1958). Finally, the assumption that the contributions-inducements exchange varies and should be matched at the job group level decreases the under- or overinvestment in HRM systems for certain job families that is inevitable when firms use only one HRM system (e.g., a “best practice” HRM systems) for all employees within the firm.

Although this premise and these theoretical assumptions have been implied (e.g., Becker & Huselid, 2006; Lepak & Snell, 2002; Pauwe & Boselie, 2005b) they have not been specifically articulated. Moreover, the specific mechanism through which firms

align jobs and HRM systems has not been identified, and the linkages between the mechanism and underlying theories have not been fully explicated. As discussed below, it is argued here that work design is the mechanism through which the contributions-inducements exchange is balanced and the heterogeneous resource bundles that underlie competitive advantage created.

## **Hypothesis Development**

### **Job Features**

**Team Production.** Team production occurs when a group's output is not a sum of separable inputs of each individual, and the specific contributions of each individual cannot be clearly specified even if one is willing to endure significant search and transaction costs to attempt to gather such information (Alchian & Demsetz, 1972). While interpersonal and resource interdependencies have been identified as an important job characteristic that may influence employee commitment and motivation (Hackman & Oldham, 1975), the complex incentive issues related to interpersonal interdependencies have not been developed in the HRM literature.

Team production creates a puzzle that involves HRM practices relating to appraisal and reward. A fundamental principle of compensation is that individuals are paid relative to their individual contributions. Thus, the inability in team-production environments to measure marginal contributions and reward or withhold rewards accordingly is problematic (Alchian & Demsetz, 1972). This puzzle is exacerbated by the dysfunctional incentives some compensation practices could create. For example, defining specific inducements for team members ex ante creates incentives for individuals to free-ride (Williamson, 1979). In contrast, defining inducement ex post



encourages individuals to lobby managers for a larger share of the incentive (Williamson, 1985). Managers may endure significant influence costs in this latter scenario given the absence of verifiable evidence of individual members' contributions (Brickley, Zimmerman & Smith, 1996).

Failure to address perceived inequities associated with team-production processes likely hinders individual and firm performance. Indeed, the direct and indirect costs that result from perceived social inequities among team members have been studied by scholars in fields as far ranging as organizational justice (e.g., Folger & Cropanzano, 1998) and anthropology (e.g., Brosnan & de Waal, 2003). For example, labor economists (e.g., Lazear, 1995) have found that inequity among team members in contributions-inducements increases the likelihood of strong performers exiting the firm (Trevor, Gerhart, & Boudreau, 1997; Salamin & Hom, 2005; Shaw et al., 2007). However, even if strong performers remain with the firm, studies have found that the perceived inequities may frustrate them. This may lead even the most conscientious of employees to potentially withhold contributions in order to balance their contributions-inducements exchange relative to other group members (Adams, 1963; Harder, 1992). Taken together, these complex incentive issues create significant social equity concerns (e.g., Adams, 1963).

Alchian and Demsetz' (1972) explication of the team production problem can be used to derive the practices in an HRM system that would mitigate such incentive issues. Such system would be comprised of HRM practices that serve as mechanisms to create social equity. For example, use of team-based incentives, 360-degree performance appraisal, and profit sharing are suggested to potentially align the interests of team

members (employees) and the firm (Heneman & Heneman, 1993; Milkovich & Newman, 2004). In addition, the potential for internal promotions may also address team production problems as one is less likely to withhold effort if they want to be favorably considered for future employment opportunities (Williamson, 1985). However, neither internal promotion nor implied or explicit job security should be guaranteed because such guarantee would likely exacerbate team production issues. Indeed, if one does not face the threat of losing their job or their ability to be promoted, shirking is more likely (Brickley, Zimmerman, & Smith, 1996). Therefore, as noted in Figure 2.1:

***Hypothesis 2a:** There will be a positive association between the intensity of team production a job requires and use of a social-equity mechanism.*

***Firm-Specific Skills.*** Another job feature is the extent to which firm-specific skills are required. Since Becker (1964), it has been acknowledged that jobs vary in the extent to which generalized and/or firm-specific skills are required. Generalized skills are applicable to more than one firm; as such, developing generalized skills aids individuals in maintaining or enhancing their “employability” or labor market mobility external to the firm. In contrast, as described earlier, firm-specific skills are developed while working with assets that are specific to the firm (Williamson, Wachter, & Harris, 1975).

But as has been well established (e.g., Becker, 1964; Kaufman, 2004), employees who acquire firm-specific skills and knowledge are at once enhancing their value to their current employer while at the same time decreasing their “employability” with future employers by not increasing knowledge broadly applicable within the labor market. Given that employees suffer opportunity costs when developing firm-specific skills (Becker, 1964) and given that individuals are likely to seek work with several employers

during their careers (Arthur & Rousseau, 1996), firms may potentially find it difficult to secure qualified employees for jobs requiring intensive use of firm-specific skills.

Firms may address any reluctance employees may have to develop firm-specific skills through certain HRM practices. Indeed, some would argue that firms *must* address such reluctance in order to potentially gain competitive advantage (Wang & Barney, 2006). Specifically, if a firm does not address the complex incentive issues arising from the need to develop firm-specific skills, the full value of firm-specific assets will not be exploited. HRM practices that may mitigate such incentive concerns include the provision of internal promotion opportunities and job security. Such practices would indemnify individuals from labor market risk; that is, if an employee no longer needs to be concerned with maintaining “employability” given the likelihood of staying with their current employer (as suggested by HRM practices such as internal promotion and layoff policies), their labor market risk is markedly reduced (e.g., Cappelli, 1999). This indemnification serves as a “bonding mechanism” which aligns the interests of employees and the firm, thus balancing the contributions-inducements exchange. Although there are firm strategies such as diversification that can also lessen the risk that employees accept when developing firm-specific skills (Wang & Barney, 2006), the focus in this paper is on job requirements. Thus, as noted in Figure 2.1

***Hypothesis 2b:*** *There will be a positive association between the intensity of firm-specific job requirements and use of HRM bonding mechanisms.*

The targeted use of the social-equity and firm-specific-bonding mechanisms as detailed in Figure 2.1 is important as such practices serve to (a) address complex incentive issues in the contributions-inducements exchange, and (b) appropriate

economic value from shareholders to employees only in required conditions. Team production and firm-specific skill requirements are two of potentially many conditions in which specific HRM practices are likely warranted.

Although the specific direction and nature of the relationship between HRM systems and firm performance remains unclear, an underlying premise of the strategic HRM field is that there is an association between the HRM systems firms use and firm performance (Wright, Gardner, Moynihan, & Allen, 2005). As such, profit-maximizing managers have an incentive to use HRM systems which provide required inducements, but neither under- or over-invest. Indeed, transaction cost theory suggests that firms either under- or over-investing in HRM systems will face negative performance implications. But what are the implications of deviations from prescribed HRM mechanism usage.

### **Implications of Deviation from Prescribed HRM System**

***Underinvestment.*** First, imbalances in the contributions-inducements exchange associated with underinvestment in HRM systems may eliminate potential sources of competitive advantage. In the case of those jobs requiring firm-specific skills, for example, it has been well-established that sources of competitive advantage stem not from common resources across firms but rather idiosyncrasies in the resource bundles managers subjectively create (Barney, 1991; Penrose, 1959; Rumelt, 1984). Without the creation of firm-specific skills, the firm has no basis for claiming to gain competitive advantage “through people” (Lepak & Snell, 1999; Wright, Dunford, & Snell, 2001). Yet firms that require firm-specific investments without providing market-competitive inducements through HRM practices (e.g., job security) may not be able to secure

required employees given that, as described earlier, employees suffer opportunity costs when developing firm-specific skills (Becker, 1964). Such underinvestment in HRM practices would likely yield lesser qualified employees and/or significant turnover as qualified employees leave the firm for other firms offering market-competitive HRM practices (e.g., Milkovich & Newman, 2004). Either or both of these situations would hinder the firm's ability to fully exploit its firm-specific assets and decrease the likelihood of the firm gaining competitive advantage.

Along similar lines, socially complex resources (i.e., teams) are a potential source of competitive advantage in that they are more difficult for rivals to duplicate or substitute (Barney, 1991). Socially complex resources such as those created through team production are often causally ambiguous and therefore likely more difficult to imitate or efficiently substitute than other resources (Peteraf, 1993). Moreover, such resources are likely more resilient to the risks of labor-market mobility (e.g., risks of poaching, loss of team members to rivals) than less causally ambiguous resource combinations (e.g., individuals working independently with trade secrets). Yet, as described earlier, firms that employ socially complex resources without addressing the incentive issues that may arise when the specific contributions of each individual cannot be specified may suffer the loss or decreased performance of strong performers. Thus, failure to provide a social-equity mechanism when conditions warrant one (as detailed in Figure 2.1) will likely negatively influence performance.

Moreover, there are likely base HRM practices which do not address specific incentive issues, but rather are practices generally advised based upon industrial-organizational and other management theories. Such practices likely include clarification

of job roles, appraisal of performance, and procedures for resolving disputes between employees and their supervisors or coworkers (Becker & Huselid, 2006).

**Overinvestment.** Given basic production function assumptions, firms hire until marginal costs equate to the marginal revenue associated with the hire. As such, the inducements a firm provides need to be less than or equal to the contributions the employee makes. Moreover, as noted earlier, the HRM practices used in “best practice” systems are costly (e.g., provision of job security and extensive training), and some have found that the cost of the systems may offset the benefits such systems create (e.g., Cappelli & Neumark, 2001). Similarly, profit-sharing systems that are intended to reduce shirking in team production situations reappropriate earnings to employees rather than shareholders or firm investment alternatives. Although interested in *balancing* the contributions-inducements exchange, firms must be careful not to lose the opportunity to *capture* the value derived from these jobs by appropriating such value to job incumbents alone. Similarly, in jobs for which there is an ample supply of applicants and there are not firm-specific skill requirements or team production processes, economic value could potentially be decreased/degraded/diminished through use of HRM systems designed to address the incentive issues these situations create. Therefore:

**Hypothesis 3:** *Given that managers are profit maximizing, the model depicted in Figure 2.1 will explain significant variation in the HRM systems firms use.*

## METHODS

**Sample.** To test the hypotheses, data with job-level information about positions that exist across many firms (e.g., front-line manufacturing or HRM manager) is needed.

To test the boundaries of extant theory and sampling space, two additional characteristics were sought. First, data were sought for jobs that may require social-equity and/or bonding mechanisms and that are also often held by non-exempt or “blue-collar” incumbents. Second, to address the “large firm bias” that is common in HRM research (Barber, 2006; Williamson, 2000); samples with both small and large establishments were pursued.

Based upon these requirements, data from the 1997 and 2002 U.S. National Firms Study (NOS) (Kalleberg, Knoke, & Marsden, 2001a) was used in this research. The resources the National Science Foundation and Department of Labor has invested in the NOS by far exceed the resources typically invested in collection of HRM system data. Such resources allowed for comprehensive sampling (i.e., stratified random sampling with booster samples to yield a national probability sample based on Dun & Bradstreet Information Services databases) and extensive communication and recruitment techniques (including pre-survey communications, use of both mail and phone surveys, and robust follow-up efforts for non-respondents). The final dataset included 1,002 establishments (55% response rate), 562 of which had front-line manufacturing or service positions.

**Informants.** The source of data on HRM practices has been a subject of debate (e.g., Gerhart, Wright & McMahan, 2000; Huselid & Becker, 2000). In the NOS the sampling unit is the establishment, which is defined as “the physical location where work takes place;” and respondents were asked whether someone at the establishment or someone at the larger firm is responsible for HRM decisions. Only those responsible for HRM decisions were interviewed. The target respondent was the HRM manager or plant

manager in the manufacturing sector and the local business site manager in the nonmanufacturing sector. Although a target respondent was used for efficiency in data collection, data were also collected from records, files, employees who were most knowledgeable about a particular type of data (e.g., financial, human resources), and Dun & Bradstreet's Historical Files. Gerhart, Wright, and McMahan (2000) suggest that if ideally multiple respondents or sources should provide data on HRM practices; this should be explicitly requested of the main respondent. This is exactly what this study does. Not only does this improve the quality of these data but it also mitigates the single-source problems of more traditional surveys (Huselid & Becker, 2000).

The number of respondents varied from one to four per establishment. Of those establishments with only one respondent, 79.6% were establishments with fewer than 100 employees; and it can be argued that a single individual would have awareness of HRM systems for employment groups in an establishment of this size.

***Missing Data and Standardization.*** The average missing data for all items used in this study was 5.6% per establishment. For each interval variable, when 10% or more of the data were missing for a scale item, data were replaced using the establishment mean for the scale. When 10% or more of the data were missing for dichotomous variables, missing data were replaced with the mode (as mean replacement would introduce a "third level" into the dichotomous scale, which is inconsistent with the intent and distributional assumptions for dichotomous variables). In terms of other data preparation, to address potential multicollinearity and to standardize the data, all variables were centered. The criteria used to delete cases from the sample (e.g., not-for-profit establishments, sole proprietorships) are listed in Table 2.1



## Measures

***Firm-Specific Skill Intensity.*** Based upon previous theoretical and empirical work (Becker, 1964; Snell & Dean, 1994), the firm-specific-skill intensity scale ( $\alpha=.92$ ) was constructed of two items assessing (1) the “extent to which the skills required of front-line employees are useful to other employers” and (2) the “extent to which the formal training of front-line employees is used to provide establishment-specific skills or knowledge.” These items were assessed using 4-point scales (1 = not at all; 4 = to a great extent). To demonstrate convergent validity, the association between the firm-specific-skill intensity scale and vestibule training (average hours required for a qualified new hire to become fully proficient at the job) was assessed ( $r = .76$ ;  $p<.05$ ). Discriminant validity was assessed by the scale’s correlation with the availability of required skills in the labor market ( $r = .14$ ;  $p<.05$ ). Both assessments provide preliminary evidence of construct validity.

***Team-Production Intensity.*** The team-production intensity scale ( $\alpha=.62$ ) was constructed of four items assessing whether (1) front-line employees are involved in work teams; (2) the extent to which work tasks are interdependent; (3) the ability to identify specific contributions of individuals; and (4) the extent to which the establishment provides team production training skills. All items except the team production training item were measured using a dichotomous scale (0 = no; 1 = yes). The team production training item used a 4-point scale (1 = not at all; 4 = to a great extent). Preliminary construct validity assessments were promising given (1) the convergent validity suggested by the association between the team-production intensity scale and whether work teams meet to solve problems ( $r = .88$ ;  $p\leq.05$ ) and (2) the discriminant validity

suggested by the scale's minimal association with use of individual-based incentive systems ( $r = .21$ ;  $p \leq .05$ ).

**HRM Practices.** Consistent with Delery (1998) and Arthur and Boyles (2007), the HRM practices used to govern front-line employees are viewed as objective and observable characteristics of firms, not perceptions of an employee or groups of employees. Such constructs originate and manifest from the “top down” in firms (Kozlowski & Klein, 2000), and as such psychometric analytic techniques are not used in scale development.

The bundle of base HRM practices that is relatively homogenous across firms was identified from recent meta-analysis (e.g., Combs et al, 2006) and literature reviews (e.g., Becker & Huselid, 2006; Lepak et al., 2006). A human resource textbook (Noe, Hollenbeck, Gerhart & Wright, 2003) was used to ascertain that each commonly used practice was generally advised based upon industrial-organizational and other management theories.

Measures that were both common and generally advised included: (1) written job descriptions; (2) records of “nearly everyone’s” job performance; (3) documents explaining how personnel evaluations are carried out; (4) documents outlining hiring and firing procedures; (5) procedures for resolving disputes between employees and their supervisors or coworkers; and (6) an established orientation process for newly-hired front-line employees. Each item was measured using a dichotomous scale (0 = not used; 1 = used).

Commonly examined practices related to the bonding of employees with the firm include the presence of employment contracts, frequency of internal promotion, layoff practices, and implied or explicit job security policies. These items were measured with dichotomous scales, with the exception of internal promotion, which was measured with a four-point scale assessing frequency of front-line employee promotion into another job family (1 = never; 4 = frequently). Practices potentially addressing the social-equity issues related to team production included use of (1) team-based goals, (2) 360-degree performance appraisals, and (3) group incentives. These items were measured with dichotomous scales (0 = no; 1 = yes).

***Control Variables.*** Given previous research suggesting relationships between HRM systems and the size, age, and union status of establishments (Jackson, Schuler, & Rivero, 1989) these variables were included as controls. Establishment age was the number of years since founding (1997 minus year of founding). Age is included in the model given that HRM systems are persistent (Snell & Youndt, 1995) and work design and norms regarding the provision of job security have varied over time (e.g., Cappelli, 1995; 1999). Age data were gathered from Dun's Historical Files and cross-checked with survey responses. There were no significant differences between secondary and primary age data. Establishment size was assessed using two variables: (1) number of employees at the establishment and (2) number of total employees (if the firm had multiple establishments). Union status for front-line employees was provided by respondents (1 = union(s) present; 2 = no unions present).

Given findings that HRM systems vary by manufacturing and service sectors (Combs et al., 2006) and industry (Jackson & Schuler, 1998), sector membership (0 = manufacturing; 1 = service; 2 = manufacturing and service) and 4-digit SIC codes were also included as controls.

Given that the characteristics of manufacturing environments have been suggested to influence HRM systems (e.g., Snell, Dean & Youndt, 1999), use of statistical process control methods, capital intensity, and year of equipment installation were included to control for technological and procedural sophistication. Average profitability (1995-1996) data from Dun's Historical Files was also included given that profitability may enable use of sophisticated manufacturing processes and costly "best practice" HRM systems and HRM systems may vary with profitability; indeed, some suggest reverse causality between firm performance and HRM systems (Schneider, Hanges, Smith, & Salvaggio, 2003; Wright, Gardener, Moynihan, & Allen, 2005).

Next, although it has been suggested that common method bias is not a concern with this data (Kalleberg, Knoke, and Marsden, 2001b), survey administration variables (1 = mail; 2 = telephone) and the number of respondents per establishment (range = 1-4) were also included. These variables were found not to be significant in any analyses and therefore were not included in final models. Finally, because survey respondents generally self-select into samples, selectivity or response bias may also affect results. The most common form of selectivity bias occurs when the probability of responding to a questionnaire is related both to a firm's performance and use of HRM practices. To formally test this possibility, data was subjected to Heckman's (1979) procedure, which generates an inverse Mills' ratio that was included as a control variable in analyses

relating to performance and two-stage least-squares regression models for each dependent variable to control for selectivity bias. In each case, the relationship between the work practice measures and the dependent variables remained consistent with the results presented above, and in no case would these corrections have altered the conclusions.

## ANALYSIS

Data analysis was conducted in four phases. In the first phase, analysis of *variables* (i.e., HRM practices through factor analysis) and groups of *establishments* (i.e., establishments using similar HRM systems through cluster analysis) was required (Hamm & Brickman, 1998). Confirmatory factor analysis with oblique rotation was used to assess patterns among HRM practice variables using (which groups variables) using *Confirmatory & Exploratory Factor Analysis* software (Browne, Cudeck, Tateneni, & Mels, 1998). Results are detailed in Table 2.3 (See Appendix B) and HRM practices generally loaded as expected for each of the three hypothesized HRM systems (bonding, social equity, and base HRM systems). HRM system scores were created by multiplying the value of each HRM practice times the factor score and creating an additive composite. This resulted in three HRM system composite scores for each establishment (bonding, social-equity, and base HRM systems).

Although often used in an exploratory manner, cluster analysis can be used to confirm theoretically defined patterns by identifying latent patterns that suggest useful groupings (clusters) of objects that are not discernible through other multivariate techniques (Hair & Black, 1998). Specifically, using pre-specified criteria, cluster analysis groups objects (i.e., establishments using similar HRM systems) based on some

measure of similarity (in this study given the categorical dependent variable, log-likelihood distance) between profiles of variable (HRM system) scores. This grouping is completed such that the profiles of scores in a particular cluster are more similar to each other than they are to those of other groups (Sneath & Sokal, 1973; Aldenderfer & Blashfield, 1984).

Although cluster analysis has been used widely in the strategy literature (e.g., Harrigan, 1985) and has been suggested for the study of HRM systems (Delery, 1998; Becker & Gerhart, 1996), only a few studies have used this approach (e.g., Arthur, 1992; 1994).

Use of cluster analysis requires a number of a priori decisions, including the measure of proximity (log-likelihood distance given the unordered polychotomous dependent variable), the type of clustering algorithm (two-stage centroid clustering using hierarchical clustering in stage one and Bayesian hierarchical cluster analysis in stage two starting with the cluster seeds identified in phase one), and decision rules for clustering routines (Bayes Information Criterion). Specifically, clusters were created until there were no longer significant mean differences in HRM system usage among clusters. The cluster analysis to group establishments by patterns of HRM systems was conducted using an initial (n=157) and then hold-out (n=171) samples

The third phase of data analysis used multinomial logistic regression to explain variation of HRM system configurations (cluster membership) based on the independent variables specified earlier. Predicted values from the model were saved. Finally, the difference between observed and predicted clusters was the basis for a “matching” variable (-1 = underinvestment, 0 = match; 1 = overinvestment) that was used to assess

the association between matching and performance. Linear regression was used for this fourth and final analysis given that the dependent variables were interval scales.

## RESULTS

Descriptive statistics and correlations for the independent and dependent variables are listed in Appendix B (Table 2.4). Where applicable, Cronbach's alphas appear on the diagonal.

To test Hypotheses 1 and 2, establishments needed to be grouped by HRM system use. The two-stage cluster analysis yielded a pseudo- $r^2$  of .54, which suggests moderate fit (Pearson goodness-of-fit=.84). Six clusters emerged which were named by the author. Of note is that the clusters shared similarities with Arthur's (1992; 1994) clusters; where possible the names used by Arthur were used to describe the cluster (e.g., "high-road' HRM," "low-road' HRM") shared similarities with Arthur's (1992, 1994) clusters. Of note is that, as predicted by Lepak and Snell (1999), both firm-based and job-based employment patterns emerged (see also Tsui et al., 1995; 1997). The two-stage cluster analyses for the full sample are detailed in Appendix B (Table 2.5).

Using the clusters listed in Appendix B (Table 2.5). Hypotheses 1 and 2 were tested using multinomial logistic regression. Results are displayed in Appendix B (Table 2.6). The firm-specific and team-intensity variables were entered after entry of the control variables and both were found to be significant ( $p=.00$ ). The pseudo- $r$  for the model was .54 and the Pearson goodness-of-fit measure (.81) was sufficient. These results are consistent with Hypotheses 1 and 2.

Hypotheses 3 focused on the relationship between matches in predicted vs. observed HRM systems. Table 2.7 (in Appendix B) details the observed cluster

classification model. Matches between observed and predicted HRM systems are on the diagonal of the table and represent 50% of the cases. To determine whether mismatches represented under- or over-investments, a multinomial logistic regression model including the controls and predictors was created in which the residuals were restricted to approach zero. Betas resulting from this analysis are listed in Appendix B (Table 2.7). These betas were used to predict the theoretically derived clusters.

In addition, to correct for endogeneity, Mill's inverse ratio was calculated using a two-stage Heckman procedure (Heckman, 1976) and was included in the analysis (Wooldridge, 2002). Observed and predicted clusters were compared and observed clusters were identified as representing under- or overinvestment when they differed significantly from those predicted by the model.

## DISCUSSION

**Contributions.** This paper further integrates resource-based and transaction cost theories with HRM systems research and contributes to the literature by providing conceptual logic for use of specific HRM systems in specific conditions. The conditions in which certain types of HRM practices are likely required were explicated and direct and indirect cost considerations discussed. The paper provides a starting point for further examination of potential nonlinearities in the HRM system-firm performance relationship.

This study provides empirical support for the model developed by Lepak and Snell (1999), which suggests that there is non-random variation of the HRM systems used to govern groups of employees (i.e., variation of HRM systems is explained by variation

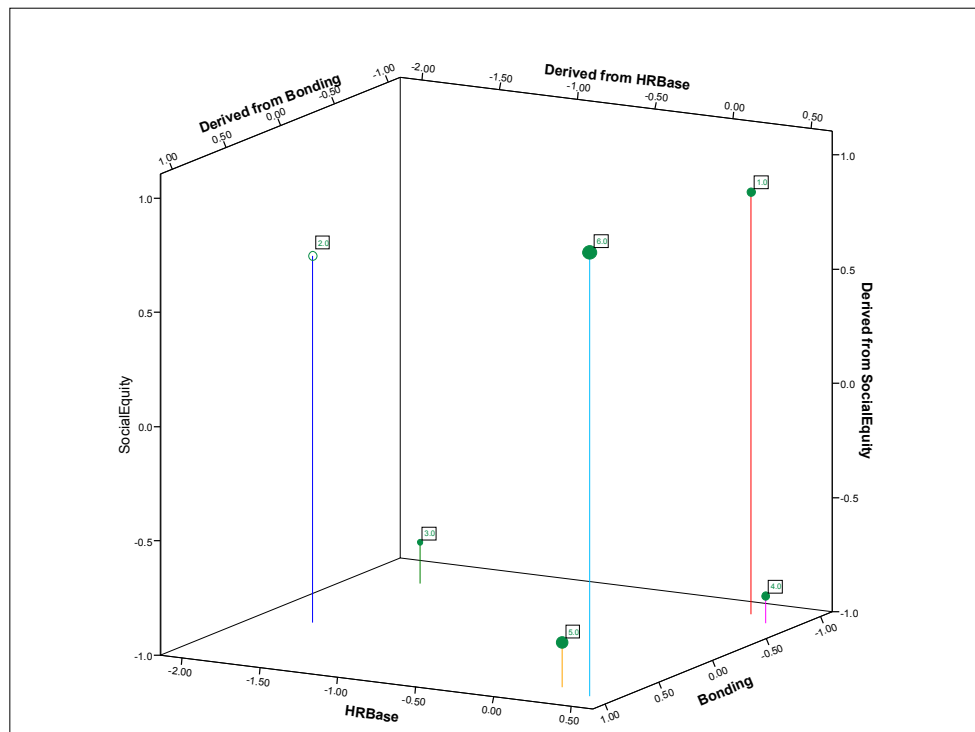


of human capital characteristics). Consistent with calls for research (e.g., Becker & Huselid, 2006; Delery & Shaw, 2001; Pauwe & Boselie, 2005b), this study suggests that shifting the locus of analysis from the firm level to job level is warranted. To date, strategic HRM studies have yielded contradictory findings. Reexamination of these studies at the job level may partially explain such findings. Ultimately, this paper contributes to a more nuanced understanding of how HRM systems may be used to gain competitive advantage.

From a practical perspective, the model presented here explains about half of the variation of HRM systems within the sample. Thus, practical contributions include prescriptions for specific HRM systems in situations that have vexing incentive issues.

***Limitations.*** The dataset used in this study undoubtedly has its limitations, including the cross-sectional nature of the sample and the consequent inability to define causal relationships and rule out common-method bias. To potentially address the common-method bias concern, the survey used multiple types of scales as well as reverse-scaled items, which served to “interrupt” any response pattern a respondent had established. Further, 34% of the surveys were completed using more than one respondent. In addition, a factor analysis consisting of all independent and dependent variables was completed to examine the extent of common-method bias in this study. The first factor accounted for 38% of the variance, suggesting that severe single-respondent bias was not a significant concern (Cohen, Cohen, West & Aiken, 2003). An additional limitation of this study concerns missing data, which derailed analysis of the implications of HRM system match/mismatch, making it difficult to address the question “Does variation of HRM systems matter?”

**Future Research.** Several interesting directions for future research include continued examination of underlying patterns in HRM practices to better understand variation of HRM systems. Moreover, only two of the specific conditions potentially warranting unique HRM systems were examined. Identification of other factors and tests of hypotheses on single-firm data would yield additional insight. For example, a research university (or multiple research universities) may be an ideal sample to consider given the broad range of HRM practices used for different employee groups (e.g., up-or-out promotion system, clinical track faculty, maintenance workers). Further, examination of the clusters of observed and predicted HRM systems in three-dimensional space may yield additional insights. For reference, the observed clusters are mapped in Figure 2.2.



**Figure 2.2**  
**Three Dimensional Model of HRM Systems**

A fruitful area for research may be the emergence of cluster two, which was not theoretically predicted. Discriminant analysis revealed that these cluster members had characteristics consistent with high-growth ventures (e.g., significant job growth in the last two years, average age = three years). Of interest with this cluster is that, contrary to expectations, establishments in the cluster are likely to use both bonding and social equity HRM systems, and although one might expect these to be accompanied by the HRM base systems, such HRM practices are not prevalent in this cluster as noted by the significant and negative mean. Such a pattern is consistent with that hypothesized by Heneman and Tansky (2003). However, this cluster comprised a small portion of the overall sample (n=28) and emerged on only one of the cluster analyses involving half of the sample. Further research is clearly needed to examine this pattern.

Finally, this study examined only firm specificity. Examination of both asset and firm specificity would aid identification of other factors (e.g., firm diversification) that may decrease the need for certain HRM systems (see Wang & Barney, 2006). Finally, given the distal nature of the relationship between individual job performance and firm performance, additional research is necessary to develop intermediate measures of performance (e.g., business process performance, labor productivity) in order to further our understanding of HRM system-firm performance relationships.

## CHAPTER 3

### **HUMAN CAPITAL ADVANTAGE: INDIVIDUAL-DIFFERENCE AGGREGATES AND ORGANIZATIONAL-UNIT PERFORMANCE**

The relationship between human capital and performance garners the attention of scholars in many disciplines. In human resource management (HRM), for example, both “micro” scholars focusing on individuals and teams and “macro” HRM scholars focusing on organizational outcomes examine human capital-performance relationships. From a micro perspective, industrial-organization (I-O) psychology theory suggests—and robust research has confirmed—that some individual-difference characteristics relate positively to individual performance (Schmidt & Hunter, 1998). And from a macro perspective, strategic HRM theory posits that variations in employees’ human capital may be predictive of differences in firm performance (e.g., Delery & Shaw, 2001). Along similar lines, organizational behavior (OB) theories such as that posed by Schneider (1987) suggest that “the people make the place;” that is, it is the individual characteristics of employees that define how the firm looks, feels, and ultimately performs.

However, theory and empirical studies notwithstanding, many have noted the bedeviling gaps between what HRM scholars know and what managers actually do

(Lawler, 1993: 2007; Rynes, Giluk, & Brown, 2007). For example, it is well-established that managers do not utilize valid selection tools consistently, and hiring decisions are not often based on factors (such as intelligence and conscientiousness) known to best predict individual performance (e.g., Lawler, Mohrman, Boudreau, 2005; Rynes, Brown, & Colbert, 2002). This knowing-doing gap is puzzling, given that managers have incentives to maximize organizational performance. Why then would managers risk putting their firms at a competitive disadvantage by failing to utilize knowledge that might optimize performance? Why does the knowing-doing gap persist?

There are many possible explanations. For example, managers may face agency issues (Eisenhardt, 1988); academic research may not be accessible (Rynes, Giluk, & Brown, 2007); or the adoption of HRM practices may be complicated by political concerns not currently incorporated in our theories (Guest, 2007). Indeed, further reflection on the knowing-doing gap raises the potential that perhaps our understanding of the relationship between human capital and performance may be not as well-developed as our guidance to managers suggests. For example, despite the intuitive appeal of received HRM theory that organizational units staffed with superior employees outperform other organizational units, empirical evidence supporting this “human capital advantage” proposition is surprisingly scant (Boxall, 1996; Pfeffer & Sutton, 2006; Ployhart, 2006; Ployhart & Schneider, 2005). As Ployhart and Schneider (2005) note, firms “hire better employees with the *expectation* that doing so contributes to group and organizational performance [emphasis added]”

(p. 514). Yet such aggregate relationships have not been demonstrated, leaving this fundamental premise of received HRM theory untested.

The purpose of this paper is to examine this fundamental premise by testing theoretical assumptions underlying received HRM theory. To test these assumptions, a proprietary dataset is subjected to random- and fixed-effects modeling. Results and implications are presented as a starting point for future theoretical and empirical work on relationships between human capital and performance within and between organizations. The discussion continues by defining human capital at the individual level.

## **MICRO HUMAN CAPITAL-PERFORMANCE RELATIONSHIPS**

### **Individual**

*Defining Individual Human Capital.* When explaining variations in individual performance, micro scholars focus on different aspects of human capital. Those from an economic tradition may be inclined to focus on observable experiential and demographic characteristics, such as education, tenure with a firm, and age as proxies for important human capital characteristics such as cognitive ability and firm-specific skill acquisition (Lazear, 2003). In contrast, those from a psychological tradition often control for the experiential and demographic characteristics economists study, choosing instead to conceptualize and psychometrically validate latent constructs. As such, psychologists tend to predict performance by focusing on latent constructs such as knowledge, skills, abilities, and other characteristics such as conscientiousness and cognitive ability (KSAOs). Melding both traditions, human capital is defined here as *individual*

*characteristics that are positively associated with variations in individual performance, including both observable and latent experiential, demographic, and psychological characteristics.*

***Predicting Individual Performance.*** Decades of research by I-O scholars established that two psychological characteristics—conscientiousness and cognitive ability—consistently predict individual performance across contexts. Although labor economists have not examined conscientiousness per se, they have alluded to this concept. Becker (1964), for example, referred to “habits such as punctuality” (p. 59). Moreover, intelligence has long been noted as a human capital construct within the economics literature, and there is rich debate among psychologists about the extent to which education and credentials serve as viable proxies for cognitive ability (Lazear, 2003; Sackett & Lievens, 2008). Indeed, Schmidt and Hunter (1998) referred to the positive associations between the predictors of conscientiousness and cognitive ability with performance as “thousands of research studies performed over eight decades and involving millions of employees” (p. 271). (See Schmitt and Chan (1998) for a comprehensive review.) Therefore:

***Hypothesis 1:*** *Individual psychological human capital (i.e., conscientiousness or cognitive ability) will have a positive association with individual performance above and beyond the effects of job experience, education, and demographic control variables.*

Individual human capital-performance relationships are important. Yet the defining characteristic of organizations is that they embed individuals within groups (i.e.,

collectives) organized in a hierarchical structure that executives use to coordinate and control resources and manage performance (Morgeson & Hofmann, 1999; Rousseau, 1985). Individuals nested within a formal collective may or may not interact with each other. Rather, collectives are defined here as a group of individuals who sharing some feature of the organization's hierarchy (e.g., a reporting relationship to a vice president) and (at least in principle) share a common goal. Collectives in organizations may include, for example, teams, departments, establishments, and geographic regions. Indeed, the entire firm as a single organization is also a collective. In the following sections, collective human capital constructs are defined and their function detailed. The discussion continues with teams.

## **Team**

*Defining Team Human Capital.* Teams share the defining properties of collectives. In addition, the tasks of team members are in some way related, creating interdependence among team members (Hollenbeck & Ilgen, 2007). This relationship among tasks may take many forms, including for example, serially related tasks (e.g., each member of an assembly team installs a unique component of a product), joint tasks (e.g., team members must partner to lift a heavy item), or completely independent additive tasks in which each team member's completion of their tasks adds to fulfillment of the team's objective (e.g., processing a portion of the packages for which a team of package shippers is responsible). For purposes of this paper, an additional characteristic differentiating teams from other collectives is that the individuals have some degree of



interaction in the workplace (i.e., they are geographically co-located and perform their tasks in a shared physical workspace).

Team scholars study patterns between team composition—combinations of specific individuals within a team—and performance. Some scholars focus on how team composition is associated with individual-level performance (e.g., a highly conscientious team member's performance when in a team of moderately conscientious individuals) and others focus on patterns between team composition and team performance (Hollenbeck & Ilgen, 2007). The focus in this paper is on the later and therefore team human capital is defined here as the aggregated set of each team member's individual human capital. Mirroring individual human capital, team human capital characteristics are defined as being positively associated with variations in team performance and include both observable and latent experiential, demographic, and psychological characteristics.

There are certainly many ways to conceptualize a collective construct such as team human capital. The conceptualization defined for purposes of this research question has at least four defining characteristics, each of which is required in order to test received HRM theory and extant notions of human capital advantage. First, some team research focuses on individuals' perceptions of team properties (e.g., team potency; Stewart & Stark, 2004), it is notable that the focus here is not on team member's perceptions of the team's overall human capital abilities (e.g., the team's level of conscientious). Second, as defined here, teams do not need to enact team human capital;

instead, through the very act of a team existing, team human capital exists for that team. As such team human capital does not require the interaction of individuals within the collective or agreement among members of the collective about the level or amount of dispersion in the human capital characteristic of interest to exist. Certainly some theories suggest that over time collectives may become more homogenous with regard to a human capital characteristic due to attraction, selection, and attrition processes (e.g., Schneider, 1987). However, such consensus among lower-level units is not required to justify the existence of team human capital.

Third, consistent with related research, it is not team human capital that determines the human capital of individual team members—rather it is the individual team members who determine the collective construct (Klein & Kozolowski, 2000; Morgeson & Hofmann, 1999; Ployhart, Weekley, & Baughman, 2006). Finally, the aggregation approach for all types of human capital characteristics (i.e., experiential, educational, and psychological) is assumed to be the same (Chan et al., 2007). The specific operationalization of team human capital (whether focusing on overall level, dispersion, strongest team member, or weakest team member) will vary by type of team.

***Team human capital and performance.*** Having clarified the team human capital construct, the function of the construct is defined. Team scholars have found that the human capital predictors of team performance (a) are highly dependent on the nature of the team task and staffing of the team and (b) may differ from predictors of individual performance (LePine, Hollenbeck, Ilgen, & Hedlund, 1997; Stewart, 2003). Indeed,

predictors of team performance have been found to vary with the type of team (e.g., hierarchical command and control teams vs. self-managed teams) (e.g., Hollenbeck, Derue, & Guzzo, 2004; Stewart, 2006), the nature of the team tasks (e.g., single task, multiple tasks, interdependent tasks, independent tasks) (e.g., Alchian & Demsetz, 1972; Sundstrom, McInyre, Halfhill & Richards, 2000), and the extent to which each team member has similar (redundant) or unique (nonredundant) KSAOs (e.g., Humphrey, Hollenbeck, Meyer, & Ilgen, 2007).

Although team scholars have found that the most effective predictors of team performance differ by situation-specific factors (e.g., type of team, team task), there are some findings that mirror individual-level human capital research. Similar to individual research, team composition scholars have found that conscientiousness, more specifically the average level of conscientiousness of team members, is related to team performance (Barrick et al., 1998; Barry & Stewart, 1997; Neuman & Wright, 1999). The theoretical logic underlying this finding is that because individuals who are more conscientious than peers are more reliable and harder working, than teams comprised of such individuals are likely to outperform teams comprised with (on average) less conscientious individuals (LePine & Hollenbeck, 2003). Moreover, social processes in such teams are likely to cast task-oriented norms (rather than problem-solving oriented or relationship-oriented) when compared with teams comprised of (on average) less conscientious individuals (Hollenbeck & Ilgen, 2007; Moynihan & Peterson, 2004; Stogdill, Goode, & Day, 1963).

Similar logic applies to cognitive ability (See Stewart, 2007 for a review of team composition and team performance).

In sum, although cognitive ability and conscientiousness are not necessarily the two *most effective* predictors of team performance across situations, in general these characteristics are often effective predictors of team performance (Hollenbeck, Derue & Guzzo, 2004). As such:

***Hypothesis 2:*** *Team psychological human capital (conscientiousness or cognitive ability) will be positively related to team performance when controlling for other team human capital characteristics (e.g., aggregated experiential, demographic, and psychological characteristics) as well as team-specific differences (e.g., type of team, team historical conditions).*

Teams are embedded within broader organizational structures. For example, as detailed in Figure 3.1 (See Appendix C.1.A), teams in this study are embedded within establishments which are physical facilities bearing a unique physical address (e.g., Toronto, Canada facility). In turn, such establishments are embedded within geographic regions (e.g., Toronto facility is embedded within the Canadian region). Geographic regions are embedded within firms, and firm are embedded within industries. Within each of these collectives is the human capital firms use to formulate and implement strategies. It is theory relating to human capital in these broad collective groups that is discussed in the following section.

## **ORGANIZATIONAL UNITS AND HUMAN CAPITAL ADVANTAGE**

## **Defining Organizational Unit Human Capital**

In the strategy and economic literatures, human capital typically is conceptualized as a micro, individual-level construct (e.g., Barney, 1991; Becker, 1964; Lazear, 2003). Although the foundational element of collective human capital constructs is individual-level human capital, similar to the manner that micro scholars have conceptualized team composition as a team-level construct, collective human capital is defined here as residing at the level of the collective.

More specifically, human capital for establishments and regions is defined in a manner consistent with team human capital. Specifically, establishment human capital is the aggregated set of human capital characteristics of those employed within the establishment. Similarly, regional human capital is the aggregated set of human capital characteristics of those employed within the establishment. It is important to note that for theoretical and methodological reasons the aggregation occurring at each level of the collective returns to the foundational element—individual human capital. For example, regional human capital is conceptualized as the aggregation of all individual's human capital embedded within the region. Regional human capital is not conceptualized as the aggregation of establishment human capital (and establishment human capital is not the aggregation of team human capital, and so forth). Finally, mirroring individual human capital, all collective human capital characteristics are defined as being positively associated with variations in team performance and include both observable and latent experiential, demographic, and psychological characteristics.

## Defining Human Capital Advantage

Having defined collective human capital, the discussion turns to human capital advantage which Boxall (1995: 1996) conceptualized as potentially occurring at the level of organizational units (such as establishments, regions, and firms). Boxall's (1995; 1996) defined *human capital advantage* as an event occurring when a firm with superior human capital gains competitive advantage over rivals having more typical human capital (e.g., Boxall, 1995; 1996).

There is a long tradition of such logic in macro literatures; indeed Adam Smith's (1904) propositions regarding how variations between nations in aggregated human capital are ultimately associated with differences in the wealth nations achieve are more than 200 years old. In addition, Boxall's (1995: 1996) conceptualization is consistent with resource-based logic which suggests that when an individual's human capital is combined with other firm resources (such as the human capital of other employees) the resulting bundle of human capital is firm-level resource. This firm-level resource, when combined with other firm resources may ultimately underlie a competitive advantage (e.g., Barney, 1991; Petaraf, 1993; Penrose, 1959).

Many have noted that relationships between aggregated human capital and performance are implied in strategic HR models (Ployhart, 2006; Schneider, Smith & Sipe, 2000; Schneider, 2008; Wright, 1984). Some have argued against the idea of human capital advantage (e.g., Lazear, 2003; Lepak & Snell, 1999; 2002). Such arguments suggest that a human capital characteristic (e.g., conscientiousness) that is widely

available in the labor market (and thus is not “rare”) may only be source of competitive parity (given that rivals may also hire individuals with the characteristic). However, it is argued here that when such human capital characteristics are aggregated above the individual level of analysis, the resulting workforce characteristics may be both rare and strategically valuable. That is, the depth or intensity of an aggregated human capital characteristic may be difficult for competitors to imitate or substitute in a timely and cost-efficient manner.

In contrast, other HRM and OB scholars have advanced theoretical arguments that allow meaningful differentiations to be made among organizational units based upon psychological human capital characteristics. For example, through an organization’s process of attracting, hiring, and retaining employees that “fit” the culture, over time, the organization’s workforce may become relatively homogenous in comparison to other organizations (Schneider, 1987). Such homogenization may either hinder or enhance an organization’s survival, yet the theory has generally been interpreted that such homogenization may prove beneficial.

Research supporting this attraction-selection-attrition theory has emerged suggesting that some firm workforces (or specific occupational groups within a firm) can be distinguished from other firms’ workforces (or occupational groups) by their aggregate personality characteristics (Jordan, Herriot, & Chalmers, 1991; Schaubrock, Ganster & Jones, 1998; Schneider, Smith, Taylor, & Fleenor, 1998). Most recently, Ployhart, Weekley, & Baughman (2006) used this theory to specify a composition

process through which differences in human capital emerge. Taken together, this research complements strategic HRM theory which makes explicit the relationship between collective human capital characteristics and firm performance. Specifically, strategic HRM scholars posit that the relationship between the HRM practices a firm uses and that firm's performance is mediated by the characteristics of the firm's workforce (Delery & Shaw, 2001; Huselid, 1995).

Scholars discussing human capital advantage (e.g., Boxall, 1995; 1996) typically imply that the relationship between human capital and performance at the individual level is similar in function and nature to human capital-performance relationships for organizational units (e.g., establishments and geographic regions). Although some psychometric theory would suggest that it is not likely that predictor-performance relationships are parallel across levels of analysis (e.g., Bliese, 2002), Boxall's (1995; 1996) depictions imply parallel relationships characterized by a positive relationship between the constructs that is of similar intensity to the relationship found at the individual level. Thus, given the interest in testing received HRM theory regarding human capital advantage, this is the view tested here.

***Hypothesis 3a:*** *Establishment psychological human capital (conscientiousness and cognitive ability) will be positively related to establishment performance above and beyond the effects of experiential and demographic characteristics.*

***Hypothesis 3b:*** *Regional psychological human capital (conscientiousness and cognitive ability) will be positively related to regional performance above and beyond the effects of experiential and demographic characteristics.*



## **Boundary Conditions**

The objective of these boundary conditions is to clearly specify the conditions in which human capital advantages are most likely to emerge. If the data does not support the existence of human capital advantages, future researchers have a set of boundary conditions to reexamine and potentially tighten. Although the boundary conditions of human capital advantage are not yet formalized, the following conservative boundary conditions are offered to make the tests for human capital advantage more conservative. Specifically, restrictions in the sampling frame, the types of jobs examined, and organizational-unit performance measures are discussed.

***Sampling Frame.*** First, given that different industries require different types of human capital and have widely varying degrees of human capital intensity, existence of human capital advantages would be most likely to emerge within a single industry. Isolating the test to a single industry has the added benefit that exogenous factors are better controlled, given that each firm will face the same set of external threats from buyers, suppliers, new entrants, and substitutes. Similarly, firms would face similar economic conditions, as well as opportunities depending on industry characteristics (e.g., opportunities to merge with or acquire rivals in fragmented industries or potential for complementarities in mature industries). For all of these reasons, isolating the quest for human capital advantages to firms and/or organization units nested within a single industry is warranted.

*Types of Jobs.* The human capital of interest is embodied in employees assigned to job roles. Therefore, the selection of the range of jobs considered has important implications for the ability to isolate human capital advantages. It is well-established that jobs vary among organizations. One could argue that the variation of interest in selecting jobs to compare between organizations the extent to which there is overlap in the job requirements and conditions. Moreover, one could argue that factors underlying variations in job requirements and conditions may vary both over time and between organizational units. As such, these exogenous factors may sometimes hinder performance while at other times enhance performance. If such factors were randomly distributed, one could argue that such factors do not impose non-random or systematic influences on criterion of interest.

The notion of focusing on the extent of similarity within the jobs studied relative to the extent of differences between jobs included—and not included—in the study leads one to explore opportunities to examine the “same” job within the same industry. One such opportunity is to leverage the “key jobs” used in wage and salary surveys. Organizational units participating in such surveys complete a standardized process and information gathering process in order to ensure that the jobs are similar enough that comparisons of the inducements firms offer are warranted, given that the contributions required are similar (Heneman, 2003). In addition, to aid the potential for job equivalence between organizational units, use of a regulated research context also would enhance the likelihood that job expectations are appropriately similar across the jobs.

***Organizational-Unit Performance.*** Finally, given the distal nature of firm performance, proximal dependent variables such as business process measures or organizational unit performance should be utilized (e.g., Becker, & Huselid, 2006) to assess human capital advantage. Use of such proximal criterion would enhance the likelihood that any existing human capital advantages are identified.

## **METHODS**

The shipping industry, more specifically the delivery of documents and small packages through air and freight couriers (NAICS code 492110), is the context for this study. The U.S. and Canadian operations of four firms provide the sample; together these four firms capture 94% of their geographic markets (IBIS, 2006). The sample includes data regarding human capital characteristics of slightly over 67,000 individuals.

Many attributes make the air and freight courier industry a viable context in which to examine human capital advantage. First, each firm provides a specific service—delivery of parcels—within a defined period of time. Therefore, each firm faces similar challenges in moving parcels from the point of drop-off to delivery. The industry is competitive and each firm is vulnerable to the threats of suppliers, buyers, and substitutes. Second, to accomplish the movement of parcels, firms have a hierarchical structure of geographically dispersed regions, with “establishments” or distribution centers nested within each region. Third, given the competitive nature of the industry, firms tend to follow each other into geographic markets, so within a single metropolitan

area, multiple firms are likely to have establishments (allowing for between-firm comparisons in the same labor market).

Fourth, teams (in which individuals work together for extended periods of time on specific tasks such as packing trucks) nest within such establishments, and in turn individuals nest within teams (See Figure 3.1). Fifth, each firm employs package handlers, thus providing a job which may be compared across organizations and is included in occupational directories of each country (e.g., U.S. O\*Net position 43-5053.00). This elaborate hierarchical nesting structure within firms provides the necessary conditions to examine the extent to which predictor-performance relationships at the individual level aggregate and function in the same manner at other organizational units (e.g., team, establishment, and region levels).

Sixth, selection tests are commonly used in this industry (Hewitt Associates, 2007; Wilk & Cappelli, 2003). Moreover, national wage and salary surveys are conducted for this position in both the United States and Canada (e.g., Hewitt Associates, 2007). For this compensation survey, job analysis was conducted by HRM consultants using a consistent process. Seventh, given that employment in package sorter jobs involves physical activity and machinery, federal agencies in each country regulate the work environment (e.g., the Occupational Health and Safety Administration). As such, institutional pressures create some consistency between job design and work processes between firms.

Finally, to remain viable, firms within the courier industry have long made intensive investments in information systems to track packages throughout each firms' value chain. Such systems create precise business process measures of performance for regions, establishments, and teams working within the firms. (Indeed, precise measurement of packages, delivery times, and misplaced deliveries are no longer considered differentiating services, but rather are required for competitive parity.) Such measures provide objective performance data that may be used to compare organization units within and between firms.

Taken together, these characteristics create a degree of conformity between firms within the industry, thus making this context an effective setting to test for the existence of human capital advantage.

### **About the Data**

Proprietary data from a management consulting firm was integrated with unemployment data from the U.S. Bureau of Labor Statistics (BLS) and Statistics Canada. Data from all three sources is archival and de-identified relative to individuals and firms. Data from the management consulting firm is in accordance with firm standards, and the BLS data is publicly available.

As suggested by Schneider, Smith, and Sipe (2000) and Ployhart (2004), management consulting firms offer a rich source of data given the advent of HRM outsourcing to consulting firms. Such outsourcing contracts have been enabled by the use

of comprehensive enterprise-wide resource planning systems that integrate human resource data (including information on payroll and wages, performance bonuses received, and selection test results) with data from other business processes (e.g., the metrics used to determine sizes of bonuses to be paid). Each firm gathered the data examined in this study as part of its typical business processes. As such, companies collected measures at specific points in time (e.g., employment tests at hiring, performance appraisal results four months later). This minimizes concerns related to common-method bias.

### **About the Focal Job**

Firms within the air and freight courier services industry employ “package handlers” who pack and unpack goods onto and from vehicles. Such employees make up the majority of all four firms’ workforces. This was determined through evaluation of the number of employees in each job family (data which was available due to HR outsourcing). This data was confirmed with the following sources: IBIS World (2006) and Thomson (2006). Package handlers also sort parcels (i.e., envelopes and small boxes weighing less than 75 pounds), categorizing parcels by zip code and placing them onto conveyor belts that move the package to the correct plane or truck for delivery. Compensation benchmarking surveys administered by a management consulting firm (and completed by human resource managers) established the equivalence of the package handler positions between firms. Two experienced consultants holding a Total

Compensation Certification offered through the Society of International Benefits and the Wharton School of Business conducted the job analyses to determine equivalence.

### **Human Capital Constructs of Interest**

The selection literature (e.g., Barrick & Mount, 1991; Ployhart, 2006) and selection test validation results for the focal job were examined to determine the human capital characteristics that would be the focus of this study. Given that the package handler job involves “non-skilled” labor (Department of Labor, 2002) and selection research (e.g., Murphy, Cronnin & Tam, 2003; Stewart, 1999); results suggest that conscientiousness would better predict performance than cognitive ability in such context. Moreover, given the structured environment (package handlers each night must load and unload trucks and planes with packages that must be delivered) and rigid schedules (i.e., planes and trucks leave for different destinations at preset times), conscientiousness is the construct used in this study. More specifically, one’s dependability (working when scheduled, keeping to task) and achievement orientation (motivation to achieve goals) likely predict performance and aid the development of functional team dynamics. Thus, both dependability and achievement are examined here, as they have been found to differentially predict performance at times (e.g., LePine, Colquitt, & Erez, 2001). Both are facets of conscientiousness, and the inclusion of both of these, and remaining facets, allows for a global conscientiousness measure.

Although conscientiousness may best predict performance, cognitive ability is still likely to be predictive of performance. Indeed, cognitive ability is beneficial to one's ability find and process zip codes on parcels to make sorting decisions—especially in the conditions of time-pressure and inconsistent locations of address labels on parcels. Moreover, the packing of parcels in trucks and airplanes requires not only physical skills but also cognitive ability to make sorting decisions but also to determine how to best pack the boxes in a manner that is likely to minimize movement and damage when the delivery truck is moving. Thus conscientiousness and cognitive ability are the broad individual differences examined in this study.

### **Sample**

The sample in this study consists of four firms within the courier industry. The sampling frame includes metropolitan areas in the United States and Canada. Within each firm is the equivalent of a geographic region (firms used different terms to denote this construct including: “district,” “zone,” or “region”). Figure 3.1 provides a depiction of the nesting structure, and Table 3.1 details the sample used at each level. This broad geographic region oversaw operations at establishments (i.e., physical locations where packages are sorted and distributed). Teams nested within the establishments, and individuals nested within teams. Approximately 10-40 teams nest within each establishment.



In terms of missing data, if one or more of the dependent variables were missing for an individual, team, establishment, region, or firm, the case was eliminated from the dataset. For independent variables, if more than 10% of data was missing (including control variables) the individual was not included in the analyses. Teams were included in the analyses if 90% of required data (including control variables) for each team member was available.

## **Measures**

***Conscientiousness.*** Conscientiousness was measured at the individual level using the NEO Five-Factor Inventory (Costa & McCrae, 1992), and in some cases the California Psychological Inventory (CPI). Consistent with the intent of the NEO Five-Factor Inventory, analyses are conducted at the trait, not facet level. Previous research has found that standardized scores for the NEO Five-Factor Inventory and the CPI tend to be highly correlated (.96) (Hough et al., 2001).

Given the consensus model of conscientiousness emergence within organizations and the interest in testing relationships between conscientiousness and performance at collective levels of analysis, conscientiousness scores for each collective analyzed (e.g., team, establishment, region, and firm) were created by averaging the centered score of all employees nested within each collective. Centered scores were used rather than standardized scores because of requirements of independent variables for HLM; see Raudenbush & Bryk, 2002.

**Cognitive Ability.** Cognitive ability was assessed using the Wonderlic (1992) employment test which assesses general cognitive ability. The Wonderlic has been found to demonstrate robust reliability (Cronbach's  $\alpha=.92$ ) and validity for predicting job performance (e.g., Furnham & Chomorro-Premuzic, 2006).

Similar to conscientiousness, given the consensus model of human capital emergence within organizations suggested here and the interest of testing relationships at collective levels, cognitive ability scores for each collective analyzed (e.g., team, establishment, region, and firm) were created for each collective by averaging the centered score of all employees nested within each collective.

**Individual Performance.** Given the interdependent nature of the package handling task, it is not feasible to identify the marginal contribution of each employee. Therefore, supervisory ratings of individual performance appraisal scores are used to represent an individual's performance. Although the specific number of scale points varied across firms, the typical performance scale included five scale points with '5' representing strong performance and '1' representing unsatisfactory performance. To allow comparison across firms, scales were reversed when necessary such that the highest scale point (e.g., '5') reflected strong performance and the lowest scale point (e.g., '1') reflected unsatisfactory performance. To control for variability in scales across firms and contexts, scores were standardized prior to being entered into the analysis.

In each firm, package sorters have received at least one performance appraisal after four months of employment. The modal time for the first performance appraisal is

four months. In addition, two factors minimize common-method bias concerns. First, whereas employees provided the information used to create the conscientiousness and cognitive ability ratings, the supervisor provided the performance appraisal. Second, the separation between the time of employment tests (at pre-employment) and the time before a performance appraisal (by four months of employment) minimize concerns about common method bias.

***Organizational Unit Performance.*** Strategy and strategic HRM scholars study the tradeoffs firms make in performance (e.g., MacDuffie, 1995; Porter, 1975; 1985). One such well-established trade-off is that between quantity and quality. In this study, quantity at the team, establishment, and region levels is operationalized as packages per person per hour (per day). Quality is operationalized as defects per 1,000,000 packages sorted with defects being defined as the placement of packages on the wrong truck and a package being placed in the right truck, but in the wrong place on the truck.

Data was gathered for each collective for five business days (the same five business days was used for all collectives). For each of the five business days, the team's average packages/person/hour was calculated. The team performance measure is the average of these five means. Members of each team received the same team performance score. Similarly, the grand mean packages/person/hour for the establishment over five business days measured establishment performance and so forth. Similar logic was applied for the quality measures.

**Control variables.** Given previous research on human capital-performance relationships (e.g., Lazear, 1995; Becker, 1964), tenure with the establishment and firm, as well as experience within the courier industry, need to be controlled. Tenure with the establishment was measured in months, as was tenure with the firm and experience within the industry.

Given that human capital variables such as conscientiousness and cognitive ability may co-vary with education, education was captured using a categorical variable. Education levels reflect the classifications used by the U.S. Department of Labor and include “some high school,” “high school,” “some college,” “undergraduate degree,” “undergraduate degree and some graduate or professional school,” and “graduate or professional school.”

Because employment dynamics and the type of applicants an individual can hire is related the level of unemployment for the desired skill set. Unemployment data from publically available sources (U.S. Bureau of Labor Statistics and Statistics Canada) was integrated.

## ANALYSES

Organizational data are inherently nested; consequently, lower level data are typically influenced by higher level grouping factors. Stated another way, almost all lower level organizational data have some degree of nonindependence due to work group, geographic membership, and so on. Unaccounted-for nonindependence can be problematic because it affects standard error estimates used to determine statistical

significance. Currently, researchers interested in modeling higher level variables routinely use multilevel modeling techniques to avoid well-known problems with Type I error rates. In addition, nonindependence affects statistical inferences in cases in which researchers are interested only in relationships among lower level variables. Ignoring nonindependence when modeling only lower level variables reduces power (increases Type II errors).

Consequently, given that the data were inherently multilevel and contained varying sample sizes between levels, analyses were conducted in SAS using the proc-mix model for random coefficient models (RCMs) (Raudenbush & Bryk, 2002; Singer, 1998). Given the nesting of the data, modeling for fixed and random effects was utilized (i.e., a mixed-effects model). These data are somewhat unique in that there are actually four levels: individuals are nested within teams; those teams are nested in establishments which are nested in regions, which in turn are nested within firms. Modeling the data without considering this hierarchy would prohibit accurate interpretation of effect sizes and significance values (Bliese & Hanges, 2004). Thus, the data was subjected to a three-level RCM to estimate the significance of the individual-difference predictors at team, establishment, and region levels with a fourth level fixed effect for firms. Firms were not modeled as a random effect given the sample of only four firms.

## RESULTS

The sample size at each level of analysis is detailed in Table 3.1 and descriptive statistics for the individual-level variables are detailed in Table 3.2. Before beginning the analyses, an empty model (one in which level-specific predictors are not included) was run to determine the portion of variance in team performance that was attributable to each level of analysis. Of the total variance, 43% was attributable to the team-level, 35% to the establishment, and 22% to the region level. The considerable variance attributable to levels above the team is evidence of the need to examine the data using hierarchical linear modeling.

Hypothesis 1 was that conscientiousness and cognitive ability would be related to performance at the individual level. As noted in Table 3.3 (See Appendix C), this hypothesis was supported as evidenced by the significant betas (regression coefficients) for conscientiousness and cognitive ability ( $p < .05$ ).

Before examining hypotheses regarding collectives, the intraclass correlation ICC values from the RCM were examined for conscientiousness and cognitive ability. This was completed in order to assess the extent to which aggregation of the constructs is warranted (although one could argue received HRM theory suggests such collective constructs exist and that such justification is not required). Previous research by James (1982) and Schneider et al. (1998) has reported ICC values equal to or greater than .12 as supporting consensus. Second, as did Schneider et al. (1998) and Ployhart, Weekley, & Baughman (2006), a multivariate analysis of variance (MANOVA) was conducted using the human capital constructs as the dependent variables and level of collective as the

categorical independent variable. The statistical significance of a MANOVA supports inferences of composition, and the squared canonical correlation indicates effect size. Table 3.4 (See Appendix C) shows there were significant composition effects for both conscientiousness and cognitive ability at the team and establishment levels, as evidenced by the ICC(1) values of .12 or greater and the statistically significant MANOVA results. At the region level, the ICC(1) for cognitive ability did not reach the .12 cutoff (ICC(1)=.10) but following Ployhart, Schneider, and Baughman (2006), given that the value was close and the MANOVA results were statistically significant, regional cognitive ability is also treated as a collective human capital construct. This approach of considering all measures to reflect collective human capital constructs is also consistent with received HRM theory. The squared canonical correlations reflect the relative effect sizes and reflect fairly substantial clustering in the data.

Having clarified the nature of the collective human capital constructs, results are discussed for hypotheses 2, 3a, and 3b, that predictor-performance relationship at the team, establishment, and region levels would be significant. Returning to Table 3.3 (See Appendix C), we see that the data support hypothesized within-level relationships at the team level (for both conscientiousness and cognitive ability). However, the data did not support hypothesized relationships at the establishment or region levels for either conscientiousness or cognitive ability.

## **DISCUSSION**

The HRM field is focused on how firms may secure, deploy, and maintain the

human capital required to formulate and implement strategies. The study of HRM is mature, and as such, taken-for-granted assumptions underlie the way we as scholars think of HRM and the advice that we give to practitioners. The purpose of this study was to identify one such assumption: Organizations with “better” employees outperform rivals. The impetus for this research was that such a statement is intuitive—and indeed, many aspects of HRM from utility analysis to the advice given to managers about whom to hire is based on this assumption.

However, this study found that this sample did not support this premise of “better employees, better performance.” There are numerable explanations for why this might be the case. First, it might be that the collective measures were not valid. Second, differences in the group sizes included in the sample may have inadvertently decreased the ability to detect results. Third, there are many factors in the work environment which influence performance; perhaps there are such elements have not been identified (and they covary with likelihood of having highly conscientious or intelligent workforce). Finally, perhaps the reason hypothesized effects were not found is because “context matters” in organizations (or in terms of the classic person-situation debate, the interaction of people and situations matters) (See Mischel (2004) for a review). As such, the premise of “better employees are associated with better organizational unit performance” is perhaps an ecological fallacy. Indeed, the decomposition of variance found that 57% of the variance was attributable to the establishment and region levels. This considerable variance attributable to levels above the team is evidence of the need to



consider how the nesting of human capital within hierarchical structures may enrich our understanding of human capital-performance relationships.

**Contributions.** This study tests a multilevel model of performance that integrates human capital and performance at the individual level, and business process performance measures at aggregate levels. A definition of human capital was created which integrates both psychological and economic views of human capital. Finally, this study suggests that some of our taken-for-granted assumptions underlying HRM may not hold (e.g., use of intensive selection and employment tests is associated with more conscientious and intelligent workforces; more conscientious and intelligent workforces outperform other groups). These findings point to theory development opportunities in micro and macro HRM—as well as for linking mechanisms to bridge the micro and macro theories.

**Limitations.** Although thought-provoking, this initial test of human capital advantage has limitations that will need to be addressed in future research. First, the study was a test of received theory; as such it was assumed that human capital constructs may be effectively measured at collective levels within organizations. This issue of multilevel construct validation looms large over this study as the reader must take what received HRM theory suggests on faith. Although on the one hand this is appropriate given the study is simply a test of received HRM theory, on the other hand it is not clear how results are to be interpreted given the lack of clarity about construct validity.

Although research to support this position is emerging (e.g., Ployhart, Weekley, Baughman, 2006; Chen, Bliese, & Mathieu, 2005), the function, structure, and very

nature of human capital constructs at collective (vs. individual) levels is just beginning to be understood. As more refined constructs are conceptualized and methods established to effectively measure, represent, and validate such collective constructs, this research will need to be re-examined and results replicated using different measures and sampling contexts.

Second, features of the data collection represent significant limitations. This study related to only one industry; other research will need to address if in some industries or jobs (e.g., knowledge worker positions) human capital advantages are both possible and more impactful. In addition, the test involved a cross-sectional sample. Such longitudinal research is lacking for much strategic HRM research and needs to be completed to isolate both the emergence of human capital and its interrelationships with performance at various levels.

Finally, the hypotheses related specifically to within-level relationships. However, it is the cross-level relationships that may be of most interest from a multilevel perspective. Indeed, if human capital at any specific level is influenced by the characteristics of the larger collective in which it is embedded (e.g., an establishment within a region), then focusing solely on within-level relationships could lead to ecological fallacies.

## **SUMMARY**

In conclusion, the creation of human capital provides an important means of sustained competitive advantage. The results showed individual and aggregate levels of

conscientiousness and cognitive ability were related to individual and team performance. However, collective conscientiousness and cognitive ability constructs were not related to performance of such organizational units. As such, an underlying assumption of HRM extant and folk theory needs to be reexamined.

## CHAPTER 4

### **BETWEEN-LEVEL HUMAN CAPITAL INTERACTIONS AND PERFORMANCE: DOES CONTEXT MATTER?**

The study of the relationship between human capital and performance has, to date, primarily focused on within-level relationships such as individual human capital-performance (e.g., Schmidt & Hunter, 1998) or team human capital-performance (Stewart et al., 2005). Analyses that investigate the interaction across the team and individual levels of analysis are less common (Hollenbeck & Ilgen, 2006). Rarer still is research which investigates the interaction between teams and the broader organizational units (e.g., establishments, business units) in which teams and other collectives (e.g., departments, functions) are embedded.

Yet, a defining characteristic of organizational science is that organizations are complex systems. As such, resources embedded within organizations are arranged in hierarchies so that managers can effectively coordinate and deploy resources to pursue firm strategies. Indeed human resource management (HRM) and organizational behavior (OB) theories suggest that the characteristics of the context in which human capital is embedded matters (e.g., Schneider, 1987). For example, research on organizational culture and climate indicates that such organizational behavior contexts in which research

targets (e.g., individuals, teams) are embedded may influence human capital-performance relationships (Hollenbeck & Ilgen, 2007). Indeed, a highly conscientious employee may not perform well in a climate characterized by a lack of perceived organizational support and yet, this same employee may have stellar performance when in a climate they perceive as more nurturing. Thus the dynamics OB scholars study influence human capital-performance relationships.

Given that OB contexts have been found to influence performance, one could argue that HRM contexts also exist. Bowen and Ostroff (2002) have pioneered one such path by defining that HRM climates exist and clarifying their potential influences. Given the centrality of human capital to HRM, another path to pursue could be human capital context. The study of human capital context could build from the rich research regarding the influence of team human capital characteristics on individual human capital-performance relationships. Indeed, one could imagine that not only are individuals embedded within a human capital context of a team, but also those teams may be embedded, for example, in departments which in turn are embedded in firms, and so forth. Yet beyond the team level, such research is notable only by its absence.

The purpose of this paper is to investigate the potential that *human capital context* matters. Specifically the question addressed is: Does the human capital context of an organizational unit (e.g., an establishment) alter the assumed single-level human capital-performance relationships (e.g., a team human capital-performance relationship) embedded within the organizational unit? If so, the following premise would inform

efforts to bridge micro and macro HRM: Rather than attempting to bridge micro and macro through simply *human capital* alone, the focus is better placed on *human capital nested within the hierarchical structure of a firm*. Although the difference may appear trivial, the implications for our understanding of human capital-performance relationships are anything but subtle. To examine such a premise, hypotheses are tested by subjecting a proprietary industry-specific dataset to mixed effects hierarchical linear modeling (HLM). Results are detailed and implications discussed. This paper continues with a discussion of human capital and organizations as multilevel systems.

## THEORETICAL DEVELOPMENT

The relationship between human capital and performance garners the attention of scholars in many disciplines. When explaining variations in individual performance, micro scholars focus on different aspects of human capital. Those from an economic tradition may be inclined to focus on experiential and demographic characteristics, such as education, tenure with a firm, and age (Lazear, 2003). In contrast, those from a psychological tradition often control for the experiential and demographic characteristics economists study, choosing instead to examine knowledge, skills, abilities, and other characteristics such as conscientiousness and cognitive ability (KSAOs). Melding both traditions, human capital is defined here as *individual characteristics that are positively associated with variations in individual performance, including experiential, demographic, and psychological characteristics*.

It is these characteristics of human capital that firms use to formulate and implement firm strategies. In order to effectively utilize such human capital, firms are organized in hierarchical structures; indeed even those entrepreneurial firms which are more clan oriented have within them an implicit hierarchy. As Weber (1968) suggested, hierarchy and bureaucracy play a vital (and potentially beneficial) role in managers' ability to coordinate and control resources. Yet such hierarchies are not without inherent complexities. Indeed, organizations are inherently multilevel systems (Klein & Kozolowski, 2000; Roethlisberger & Dickson, 1939; Rousseau, 1985). As Kozlowski and Klein (2000) note:

*Despite the historical tradition and contemporary relevance of organizational systems theory, its influence is merely metaphorical. The organizational system is sliced into organization, group, and individual levels, each level the province of different disciplines, theories, and approaches. The organization may be an integrated system, but organizational science is not (p. 3).*

Indeed, many scholars have repeatedly noted the need to incorporate the hierarchical nature of organizations into research designs and analyses (e.g., Klein & Kozlowski, 2000; Kozolowski & Klein, 2000; Ostroff & Bowen, 2000; Bowen & Ostroff, 2004; Rousseau, 1985; 2000). Why? There are many concerns, one of which has to do with fulfilling the general linear model's requirement that observations be independent. The observations for those nested within the same team (or establishment or firm for that matter) are not independent as they are influenced by such factors as the cohesion of the group, its sense of entitivity (or "group-ness"), and the leadership style of the manager, the group's previous performance and a myriad of other factors. Indeed, the underlying

premise of attraction-selection-attrition (ASA) theory (Schneider, 1987) is that over time the composition of such collectives becomes more homogenous (i.e., nonindependent) over time as group processes and dynamics wage a more significant impact over time.

One might argue that these some sampling approaches might address such factors: Use of random sampling would randomize such factors; therefore they are not of concern. However, given that samples can take place at a variety of levels (e.g., across an industry, within a firm, within an establishment). Or, that use of student samples addresses this issue. Yet even student samples exhibit this same nesting dynamic as students are embedded within classes nested within colleges which are nested within universities. Indeed, ASA theory has most often been tested not on workforces of firms but rather among occupational groups (e.g., Chatman's (1989) work on accountants, Ployhart, Weekley & Baughman's (2006) research on occupational groups within the service industry).

As such, this paper focuses on one such contextual factor which may influence the observations taken from those nested within the collective: human capital context. To date, research has focused primarily on group and team human capital, and the associations between composition (i.e., the combination of group members' individual differences) and social cohesion and/or group performance (e.g., Halfhill, Sundstrom, Lahner, & Calderone, 2004). In contrast, Neuman and Wright (1999) focused on how individual performance was influenced by group personality composition. Indeed, there is evidence that the aggregate "personality" of a team moderates the personality-



performance relationships of those embedded within it (e.g., Barry & Stewart, 1997).

Extending this logic, one could imagine that the “personality” of broader organizational units would influence the human capital-performance relationships for those collectives embedded within it. Yet such logic has not been tested, therefore:

***Hypothesis 1:*** Team human capital will moderate individual human capital-performance relationships, such that an individual embedded in a highly-conscientious team will have stronger performance than peers embedded in less conscientious teams.

***Hypothesis 2:*** Establishment human capital will moderate team human capital-performance relationships, such that an individual embedded in a highly-conscientious establishment will have stronger performance than teams not embedded in such an establishment.

***Hypothesis 3:*** Region human capital will influence establishment human capital-performance relationships such that an establishment embedded in a highly-conscientious region will have stronger performance than an establishment not embedded in such a region.

## METHODS

The shipping industry, more specifically the delivery of documents and small packages through air and freight couriers (NAICS code 492110), is the context for this study. The U.S. and Canadian operations of four firms provide the sample; together these four firms capture 94% of their geographic markets (IBIS, 2006).

Many attributes make the air and freight courier industry a viable context in which to examine human capital advantage. First, each firm provides a specific service—delivery of parcels—within a defined period of time. Therefore, each firm faces similar challenges in moving parcels from the point of drop-off to delivery. The industry is

competitive and each firm is vulnerable to the threats of suppliers, buyers, and substitutes. Second, to accomplish the movement of parcels, firms have a hierarchical structure of geographically dispersed regions, with “establishments” or distribution centers nested within each region. Third, given the competitive nature of the industry, firms tend to follow each other into geographic markets, so within a single metropolitan area, multiple firms are likely to have establishments (allowing for between-firm comparisons in the same labor market).

Fourth, teams (in which individuals work together for extended periods of time on specific tasks such as packing trucks) nest within such establishments, and in turn individuals nest within teams (See Figure 3.1). Fifth, each firm employs package handlers, thus providing a job which may be compared across organizations and is included in occupational directories of each country (e.g., Department of Labor, U.S. O\*Net position 43-5053.00). This elaborate hierarchical nesting structure within firms provides the necessary conditions to examine the extent to which predictor-performance relationships at the individual level aggregate and function in the same manner at other organizational units (e.g., team, establishment, and region levels).

Sixth, selection tests are commonly used in this industry (Hewitt Associates, 2007; Wilk & Cappelli, 2003). Moreover, national wage and salary surveys are conducted for this position in both the United States and Canada (e.g., Hewitt Associates, 2007). For this compensation survey, job analysis was conducted by HRM consultants using a consistent process. Seventh, given that employment in package sorter jobs

involves physical activity and machinery, federal agencies in each country regulate the work environment (e.g., the Occupational Health and Safety Administration). As such, institutional pressures create some consistency between job design and work processes between firms.

Finally, to remain viable, firms within the courier industry have long made intensive investments in information systems to track packages throughout each firms' value chain. Such systems create precise business process measures of performance for regions, establishments, and teams working within the firms. (Indeed, precise measurement of packages, delivery times, and misplaced deliveries are no longer considered differentiating services, but rather are required for competitive parity.) Such measures provide objective performance data that may be used to compare organization units within and between firms.

Taken together, these characteristics create a degree of conformity between firms within the industry, thus making this context an effective setting to test for the existence of human capital advantage.

### **About the Data**

Proprietary data from a management consulting firm was integrated with unemployment data from the U.S. Bureau of Labor Statistics (BLS) and Statistics Canada. Data from all three sources is archival and de-identified relative to individuals and firms. Data from the management consulting firm is in accordance with firm standards, and the BLS data is publicly available.

As suggested by Schneider, Smith, and Sipe (2000) and Ployhart (2004), management consulting firms offer a rich source of data given the advent of HRM outsourcing to consulting firms. Such outsourcing contracts have been enabled by the use of comprehensive enterprise-wide resource planning systems that integrate human resource data (including information on payroll and wages, performance bonuses received, and selection test results) with data from other business processes (e.g., the metrics used to determine sizes of bonuses to be paid). Each firm gathered the data examines in this study as part of its typical business processes. As such, companies collected measures at specific points in time (e.g., employment tests at hiring, performance appraisal results four months later). This minimizes concerns related to common-method bias.

### **About the Focal Job**

Firms within the air and freight courier services industry employ “package handlers” who pack and unpack goods onto and from vehicles. Such employees make up the majority of all four firms’ workforces; this was determined through evaluation of the number of employees in each job family (data which was available due to HR outsourcing). This data was confirmed with the following sources: IBIS World (2006) and Thomson (2006). Package handlers also sort parcels (i.e., envelopes and small boxes weighing less than 75 pounds), categorizing parcels by zip code and placing them onto conveyor belts that move the package to the correct plane or truck for delivery. Compensation benchmarking surveys administered by a management consulting firm

(and completed by human resource managers) established the equivalence of the package handler positions between firms. Two experienced consultants holding a Total Compensation Certification offered through the Society of International Benefits and the Wharton School of Business conducted the job analyses to determine equivalence.

### **Human Capital Constructs of Interest**

The selection literature (e.g., Barrick & Mount, 1991; Ployhart, 2006) and selection test validation results for the focal job were examined to determine the human capital characteristics that would be the focus of this study. Given that the package handler job involves “non-skilled” labor (Department of Labor, 2002) and selection research (e.g., Murphy, Cronnin & Tam, 2003; Stewart, 1999); results suggest that conscientiousness would better predict performance than cognitive ability in such context. Moreover, given the structured environment (package handlers must load and unload trucks each night and planes with packages that must be delivered) and rigid schedules (i.e., planes and trucks leave for different destinations at preset times), conscientiousness is the construct used in this study. More specifically, one’s dependability (working when scheduled, keeping to task) and achievement orientation (motivation to achieve goals) likely predict performance and aid the development of functional team dynamics. Thus, both dependability and achievement are examined here, as they have been found to differentially predict performance at times (e.g., LePine, Colquitt, Erez, 2001). Both are facets of conscientiousness, and the inclusion of both of these, and remaining facets, allows for a global conscientiousness measure.

## Sample

The sample in this study consists of four firms within the courier industry. The sampling frame includes metropolitan areas in the United States and Canada. Within each firm is the equivalent of a geographic region (firms used different terms to denote this construct including: “district,” “zone,” or “region”). Figure 3.1 provides a depiction of the nesting structure, and Table 3.1 details the sample used at each level. This broad geographic region oversaw operations at establishments (i.e., physical locations where packages are sorted and distributed). Teams nested within the establishments, and individuals nested within teams. Approximately 10-40 teams nest within each establishment.

In terms of missing data, if one or more of the dependent variables was missing for an individual, team, establishment, region, or firm, the case was eliminated from the dataset. For independent variables, if more than 10% of data was missing (including control variables) the individual was not included in the analyses. Teams were included in the analyses if 90% of required data (including control variables) for each team member was available.

## Measures

**Conscientiousness.** Conscientiousness was measured at the individual level using the NEO Five-Factor Inventory (Costa & McCrae, 1992), and in some cases the California Psychological Inventory (CPI). The conscientiousness facets of both dependability and achievement were utilized given previous research showing that the

facets of dependability and achievement demonstrate cross-situational generalizability and differentially predict performance (LePine, Colquitt, & Erez, 1999). The standardized facet scores for the NEO Five-Factor Inventory and the CPI were highly correlated, with both dependability (.96) and achievement (.93) correlations being significant.

Given the consensus model of conscientiousness emergence within organizations and the interest in testing relationships between conscientiousness and performance at collective levels of analysis, conscientiousness scores for each collective analyzed (e.g., team, establishment, region, and firm) were created by averaging the centered score of all employees nested within each collective. Centered scores were used rather than standardized scores because of requirements of independent variables for HLM; see Raudenbush, 2005.

***Individual Performance.*** Given the interdependent nature of the package handling task, it is not feasible to identify the marginal contribution of each employee. Therefore, supervisory ratings of individual performance appraisal scores are used to represent an individual's performance. Although the specific number of scale points varied across firms, the typical performance scale included five scale points with '5' representing strong performance and '1' representing unsatisfactory performance. To allow comparison across firms, scales were reversed when necessary such that the highest scale point (e.g., '5') reflected strong performance and the lowest scale point (e.g., '1') reflects unsatisfactory performance. To control for variability in scales across firms and contexts, scores were standardized prior to being entered into the analysis.

In each firm, package sorters have received at least one performance appraisal after four months of employment. The modal time for the first performance appraisal is four months. In addition, two factors minimize common-method bias concerns. First, whereas employees provided the information used to create the conscientiousness and cognitive ability ratings, the supervisor provided the performance appraisal. Second, the separation between the time of employment tests (at pre-employment) and the time before a performance appraisal (by four months of employment) minimize concerns about common method bias.

***Organizational Unit Performance.*** Strategy and strategic HRM scholars study the tradeoffs firms make in performance (e.g., MacDuffie, 1995; Porter, 1975; 1985). One such well-established trade-off is that between quantity and quality. In this study, quantity at the team, establishment, and region levels is operationalized as packages per person per hour (per day). Quality is operationalized as defects per 1,000,000 packages sorted with defects being defined as the placement of packages on the wrong truck and a package being placed in the right truck, but in the wrong place on the truck.

Data was gathered for each collective for five business days (the same five business days was used for all collectives). For each of the five business days, the team's average packages/person/hour was calculated. The team performance measure is the average of these five means. Members of each team received the same team performance score. Similarly, the grand mean packages/person/hour for the establishment over five



business days measured establishment performance and so forth. Similar logic was applied for the quality measures.

***Control variables.*** Given previous research on human capital-performance relationships (e.g., Lazear, 1995; Becker, 1964), tenure with the establishment and firm, as well as experience within the courier industry, need to be controlled. Tenure with the establishment was measured in months, as was tenure with the firm and experience within the industry.

Given that human capital variables such as conscientiousness and cognitive ability may co-vary with education, education was captured using a categorical variable. Education levels reflect the classifications used by the U.S. Department of Labor and include “some high school,” “high school,” “some college,” “undergraduate degree,” “undergraduate degree and some graduate or professional school,” and “graduate or professional school.”

Because employment dynamics and the type of applicants a firm can hire is related the level of unemployment for the desired skill set. Unemployment data from publically available sources (U.S. Bureau of Labor Statistics and Statistics Canada) was integrated.

## ANALYSES

Given that the data were inherently multilevel and contained varying sample sizes between and within levels, analyses were conducted in SAS using the proc-mix model for random coefficient models (RCM) (Raudenbush & Bryk, 2002; Singer, 1998). These data

are somewhat unique in that there are actually four levels: individuals are nested within teams; those teams are nested in establishments which are nested in regions, which in turn are nested within firms. Modeling the data without considering this hierarchy would prohibit accurate interpretation of effect sizes and significance values (Bliese & Hanges, 2004). Thus, the data was subjected to a three-level RCM to estimate the significance of the individual-difference predictors at individual, team, and establishment levels with a fourth level fixed effect for firms. Firms were not modeled as a random effect given the sample of only four firms.

## RESULTS

The sample size at each level of analysis is detailed in Table 4.1 and descriptive statistics for the individual-level variables are detailed in Table 4.2 (See Appendix D). Before beginning the analyses, an empty model (one in which level-specific predictors are not included) was run to determine the portion of variance in team performance that was attributable to each level of analysis. Of the total variance, 43% was attributable to the team-level, 35% to the establishment, and 22% to the regional level. The considerable variance attributable to levels above the team is evidence of the need to examine the data using hierarchical linear modeling.

The hypotheses in this paper require examination of collective human capital constructs. The appropriateness of examining conscientiousness and cognitive ability as collective human capital constructs was established in chapter 3, using the findings

detailed in Table 3.4 (See Appendix C). Having established such constructs, the discussion continues with the across-level hypotheses posed in this study.

Hypothesis 1 was that team-level conscientiousness would moderate the relationship between individual-level conscientiousness and performance. The data supported this hypothesis as indicated by the significant relationship ( $<.05$ ) shown in Table 4.3 (See Appendix D). Similarly, hypothesis 2 that establishment conscientiousness moderates the relationship between team conscientiousness and performance was also supported. However, there was not support for hypothesis 3 that region conscientiousness would moderate the relationship between establishment human capital and establishment performance. This lack of support is evidenced by the nonsignificant regression coefficient.

## DISCUSSION

It is well accepted that the context in which an individual is embedded impacts their behaviors and performance. Indeed, Lewin (1939) theorized about such interactions in his seminal work and others (e.g., Chatman & O'Reilly, 1989) have continued this work on person-situation interactions. In short, context matters.

For a variety of reasons, including the unavailability of data, interactions between human capital constructs at various levels within organizations have not been tested. This study offers such a test and the data support that human capital context sometimes moderates single-level human capital-performance relationships. The finding that regional context did not influence establishment-human capital relationships was

discussed with a manager of an establishment included within the study. Their suggestion was that one reason that regional influences did not occur may be because of the limited interaction between establishment general managers and regional vice presidents—and the limited exposure that those embedded within establishments (e.g., employees sorting packages) have to the regional vice president. Moreover, in this sample, the staffing of the region is very limited—including only a vice president and their assistant. As such, the impact a single individual leader (with limited exposure to those within the group) may have is likely limited. Such second (or third-level) nesting effects may be supported in other samples in which the higher-level nestings (e.g., nesting within a business unit) involve more exposure and interactions between leaders and those nested within the organization. These findings need to be replicated but tentatively suggest that the "human capital context" in which employees are embedded does "sometimes matter"—or alter within-level human capital-performance relationships found that do not consider the nesting of employment relationships within an organization.

This research suggests that ecological fallacies may result if only micro theory is used to predict the performance of collectives and the hierarchical structure in which human capital is embedded is not considered. Despite the risks associated with treating human capital as though it is not nested within an organizational system, such research persists in both micro and macro HRM (Rousseau, 2000). Although some of this research does not likely lead to ecological fallacies or misinterpretations of results; the concern is that portion of research that does. Thus, perhaps the study of HRM would benefit from

more careful consideration of how the samples used to examine HRM dynamics are embedded firm hierarchies. Indeed, such a view is central to organizational systems theory (e.g., Boulding, 1956; Bertalanffy, 1968; Homans, 1950; Katz & Kahn, 1966). In short: nesting often matters when examining human capital-performance relationships, therefore future research may benefit from more careful attention to the implications of nesting and sampling approaches.

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## APPENDIX A

### LARGE TABLES AND FIGURES SUPPORTING CHAPTER 1

HR Tradition	Foundation	Central Constructs	Typical Independent Variables	Typical Mediating Variables	Representative Dependent Variables
Macro: Firm and Organizational Unit Research	<ul style="list-style-type: none"> <li>• Strategy</li> <li>• Sociology</li> <li>• Organizational theory</li> <li>• Organizational Economics</li> <li>• Anthropology</li> </ul>	<ul style="list-style-type: none"> <li>• Organization-level resources</li> <li>• HR systems</li> <li>• Aggregated human capital</li> <li>• Organizational routines</li> <li>• Organizational climate</li> <li>• Socially-complex processes</li> <li>• Founder effects</li> </ul>	HR practices	Typically not measured but suggested to be human capital, ability, motivation, and opportunity to participate	Firm and organizational unit performance (e.g., financial measures such as Tobin's q or business process measures)
Micro: Team Research	<ul style="list-style-type: none"> <li>• Social psychology</li> <li>• Sociology</li> </ul>	<ul style="list-style-type: none"> <li>• Team production</li> <li>• Socially complex processes</li> <li>• Team-based routines</li> </ul>	<ul style="list-style-type: none"> <li>• Team composition</li> <li>• Task type</li> <li>• Type of team oversight</li> <li>• Team size</li> </ul>	Cohesion Mental models Coordination processes	Individual and team performance
Micro: Individual Research	<ul style="list-style-type: none"> <li>• Organizational behavior</li> <li>• Individual differences</li> <li>• Personality psychology</li> <li>• Cognitive Psychology</li> </ul>	Human capital (psychological, demographic, and experiential characteristics; KSAOs)	<ul style="list-style-type: none"> <li>• Cognitive ability</li> <li>• Personality</li> <li>• Physical ability</li> </ul>	Job knowledge Job skills Motivation Job choice Judgment	Individual performance (job, task, contextual, OCB's; accidents, turnover) Satisfaction Withdrawal

**TABLE 1.2 Comparing and Contrasting HRM Research Across Levels of Analysis**

## APPENDIX B

### LARGE TABLES AND FIGURES SUPPORTING CHAPTER 2

Traditional HRM System	Disaggregated HRM System
<p>“More is better”</p> <ul style="list-style-type: none"> <li>• The intensity of HRM best practice utilization is positively correlated with firm performance.</li> <li>• As the percentage of a firm’s workforce that is covered with best practice HRM systems increases, firm performance is enhanced</li> </ul>	<p>“More is sometimes better”</p> <ul style="list-style-type: none"> <li>• “More” intensive use of HRM “best” practices may either create or destroy value; intensive use of HRM systems may be associated with diminishing returns.</li> </ul>
<p>HRM systems must be addressed as unidimensional systems</p>	<ul style="list-style-type: none"> <li>• There are subsystems underlying HRM systems which address specific functions (e.g., staffing) and incentives issues (e.g., firm-specific skill acquisition and team production).</li> <li>• Firms maximize value creation by aligning job families (i.e., groups of jobs with similar human capital requirements and strategic value) with HRM subsystems which differ in their costs and intended effects.</li> </ul>

**TABLE 2.1 Theoretical Assumptions: Traditional and Disaggregated Views**

<b>Barrier to Inclusion</b>	<b>Cases Deleted<sup>a</sup></b>
No front-line manufacturing or service jobs within firm	128
School or government firms	154
Could not provide clear information regarding type of business	48
Sole proprietorship and/or type of firm missing	148
Front-line jobs not on payroll (e.g., outsourced or filled with direct contractors or temporaries)	80
Fewer than three core employees (due to the need to assess team-related work)	116
Duplicate cases (mail and phone responses)	46
Total Cases Deleted	678
<b>Total NOS (1997) cases</b>	<b>1008</b>
<b>Total cases for this study</b>	<b>328</b>

<sup>a</sup> The number in each row represents the number of additional cases deleted based upon the inclusion criteria.

**TABLE 2.2 NOS (1997) Case Summary**

Variable	n	Mean	s.d.	1	2	3	4	5	6
1. Team intensity	583	5.40	.86	(.62)					
2. Firm-specific-skill intensity	583	4.99	.86	-.06	(.92)				
3. HR administrative practices	583	4.51	1.80	-.16**	.06	(.81)			
4. HR bonding system	530	2.39	.98	-.14**	.04	.31**	(.87)		
5. HR social equity system	583	1.06	.73	-.09*	.09*	.08*	.21**	(.71)	
6. Establishment performance	369	16.35	2.36	-.00	.03	.11*	.14**	.13**	(.73)

<sup>a</sup> Scale reliability coefficients (Cronbach's alphas) appear on the diagonal.

\*  $p \leq .05$

\*\*  $p \leq .01$

**TABLE 2.3 Descriptive Statistics and Correlations: Independent and Dependent Variables <sup>a</sup>**



Items	Component		
	1 HRM base practices	2 HRM social equity practices	3 HRM bonding practices
Hiring/firing procedures	.82	-.02	-.10
Job descriptions	.70	-.04	-.20
Conflict resolution procedures	.66	-.07	-.19
Performance appraisals (individual)	.76	-.13	-.18
New hire orientation	.60	-.18	-.05
Employment contract	.22	.65	-.18
Job security	.13	.71	.03
Frequency of promotion	.15	.45	-.08
Team performance appraisal	.27	.04	.72
Team incentives	.27	.19	.71
Profit sharing	.39	-.17	.46
<b><i>Cronbach's Alpha</i></b>	<b>.78</b>	<b>.55</b>	<b>.67</b>

<sup>a</sup>Confirmatory factor analysis with oblique rotation was used to assess patterns among HRM practice variables using (which groups variables) using *Confirmatory & Exploratory Factor Analysis* software (Browne, Cudeck, Tateneni, & Mels, 1998).

**TABLE 2.4 Confirmatory Factor Analysis Component Matrix<sup>a</sup>**

Assigned Cluster Description	Organization-Based Employment			Job-Based Employment								
	Cluster 1 n = 76	Cluster 2 n = 28	Cluster 3 n = 57	Cluster 4 n = 73	Cluster 5 n = 51	Cluster 6 n = 43						
	“High Road” HR	High-Growth Venture	HR Basics + Security	HR Basics + Social Equity	HR Basics	“Low Road” HR						
Variable	Mean	s.d.	Mean	s.d.	Mean	s.d.						
Bonding	.89**	.57	.21**	1.13	.80**	.45	-.77**	.40	-.71**	.67		
Social equity	.94**	.50	.60**	.54	-.80	.48	.85*	.47	-.88**	.50	-.82**	.48
HR generic	.47**	.43	-1.78**	.58	.22**	.58	.27**	.58	.45**	.41	-1.73*	.61
% Unionized <sup>a</sup>	23%		1%		14%		19%		13%		5%	

<sup>a</sup>This variable is provided for reference given the historic correlation of unionization and HR systems. The variable reflects whether a union represents some or all of front-line employees at the establishment. Although unionization was used as a control variable in other analyses, unionization was not included as part of the cluster analysis.

\* p ≤ .05; comparisons are the focal cluster’s mean vs. the mean for that HR system of all other clusters.

\*\* p ≤ .01; comparisons are the focal cluster’s mean vs. the mean for that HR system of all other clusters.

TABLE 2.5 HR System Cluster Profiles

	Model 1		Model 2	
	LogL <sup>c</sup>	Significance	LogL <sup>c</sup>	Significance
Union present	766.23	.21	766.23	.21
Product or service	780.83	.11	780.83	.11
Private or public	769.21	.07	769.21	.07
4-digit SIC	772.87	.02*	772.87	.02*
Log full-time employees	793.58	.00**	793.58	.00**
Log age	763.46	.49	763.46	.49
Firm-specific intensity			789.51	.00**
Team intensity			917.66	.00**
Constant	1143.52		1078.70	
N	328		308	
-2 Log Likelihood	955.75		710.10	
Pseudo-R <sup>2</sup>	.22		.55	

<sup>a</sup> This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

<sup>b</sup> The Pearson Goodness-of-Fit is (chi-square 965.45, df 960: .987).

<sup>c</sup> Values represent the (-2 Log Likelihood).

\* p ≤ .05

\*\* p ≤ .01

**TABLE 2.6<sup>a, b</sup> HR Cluster Predictions Based upon Control and Independent Variables**

Observed	Predicted						Percent Correct
	1	2	3	4	5	6	
Assigned Cluster Description	“High Road” HR	High-Growth Venture	HR Basics + Security	HR Basics + Social Equity	HR Basics	“Low Road” HR	
1	24	4	5	27	1	3	42.2%
2	2	16	5	3	0	1	59.3%
3	2	3	5	2	5	26	60.5%
4	6	0	13	4	16	9	33.3%
5	8	3	25	5	6	9	44.6%
6	44	4	5	12	3	2	62.9%
Overall percentage	27.9%	9.7%	18.8%	17.2%	10.1%	16.2%	<b>50.0%</b>

TABLE 2.7 Observed vs. Predicted Clusters Based upon Control and Independent Variables

	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	B	B	B	B	B
	(se)	(se)	(se)	(se)	(se)
Intercept	-.76 (.74)	1.06* (.49)	.57 (.46)	.62 (.54)	-.22 (.68)
Union present	-2.19 (1.15)	-.49 (.53)	-.78 (.45)	-.70 (.56)	-1.01 (.76)
Product or service	-.48 (.78)	-2.63** (.72)	-.27 (.47)	-1.70* (.70)	-1.82* (.81)
Private or public	-.89 (.86)	.75 (.49)	-.05 (.37)	-.43 (.48)	-.86 (.81)
4-digit SIC	-.98** (.35)	-.16 (.27)	-.54* (.25)	-.11 (.28)	-.62 (.33)
Log full-time employees	-1.89** (.51)	-.16 (.26)	.15 (.22)	.27 (.28)	-.86* (.37)
Log age	-.26 (.34)	.03 (.25)	-.08 (.20)	.16 (.27)	.46 (.33)
Firm-specific intensity	.37 (.31)	.48 (.25)	-.55** (.20)	-.02 (.25)	-.41 (.28)
Team intensity	-.92** (.37)	-2.20** (.32)	-.14 (.27)	-2.29** (.34)	-3.26** (.44)
N	28	57	73	51	43

<sup>a</sup> The reference category is cluster 1.

<sup>b</sup> Significance values based upon Wald statistics  $p < .05$ ;  $p < .001$ .

<sup>c</sup> Standard errors are robust and adjusted for clustering by focal firm.

\*  $p \leq .05$

\*\*  $p \leq .01$

**TABLE 2.8 HR System Selection Result Parameter Estimates from Model Two (See Table 2.6)<sup>a, b, c</sup>**

**Team Production**

		<b>Team Production</b>	
		Not Team Intensive	Team Intensive
<b>Type of Skill</b>	Firm-Specific Intensive	HR bonding mechanisms  HR base practices	HR bonding mechanisms HR social equity mechanisms  HR base practices
	General Skill Intensive	HR base practices	HR social equity mechanisms  HR base practices

**FIGURE 2.1 Job Requirement Dimensions as Determinants of HRM Systems**

## APPENDIX C

### LARGE TABLES AND FIGURES SUPPORTING CHAPTER 3

<b>Firm</b>	<b>Regions</b>	<b>Establishments</b>	<b>Teams</b>	<b>Individuals</b>
A	18	108	2160	17776
B	21	273	2184	17478
C	28	224	1792	12554
D	25	248	2232	20088
<i>N</i>	<i>92</i>	<i>853</i>	<i>8368</i>	<i>67896</i>

**TABLE 3.1** Sample at Firm, Region, Establishment, Team, and Individual Levels



	Mean	s.d.	1	2	3	4	5
1. Job performance	0.38	1.01	--				
2. Job experience (months)	22.4	4.9	.23*	--			
3. Achievement striving <sup>b</sup>	18.62	4.49	.10*	.06*	(.67)		
4. Dependability <sup>b</sup>	21.28	4.53	.22*	.21*	.32*	(.80)	
5. Cognitive ability	22.79	5.46	.16*	-.01	.06*	.04*	(.92)

<sup>a</sup> Internal consistency reliability coefficients for the individual-level analyses appear on the diagonal in parentheses. The job performance measure is standardized and based on a sample of 57,742. All other correlations are based on a sample of 57,896.

<sup>b</sup> In later analyses, there were not significant differences between the achievement-striving and dependability facets of conscientiousness. Therefore, later analyses refer to simply “conscientiousness” and the two subscales are combined into an additive composite.

\*  $p < .05$

**TABLE 3.2 Descriptive Statistics for Individual-Level Measures<sup>a</sup>**

Model	Quantity <sup>ab</sup>		Quality	
	Regression Coefficient	s.e.	Regression Coefficient	s.e.
Conscientiousness				
Intercept <sup>c</sup>	1.19	.20	1.12	.22
Individual mean	.10*	.02	--	--
Team mean	.14*	.03	.10*	.04
Establishment mean	.97	.21	.68	.18
Region mean	1.13	.26	.89	.19
Cognitive ability				
Intercept <sup>c</sup>	1.08		.98	
Individual mean	.05*	.01	--	--
Team mean	.08*	.02	.08	.06
Establishment mean	1.16	.32	.84	.23
Region mean	.73	.26	.87	.21

<sup>a</sup>At the individual-level, performance was standardized;  $n = 57,742$ . This performance measure is performance appraisal scores.

<sup>b</sup>For the team, establishment, and region levels, the dependent variable is packages per person per hour (PPPH). In these models, team is level 1 ( $n=7,180$ ), establishment is level 2 ( $n=852$ ), and region is level 3 ( $n=92$ ). The performance being predicted at these levels is either team, establishment, or region performance (not individual performance).

<sup>c</sup>Intercepts are averaged across team, establishment, and region models.

\* $p < .05$

**TABLE 3.3 Results of Four-Level Mixed-Effects Multivariate Analyses for Within-Level Job Performance<sup>ab</sup>**

Variable	Team		Establishment		Region	
	ICC(1)	Squared Canonical Correlation	ICC(1)	Squared Canonical Correlation	ICC(1)	Squared Canonical Correlation
Conscientiousness	.26	.14	.16	.11	.15	.08
Cognitive ability	.14	.06	.12	.04	.10	.03
$\sum \lambda$		.20 .48***		.15 .52***		.09 .63***

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<sup>a</sup> ICC(1) values greater than .12 indicate support for aggregation (James, 1982).

\*\*\*  $p < .001$

**TABLE 3.4** Intraclass Correlation Coefficients and MANOVA Results at Team, Establishment, and Region Levels<sup>a</sup>

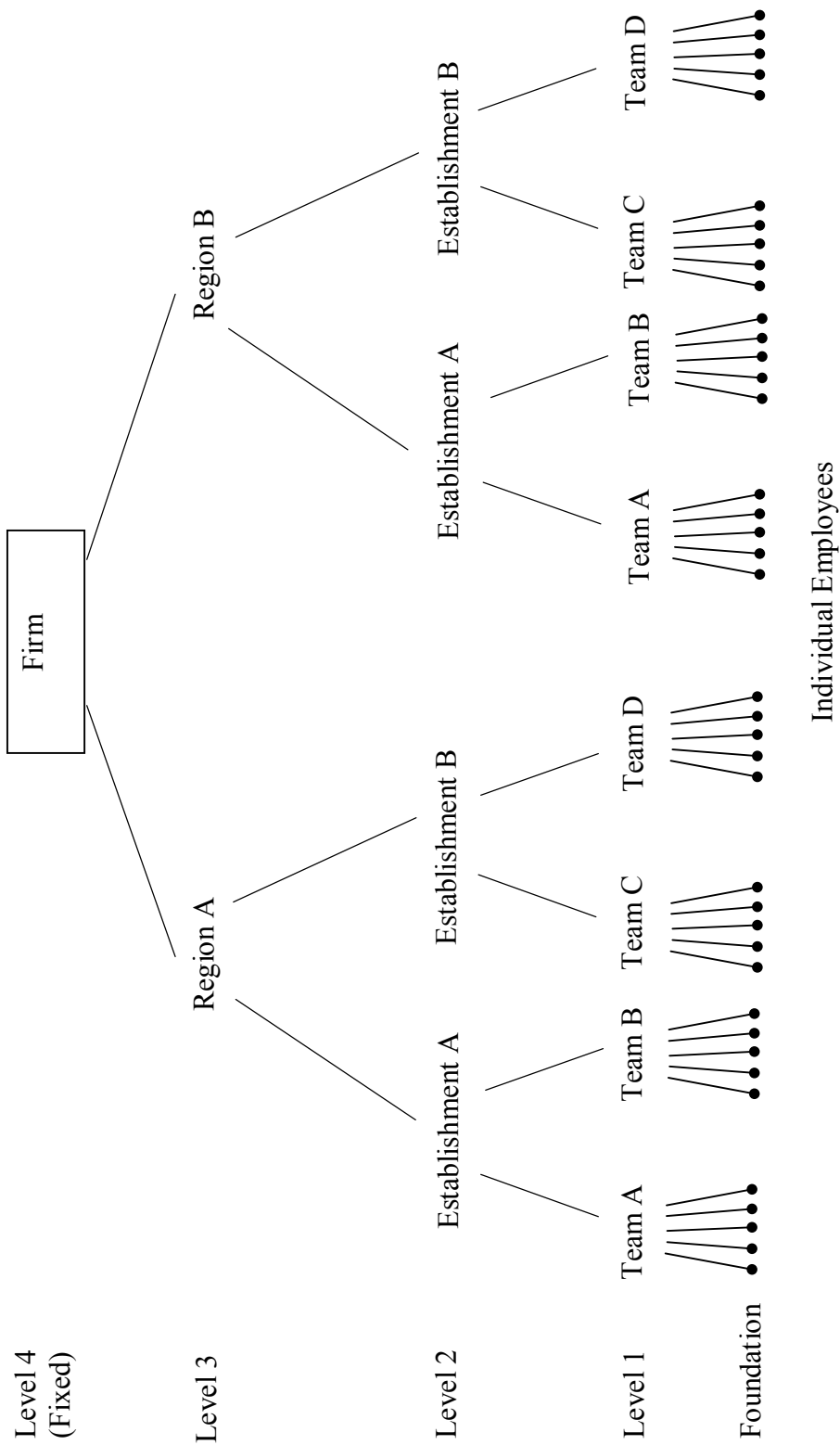
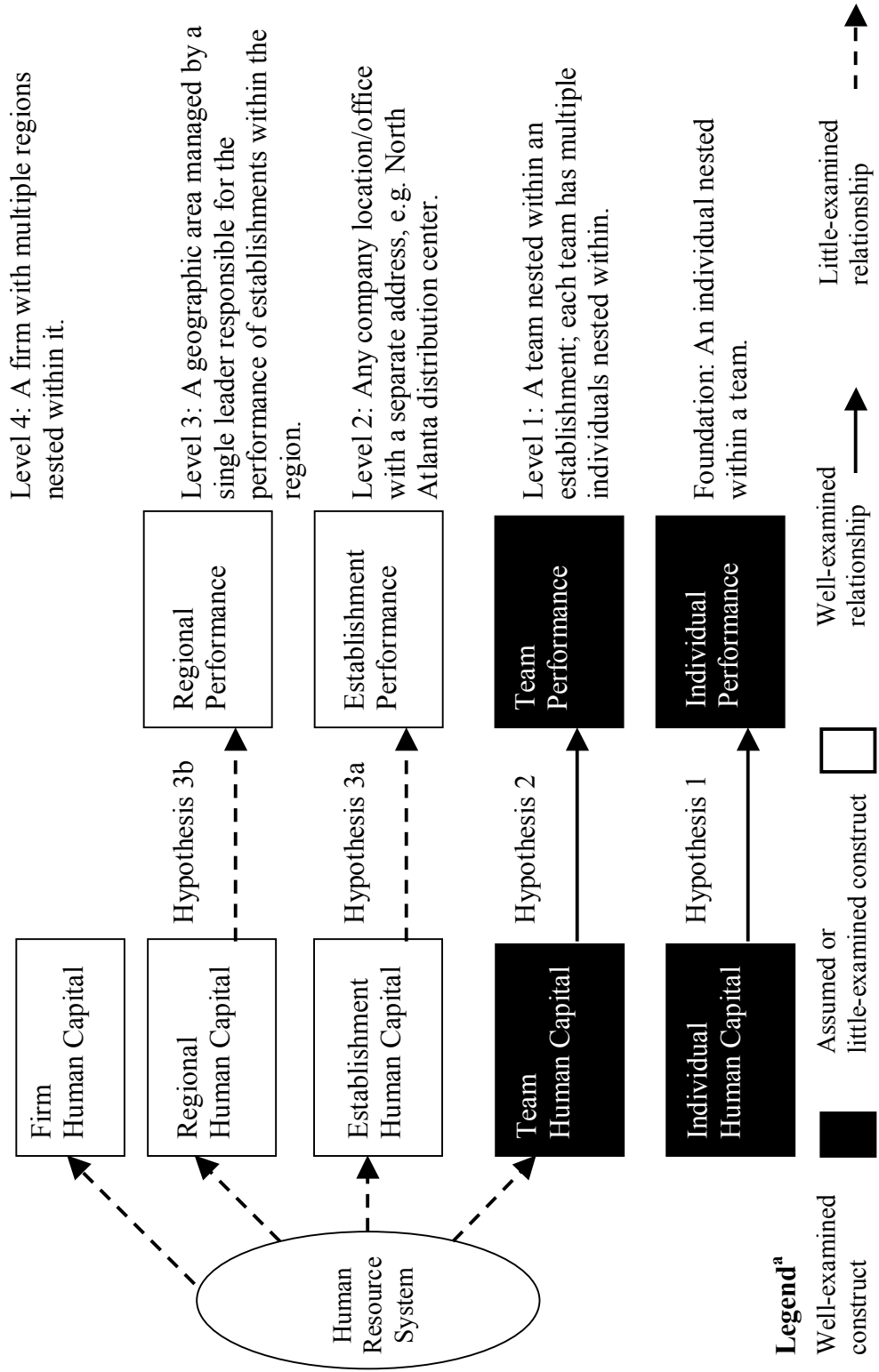


Figure 3.1 Hierarchical Nestings of Employees within Firms



**FIGURE 3.2 Implied vs. Examined Within Level Human Capital-Performance Relationships**

## APPENDIX D

### LARGE TABLES AND FIGURES SUPPORTING CHAPTER 4

Firm	Regions	Establishments	Teams	Individuals
A	18	108	2160	17776
B	21	273	2184	17478
C	28	224	1792	12554
D	25	248	2232	20088
<i>n</i>	92	853	8368	67896

TABLE 4.1 Sample at Firm, Region, Establishment, Team, and Individual Levels

	Mean	s.d.	1	2	3	4	5
1. Job performance	0.38	1.01	--				
2. Job experience (months)	22.4	4.9	.23*	--			
3. Achievement striving	18.62	4.49	.10*	.06*	(.67)		
4. Dependability	21.28	4.53	.22*	.21*	.32*	(.80)	
5. Cognitive ability	22.79	5.46	.16*	-.01	.06*	.04*	(.92)

<sup>a</sup> Internal consistency reliability coefficients for the individual-level analyses appear on the diagonal in parentheses. The job performance measure is standardized and based on a sample of 57,742. All other correlations are based on a sample of 57,896.

\*  $p < .05$

**TABLE 4.2 Descriptive Statistics for Individual-Level Measures<sup>a</sup>**



Across-Level Performance		
Model	Regression Coefficient	s.e.
Conscientiousness		
Team mean → Individual	.15*	.08
Establishment mean → Team	1.18*	.26
Region mean → Establishment	.73	.28

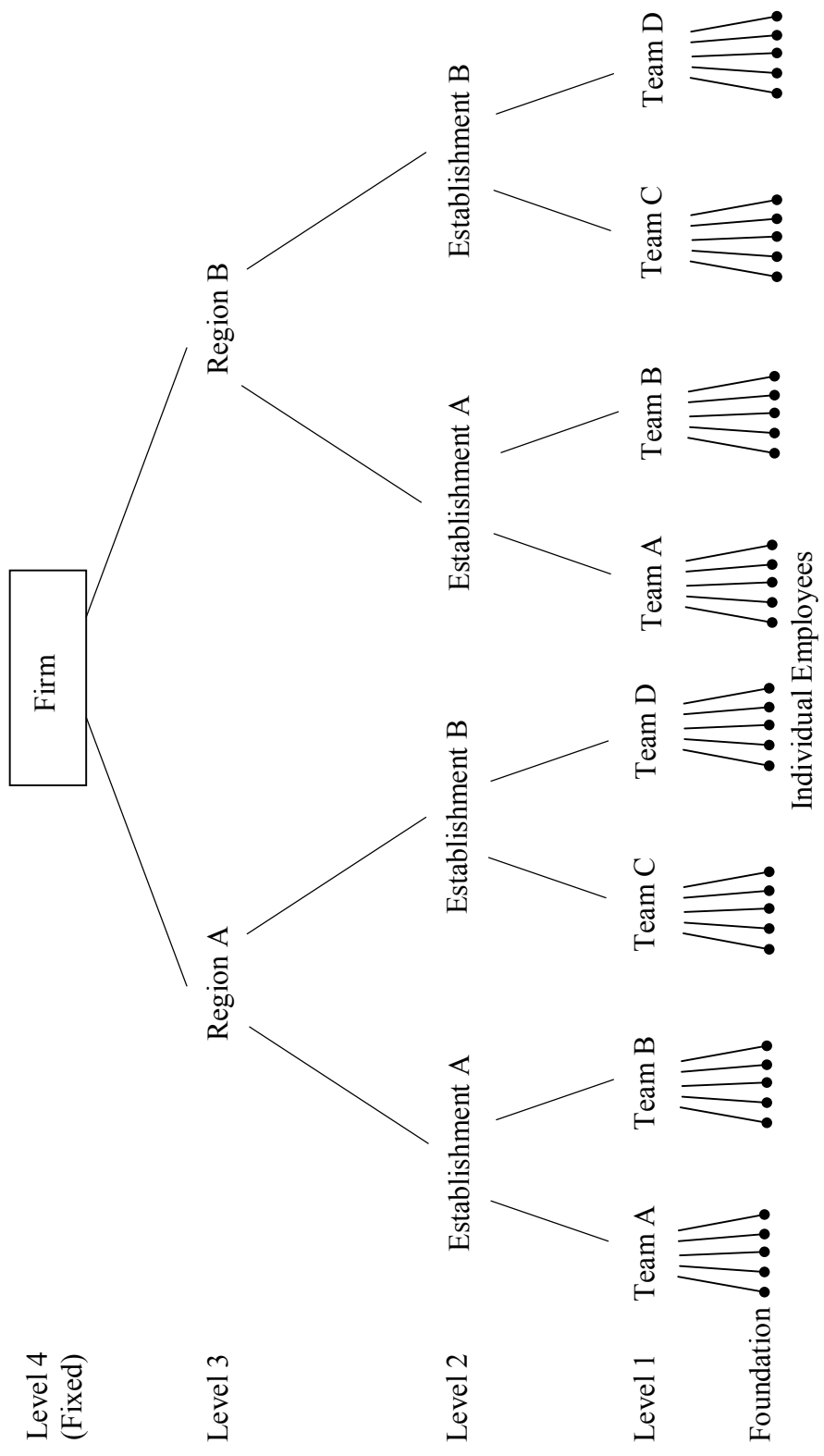
<sup>a</sup> At the individual-level, performance was standardized;  $n = 57,742$ . This performance measure is performance appraisal scores.

<sup>b</sup> For the team, establishment, and region levels, the dependent variable is packages per person per hour (PPPH). In these models, team is level 1 ( $n=7,180$ ), establishment is level 2 ( $n=852$ ), and region is level 3 ( $n=92$ ). The performance being predicted at these levels is either team, establishment, or region performance (not individual performance).

<sup>c</sup> Intercepts are averaged across team, establishment, and region models.

\* $p < .05$

**TABLE 4.3 Results of Random Coefficient Analysis for Across-Level Performance**<sup>ab</sup>



**Figure 4.1 Hierarchical Nestings of Employees within Firms**