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Clarifying and Measuring the Value of Human Capital Resources

Donald Hale, Jr.

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By

Donald Hale, Jr.

Bachelor of Arts
North Carolina State University, 1994

Master of Business Administration
North Carolina State University, 1996

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Accepted by:

Robert Ployhart, Major Professor

Anthony Nyberg, Committee Member

Patrick Wright, Committee Member

Mark Ludwick, Committee Member

Cheryl L. Addy, Vice Provost and Dean of the Graduate School

DEDICATION

This dissertation is dedicated to my wife Maria Hale, my children Lily Hale and Ellie Hale, and my parents Donald and Evelyn Hale. While intellectually I stand on the "backs of giants," in my whole life I stand on your love and support.

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ABSTRACT

The concept of value is central to the strategic human resources (SHRM) and strategic human capital resource literatures (SHCR) because of their grounding in Resource Based Theory (RBT). In order to facilitate a firm's competitive advantage, both the SHRM and SHCR literatures argue that the practices and people in a firm must work together to generate resources that are valuable, rare, inimitable, and non-substitutable. Value is the first and primary consideration in this logic. Despite the centrality of value in both literatures, prior attempts to identify and measure human capital resource (HCR) value (e.g. utility analysis) have produced mixed results at best. This oversight is problematic because it prevents a thorough understanding of how people, one of a firm's most important assets, contribute to the competitive advantage of firms. Therefore, the purpose of this study is four-fold. First, I explore the concept of employee value as a unique construct which has inherent theoretical value in the SHRM and SHRC literatures. Second, I draw upon the customer lifetime value (CLV) literature in marketing to propose a robust framework in which to create employee financial valuations models (EFVal). Third, I test the EFVal framework by comparing and contrasting its performance with utility analysis on a sample of 4,196 employees nested in 34 units of a large U.S. communications company. Lastly, I discuss the practical and theoretical implications of EFVal models in the SHRM and SHCR literature.

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CHAPTER 1

INTRODUCTION

The literature on human resource management (HRM) and human capital resources (HCRs) are inexorably linked. HRM is, 'the pattern of planned HR deployments and activities intended to enable an organization to achieve its goals (Wright & McMahan, 1992: p. 298). HCRs are, "the capacities based on individual KSAOs that are accessible for unit (or firm) relevant purposes" (Ployhart, Nyberg, Reilly, & Maltarich, 2014: 376). HCRs are held as one of the mediating mechanisms between HR practices and firm performance (e.g. Jiang, Lepak, Hu et al., 2012; Subramony, 2009) while HR practices are viewed as one of the antecedents that impact HCRs (e.g. Wright, Coff, and Moliterno, 2014;). Both literatures also rely heavily on Resource Based Theory (RBT) to frame the contribution of HRM and HCR to organizations. So, while they are two different constructs, the two literatures are intertwined via theory and empirical research that incorporates both constructs as capable of enhancing the value of an organization (Nyberg, Moliterno, Hale & Lepak, 2014, Wright et al., 2014; Boon, Eckardt, Lepak et al., 2018). Therefore, in this chapter, I will explore the RBT and its implications on the concept of value in the HRM and HCR literatures.

1.1 RESOURCE BASED THEORY

Prior to RBT, the dominant logic in strategy research involved characteristics of the market, not the firm (e.g. Porter, 1985). RBT theory was created as a response to this logic and attempts to explain why firms in the same industry differ in terms of performance (Barney, 1991). RBT proposes that firms differ in performance because they are endowed with heterogeneous resources. Resources include, "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991: 101). In many ways RBT complements the view of market dynamics (Mahoney & Pandian, 1992; Peteraf & Barney, 2003). While Barney (1991) is generally credited with formalizing RBT, many other authors contributed to the theory's initial development (e.g. Dierickx & Cool, 1989; Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984).

According to RBT, a resource can create competitive advantage if it is valuable and rare. However, in order to create sustained competitive advantage, a resource must also be inimitable and nonsubstitutable (Barney, 1991). Together these conditions are commonly called the VRIN framework. Firms are said to have a competitive advantage if they earn a higher economic return than their next closest competitor (Peteraf & Barney, 2003). Sustained competitive advantage is a competitive advantage that persists over time (Barney, 1991).

One of the core assumptions of RBT is that resources are purchased in competitive factor markets (Barney, 1986). Factor markets are the markets where factors of production (resources) are bought and sold (Barney, 1986). Efficient factor markets imply that factor markets will bid away any excess return from factors of production. So, while a firm may enjoy excess economic returns at any given point, those excess returns will be short lived as competitors enter the market for those resources and drive up the cost. Therefore, if a firm is purchasing resources in competitive factor markets, a firm cannot create a sustained competitive advantage from those resources (Barney, 1986).

In order to create a sustained competitive advantage, firms must purchase resources in inefficient factor markets. If a resource is inimitable, its inimitability acts as a disruptor of market efficiency and creates a barrier to competitors who would otherwise bid away its economic value (Barney, 1991). Therefore, inimitability is a resource characteristic that disrupts underlying factor markets and can lead to sustained competitive advantage. Inimitability can be created via firm-specificity (Amit & Schoemaker, 1993), time diseconomies (Dierickx & Cool, 1989), social complexity (Barney, 1991), causal ambiguity (Lippman & Rumelt, 1982; Reed & DeFilipe, 1990), and asymmetry of information (Barney, 1991; Chadwick & Dabu, 2009). Together, these sources of inimitability are often referred to as isolating mechanisms (Rumelt, 1984).

1.2 HUMAN RESOURCE MANAGEMENT AND RBT

As outlined earlier, HR policies are the firm's official intentions with regard to HR practices, while HR practices are the actual programs, processes, and techniques that get implemented within the firm (Wright & Boswell, 2002). At first glance, it would seem that neither HR policies nor HR practices could lead to sustained competitive advantage because they are easy to copy (Chadwick & Dabu, 2009; Wright, McMahan, & McWilliams, 1994). Despite this seeming conundrum, HR practices have the potential to contribute to sustained competitive advantage in three ways. First, individual HR practices exist in a system of practices and the system of practices and their interactions are more complex and generate a higher level of causal ambiguity (Lado & Wilson, 1994). Second, HR practices and HR systems have the potential to aid in the creation of

VRIN resources at both the individual and unit-level by impacting the emergent enabling states of the unit (e.g. Ployhart, Van Iddekinge, & MacKenzie, 2011). Lastly, HR practices and systems must match the context of a particular organization and its environment (Lepak & Snell, 1999). An organization's ability to effectively match HR policy to its environment can lead to a sustained competitive advantage. However, it is important to note that HR policies do not directly cause competitive advantage. Instead, HR policies and practices affect firm-level resources such as human capital, which in turn affect the competitive advantage of firms (Lepak, Liao, Chung, & Harden, 2006; Wright, Dunford, Snell, 2001). Key to understanding the strategic nature of HRM is the ability to understand what value it creates and whether that value is inimitable or nonsubstitutable.

1.3 HUMAN CAPITAL RESOURCES AND RBT

Early work on human capital focused on KSAOs at the individual-level. The individual-level literature focused primarily on individual choices regarding investments in new skills and knowledge (Coff & Kryscysnski, 2011). Therefore, human capital was conceptualized as an individual's stock of KSAOs acquired through training, experience, and development (Becker, 1964). Barney (1991) included aggregate stocks of human capital as a potential source of competitive advantage.

Within, the RBT/human capital literature, human capital resources are categorized as generic and firm-specific. Individual-level human capital resources are not specific to a particular unit or firm (Barney & Wright, 1998; Hatch & Dyer, 2004; Lepak et al., 2006; Ployhart et al., 2011; Wright et al., 2001). Firm-specific human capital is specific to a focal firm (Hatch & Dyer, 2004; Hitt, Bierman, Shimiau, & Kochhar, 2001; Lepak & Snell, 1999). In the traditional view of human capital within RBT, only firm-specific human capital can lead to sustained competitive advantage. According to early RBT, generic human capital cannot lead to competitive advantage because it is valuable to many firms and subject to efficient factor markets (Barney & Wright, 1998).

Firm-specific human capital is generated within a firm and only has value to the focal firm. Therefore, firm-specificity acts as an isolating mechanism that gives firm-specific human capital the ability to contribute to a firm's sustained competitive advantage. Indeed, a recent meta-analysis found that firm-specific human capital was more strongly related to firm performance than individual-level human capital resources (Crook, Todd, Combs, Woehr, & Ketchen, 2011).

Recent literature has challenged the notion that only firm-specific human capital can lead to sustained competitive advantage. Ployhart et al. (2011) suggested that the traditional understanding of human capital specificity misses the link between individual-level human capital resources and the ability of a firm to create firm-specific human capital. In their framework, firm-specific human capital is still the most proximal antecedent to firm-level competitive advantage; however, generic individual-level human capital resources can enable the creation of inimitable, firm-specific, human capital resources. Generic human capital resources can be transformed and combined into firm-specific resources via the process and emergent enabling states of an organization. In this way, two firms with the same levels of individual-level human capital resources may realize different levels of unit-level human capital resources because there is heterogeneity in the way those resources are combined and emerge.

In addition, Campbell, Coff, & Kryscynski (2012) proposed that generic human capital can lead to sustained competitive advantage if there are demand or supply side inefficiencies in factor markets. In their model, demand side inefficiencies are created when other firms do not properly value an employee's human capital. Improper valuations can result because there is imperfect or incomplete information about the potential value of a worker's generic human capital (Jovanovic, 1979; Spence, 1973). For example, because a worker's generic human capital is hard to value, firms may rely on signals about a worker's ability to obtain firm-specific human capital. These signals are imperfect and may force firms to overpay for firm-specific human capital that is not relevant to the focal firm. Supply side inefficiencies are created when a worker incurs switching costs (Wright et al., 1994) or lacks information about their own value (Campbell et al., 2012). Switching costs are created when an employee incurs a psychological or monetary cost via the act of switching jobs (Campbell et al., 2012). Switching costs can be geographic as when an employee wants to stay near family, or firm-specific as when a focal firm offers a particularly valuable social network. Legal agreements such as patents and noncompetes can also create switching costs (Marx, Strumsky, & Fleming, 2009). Workers may lack information about their own value when it is difficult to estimate the firm-specificity of their current KSAOs or when it's difficult to estimate the value of their generic KSAOs.

Ployhart et al. (2014) challenges the necessity of the generic/firm-specific distinction and the construct clarity of human capital in general (see Ployhart et al., 2014 for a complete review and synthesis). As an example of their concerns, someone may take up master gardening for a hobby. In the process, that individual develops new knowledge, skills, and abilities; therefore, they have increased their human capital. To the individual, the newly acquired human capital is valuable because it allows them to engage in a relaxing hobby that produces edible food and aesthetically pleasing surroundings. If the individual applies for a job in a greenhouse, their newly acquired skills are applicable to the hiring firm. To the greenhouse, the newly acquired human capital is valuable because it gives the individual the ability to answer customer's questions. However, if that same individual is employed as a nuclear engineer, it is likely that none of his or her newly acquired human capital is applicable. To the nuclear firm, the newly acquired human capital has no value. There is something substantively different about the individual's newly acquired human capital when it is viewed from the perspective of the individual, the greenhouse, and the nuclear firm.

In order to solve this and other conundrums, Ployhart et al. (2014) introduced a new definitional framework. In the Ployhart et al. framework, human capital consists of the economically valuable KSAOs of an individual. In the case of the master gardener, his or her newly acquired skills are human capital because they are economically valuable (he or she could sell their produce or use their new skills to get a paying job at the greenhouse). Human capital resources are, "the capacities based on individual KSAOs that are accessible for unit (or firm) relevant purposes" (Ployhart et al., 2014: 376). In the case of our master gardener, their newly acquired skills are a human capital resource from the perspective of the greenhouse, but not from the perspective of the nuclear firm. Human capital resources can exist at the individual (such as those capacities generated from a CEO) or unit-level (such as those capacities generated from a group of employees). Strategic human capital resources are the individual or unit-level human capital resources, "that provide competitive advantage." (Ployhart et al., 2014: 376). In the case of the master gardener, the master gardener's newly acquired skills are strategic human capital resources if they can be leveraged by the greenhouse to create a competitive advantage.

Several distinctions from this framework about human capital resources are relevant to the present paper. First, KSAOs are distinct from individual differences. Individual differences are all heterogeneous capacities of individuals; while KSAOs are only those differences that are intra-psychological (as opposed to a result of context) and relatively stable over time. The framework uses prior definitions of KSAOs (Noe, Hollenbeck, Gerhart, & Wright, 2006; Schmitt & Chan, 1998) such that: (a) *knowledge* is the information necessary to perform a job and the foundation of skills, (b) *skills* are the capabilities to perform specific tasks, (c) *abilities* are enduring capabilities that are applicable to a multitude of jobs and tasks, and (d) *other characteristics* are personality traits and dispositional attributes that affect performance.

Second, *capacities* mean that the resource has the *ability* to produce outcomes. *Access* simply means the firm is able to use the capacity. Capacity is distinct from the underlying KSAOs and distinct from the outcomes created from the human capital resource (Kraaijenbrink, 2011; Kraaijenbrink, Spencer, & Groen, 2010).

Third, Ployhart et al. (2014) suggest that human capital resources likely exist in combinations such that they are complementary (Adegbesan, 2009; Denrell, Fang & Winter, 2003; Ennnen & Richter, 2010). Complimentary resources are resources that become more valuable in combination (e.g. Schmidt & Keil, 2013). Complimentary KSAOs can be complimentary because they are causally related (Hunter, 1983; Jensen, 1998) or because there is an interaction between them (e.g. Witt, Burke, Barrick & Mount, 2002). Human capital resources are causal complimentaries if one human capital resource causes or contributes to the development of another human capital resource. Human capital resources are interactive complimentaries if their combination leads to a different outcome than would occur if they existed independently. Units can combine resources causally or interactively. Complimentary combinations can exist within person, between-employees, across level, or some combination of each.

Fourth, Ployhart et al. (2014) propose that the inherent complexity of strategic human capital resources (from the many possible complimentaries and combinations) limits the efficiency of human capital factor markets. In their framework, strategic human resource combinations are complex and have limited or no factor markets (Campbell et al., 2012; Denrell et al., 2003). However, they also suggest that lower level human capital resources are commodities and that the traditional generic vs. specific framework is reasonable in regard to those human capital resources. However, just as it is in the SHRM literature, understanding value creation is the key to understanding the strategic value of human capital resources.

1.4 CENTRALITY OF HUMAN CAPITAL RESOURCE VALUE

RBT offers a framework in which to evaluate the strategic impact of heterogeneous firm resources. Aggregate human capital is a potential firm-level resource (Barney, 1991). According to traditional RBT perspective, generic resources cannot be a source of competitive advantage (Barney, 1986). As a result, traditional research in RBT has assumed that HR policies and practices (that are easy to copy; Wright et al., 1994) and generic human capital cannot be sources of sustained competitive advantage.

However, recent RBT research is building on traditional RBT and opening up new possibilities. The recent RBT research suggests that generic human capital contributes to the development of specific human capital (e.g. Ployhart et al., 2011) and generic human capital can be protected by isolating mechanisms other than firm-specificity (e.g. Campbell et al., 2012). Ployhart et al. (2014) also offer an alternative framework of human capital and human capital resources in which: (a) human capital is the individual-level set of KSAOs an individual can use for economic gain, (b) individual and unit-level human capital resources are capacities based on individual-level KSAOs that units can access for their purposes, and (c) strategic human capital resources are KSAO based capacities firms can use for competitive advantage. In their framework, unit-level human capital resources and strategic human capital resources are complex combinations of human capital resources that may limit the efficiency of factor markets. The new RBT research opens up new windows through which we can view the strategic value of human capital.

However, endemic to each of these strategic value perspectives is the notion of value. In order to create competitive advantage, a firms' HR practices or its HCRs must first create value. Indeed, Chadwick (2017) suggested that anything that increases the value or lowers the cost of an employee's human capital has the potential to contribute to the competitive advantage of firms. Still, a full exploration of employee value and the ability to measure it remains elusive in the current SHRM and SHCR literature (Call & Ployhart, 2020; Ployhart & Fulmer, 2014; Sturman, 2012).

CHAPTER 2

EMPLOYEE VALUE

2.1 DEFINING EMPLOYEE VALUE

As outlined in chapter 1, the notion of value is central to RBT and the links between a firm's competitive advantage and both SHRM and SHCR. Within the SHRM literature, human resource policies and practices have been linked to firm value creation via their impact on employee behavior (e.g. Huselid, Jaskson & Schuler, 1997; Jackson, Schuler, & Rivero, 1989; Shurler & Jackson, 1987; Wall & Wood, 2005; Wright & Snell, 1998) or their impact on a firms' human capital (e.g. Kehoe & Collins, 2017; Lin & Shih, 2008; Wright & McMahan, 1992; Wright, McMahan, McCormick, & Sherman, 1998), or their impact on a firms social/relational capital (e.g. Hollenbeck & Jamieson, 2015; Raffiee & Bynum, 2020). In the SHC literature, human capital resources have been linked to firm value via their impact on employee or unit performance (e.g. Oh, Kim & Van Iddekinge, 2015; Ployhart, Weekley & Ramsey, 2009). While the concept of value creation is either explicitly or implicitly part of both literatures, very little has been done to explore employee value as a concept or theoretical construct. However, understanding how employees create value for a firm is a central question in the management literature (Barney & Clark, 2007; Bowman & Ambrosini, 2010; Call & Ployhart, 2020; Fulmer & Ployhart, 2014; Lepak, Smith & Taylor, 2007; Sundaram & Inkpen, 2004).

Recently, Chadwick (2017) offered a model of human capital rents which outlines the relationship between a firm's human capital value and its costs as the determinate of a firm's human capital rents. In addition, Sturman (2012) proposed that human capital related value is a unique construct, but he did not explore its full definition. Call & Ployhart (2020) defined value generically as, "the financial worth or usefulness of a given resource." In line with Chadwick (2017), Sturman (2012), and Call & Ployhart (2020), I define employee value as the firm's aggregate benefits generated via its human capital resources.

There are a few things to point out about this definition. First, the definition includes benefits of social capital, relational capital, technology or other resources that might enhance the quality or value of human capital resources embedded in an employee or group of employees (e.g. Hollenbeck & Jamieson, 2015; Mahoney & Kor, 2015; Raffiee & Byun, 2020). Second, the definition is not specific to any particular kind of benefit. The definition includes non-pecuniary or non-job-related benefits such as reputation, network, and OCBs (e.g. Campbell & Wiernik, 2015). Third, the definition is inherently multi-level. Employee value can be generated by individual employees or by groups of employees (e.g. Mathieu, Gallagher, Domingo, & Klock, 2019). Therefore, in situations where it is difficult to parse out value creation because of interconnectedness, the definition can apply to bundles of employees. Fourth, the definition is specific to the firm. While there may be benefits that accrue to the employee (e.g. wages, meaning, social identity), this definition is focused on the benefits that accrue to the firm. In that sense it is the value captured by the firm which is the value created by the employee minus the value captured by the employee (Call & Ployhart, 2020; Chadwick, 2017). Lastly, employee value is distinct from employee performance even though they are closely linked (Call & Ployhart, 2020; Sturman, 2012). For example, an employee may perform very well on a set of tasks that are not directly related to the generation of firm value. In addition, employee job performance may not be linearly correlated with employee value. This may be true because of non-linearities in the relationship between employee job performance and employee value creation.

While distinct, the relationship between employee job performance and employee value does allow us to make some theoretical propositions about the nature of employee value at the individual and unit-level. While other constructs can and do contribute to employee performance, for the purposes of this dissertation, I will focus on the theoretical relationship between HCR, job performance, and employee value.

2.2 INDIVIDUAL-LEVEL CHARACTERISTICS OF EMPLOYEE VALUE

2.2.1 *Job Performance and Value Over Time*

Job performance has multiple definitions. First, job performance is both processes (i.e. behavior) and outcomes (Campbell, McCloy, Oppler & Sager, 1993; Motowidlo, 2003; Roe, 1999; Sonentag & Frese, 2012). While much of the theory on job performance is focused on process or behaviors (Campbell et al., 1993; Motowidlo, Borman, & Schmit, 1997), much of the literature examining job performance operationalizes job performance as an outcome or result (Sturman, 2003; Ployhart & Hakel, 1998; Sonnentag & Frese, 2012). Behaviors are a direct result of a person's actions, whereas outcomes may be influenced by other processes. However, outcome related job performance is more proximal to business performance and is often easier or more readily measured (Sonnentag & Frese, 2012).

Second, job performance can be related to task or context. Task performance is comprised of behaviors that are directly related to the organization's core activities while contextual performance refers to discretionary behaviors that improve the functioning of the social or organizational context (Borman & Motowidlo, 1993; Hoffman, Blair, Meriac, & Woehr, 2007; Motowidlo, 2003; Rotundo & Sackett, 2002; Sonnentag & Frese, 2012). Third, job performance can be related to adaptation or proactivity. Adaptive performance is a set of behaviors focused on coping or adapting to change (Griffin, Neal, & Parker, 2007; Pulakos, Arad, Donovan, & Plamondon, 2000). Proactive performance is a set of behaviors focused on initiating change (Frese & Fay, 2001; Frese, Kring, Soose, & Zempel, 1996; Grifin et al., 2007; Thompson, 2005). While each of these dimensions constitute important areas of research, for the purposes of this dissertation, I focus on job performance as results (not behaviors) that are valuable to the firm (Campbell & Wiernik, 2015; Motowidlo & Kell, 2012).

There is a robust body of literature examining intra-individual job performance over time. Much of the literature has focused on job tenure, seniority or age. In this dissertation, I will focus on the relationship between job tenure and job performance over time. Theoretically, both human capital theory and learning theory suggest that individual performance should improve as individuals accumulate job relevant KSAOs (Ehrenberg & Smith, 2000; Sturman, 2003; Weiss, 1990). Job tenure is not a direct measure of differences in the quality of job experience (Quinones, Ford, & Teachout, 1995; Tesluk & Jacobs, 1998). However, even though differences in quality of experience may drive between-employee differences, the within-person accumulation of job-related experience will enhance the stock of individual-level human capital resources the individual possesses. Thus, within-person job performance should increase with changes in tenure. There are a variety of empirical studies linking increases in job tenure to increases in job performance (Avolio, Waldman, & McDaniel, 1990; McDaniel, Schmidt, & Hunter, 1988; Ployhart & Hakel, 1998; Schmidt, Hunter, Outerbridge, & Goff, 1988). However, the incremental advantage of increased job tenure is significantly greater at lower levels of job experience (McDaniel, Schmidt & Hunter, 1988; Schmidt, Hunter, & Outerbridge, 1986). Given the amount of theoretical and empirical evidence for an individual-level, I expect that the relationship between job tenure and individual job performance will generally follow a curvilinear (specifically quadratic) pattern such that employee performance will increase at a decreasing rate as job tenure increases. This is traditionally referred to as the "learning curve."

However, the "learning curve" is not the only driver of intra-individual job performance over time. Contextual factors such as personal circumstances, motivation, and fit with context can cause intra-individual changes in job performance (e.g. Wolfson & Mathieu, 2018). Therefore, because of the direct link between human capital resources, employee job performance and employee value, I expect that the value generated by an individual employee will vary over time.

2.2.2 *Individual Differences in Job Performance Over Time*

While intra-employee value will vary over time, I also expect that between-employee value will vary over time. One of the key findings in the personnel selection literature is that individual differences are associated with differences in job performance. However, the stability of job performance has been an open question for many years (see Sturman, Cheramie, & Cashen, 2005 for more detail). The core questions are whether individual differences lead to a consistent rank ordering of performance over time (stability) or whether the rank ordering of performance changes over time (dynamic).

Early research on the stability of performance ratings showed that the relationship between performance measures decreased as the amount of time between measures increased (Barrick & Alexander, 1987; Ghiselli & Haire, 1960; Humphreys, 1960). In a meta-analysis of 22 independent samples, Sturman et al. (2005) found that relative performance over time does change even after accounting for measurement error. However, the same meta-analysis showed that the correlations over time do not approach zero; meaning there is a portion of job performance that is stable over time.

Sturman et al. (2005) established that relative performance is not stable over time, but they did not address the question of how individual differences in performance trajectories contribute to their findings. Instead, a separate stream of research has examined the link between individual-level human capital and performance trajectories over time. Hoffmann, Jacobs, & Gerras (1992) showed that subgroups of baseball players differed in their performance trajectories over time (some positive and some negative). Hoffmann, Jacobs, and Baratta (1993) showed that 69% of the variance in the linear and 30% of the variance in the quadratic growth parameters were attributable to individual-level differences. Other studies have examined the relationship between individual-level human capital resources and the quadratic (Ployhart & Hakel, 1998; Thoresen, Bradley, Bliese, & Thoreson, 2004) and cubic (Ployhart & Hakel, 1998; Thoresen et al., 2004) parameters of the job performance function.

This line of research has also examined which forms of individual-level human capital resources influence the trajectory of job performance over time. Deadrick, Bennett & Russell (1997) examined the relationship between cognitive ability, job experience, and linear changes in job performance. They found that job experience was negatively related to linear improvements in job performance while cognitive ability was positively related. Ployhart and Hakel (1998) found that past salary and future expected earnings were positively related to initial job performance while self-reported persuasion and empathy were positively related to linear growth in job performance. Thoresen et al. (2004) examined the relationship between Big Five personality traits and performance over time. They found a complex set of relationships in which different dimensions of personality affected changes in performance depending on which stage of performance (transitional or maintenance) and which parameter (linear, quadratic, cubic) was being investigated. Taken together, the job performance trajectory research highlights three salient points: (a) individual differences in human capital resources influence the trajectory of job performance over time, (b) particular individual differences in human capital resources can act differentially to influence the intercept, linear, or polynomial parameters of the job performance function, and (c) individual differences in human capital resources are more or less relevant at different stages of job tenure.

While examining general mental ability, Schmidt et al. (1988) boiled the complexities of these points into three basic relationships between individual-level human capital resources and job performance over time. They tested whether the relationship between general cognitive ability and job performance was divergent, convergent, or noninteractive. The divergent hypothesis tested whether or not the relationship between general cognitive ability and job performance increased over time. The convergent hypothesis tested whether or not the relationship between general cognitive ability and job performance decreased over time. The noninteractive hypothesis tested whether or not the difference in performance stayed constant over time. Using data from four different jobs, Schmidt and colleagues found that the relationship between general cognitive ability and job performance was noninteractive. While these findings are specific to the relationship between general cognitive ability and job performance, the three hypotheses (divergent, convergent, and noninteractive) form an effective categorization of the potential relationships between individual-level human capital resources and job performance over time.

The empirical research linking individual differences to various aspects of job performance over time creates a useful framework in which to examine the relationship between individual-level human capital resources and job performance over time. However, the underlying theoretical models are more ambiguous (Sonnentag & Frese, 2012). The relationship between time and individual-level human capital resources are not the causal mechanism linking individual-level human capital resources to job performance (Hulin, Henry, & Noon, 1990) over time. As the empirical research outlines, the relationships between individual-level human capital resources and job performance trajectories are different depending on the specific individual human capital resources and the parameter of job performance trajectory being evaluated. This is likely due to different theoretical mechanisms linking human capital resources to changes in job performance over time. Several theoretical models have been utilized to try and explain the changing nature of these relationships. The changing-subject and task models (Alvares & Hulin, 1972; Henry & Hulin, 1987, Keil & Cortina, 2001), the skill acquisition model (Ackerman, 1987, 1988), and the employment stage model (Murphy, 1989) all provide a basis to link individual-level human capital resources, job tenure and changes in job performance.

The changing subject and changing task models assume that either the individual or the task changes over time. Keil and Cortina (2001) and Sonnetag and Frese (2012) suggest that these two models can be integrated into a single model that examines the interactions of changes in individual and the task environment. However, viewed independently or as an integrated model, these models assume that something about either the individual or the task has changed.

The skill acquisition model proposes that skills are acquired in three different sequential stages: the cognitive, associative, and autonomous stages (Ackerman, 1987, 1988). During the cognitive stage, individuals are learning a new skill and are therefore utilizing the cognitive-attentional system to process and learn the new skill. Ackerman proposed that general cognitive ability is very important in determining performance during the cognitive stage of skill acquisition. The associative phase occurs second and is when the individual evaluates stimulus-response connections in order to refine performance. Ackerman proposed that perceptual speed abilities are the most important individual differences in the associative phase. During the autonomous phase, the individual completes a task without full attention. Ackerman proposed that psychomotor ability is the most important individual difference that differentiates performance during the autonomous phase. The skill acquisition model does not assume the individual or task change over time, instead it assumes that the processes used to complete a task change relative to the stage of skill acquisition. Ackerman (1988) also suggested that the complexity and consistency of tasks could moderate the importance of different cognitive processes.

The employment stage model suggests that job performance occurs in two specific stages (Murphy, 1989). During the transition stage, when an employee enters a new job, or major job changes have occurred, employees must learn new duties, develop new skills, and operate in an environment they are not familiar with. In the transition stage, job performance is dependent upon cognitive ability. During the maintenance stage, an employee is familiar with the job duties, has developed the necessary skills, and is familiar with the operating environment. As a result, job tasks can be performed with little cognitive effort such that personality and motivation become better predictors of job performance.

In this chapter, I am concerned about differences between employee value over time. While it is not the only source of value creation, it is clear that differences in human capital resources can drive differences in an employee's initial level of performance, changes in performance over time, and their peak level of performance in a job. Figure 2.1 is an example of how those differences might show up in a divergent pattern. Because employee value is linked to employee performance, I also expect that differences in employee human capital can lead to differences in initial value creation and changes in value creation over time. Therefore, due to differences in human capital resources and associated performance, differences in employee value can follow a divergent, convergent, or non-interactive path depending on the type of human capital and the specific job being evaluated.

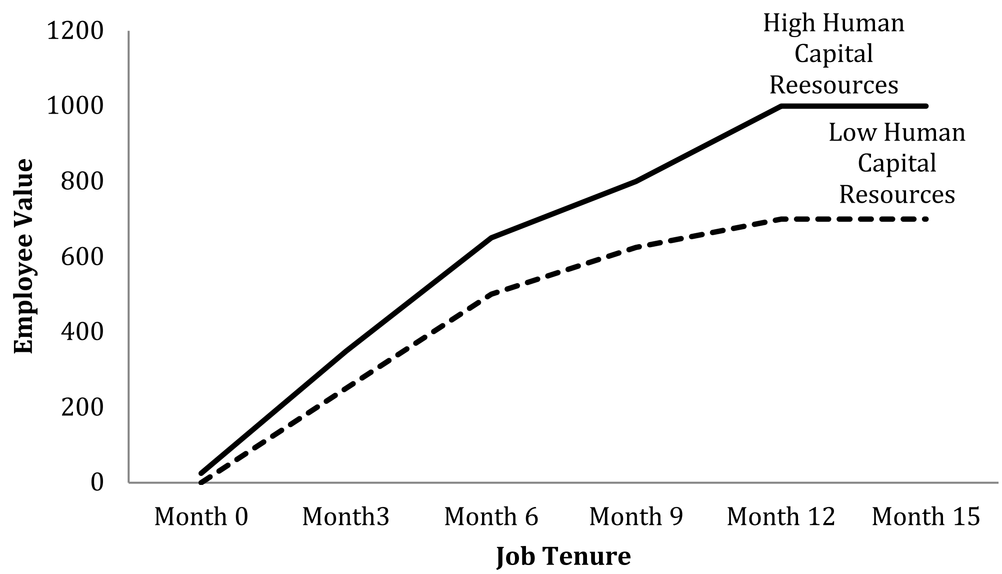

Figure 2.1 Example of Divergent Value

2.2.3 *Context and Employee Value Over Time*

In addition to inter-employee differences in value creation over time, contextual (or inter-unit) differences will also drive differences in employee value over time. Prior literature has gone to great lengths to show that the relationship between some individual-level human capital resources and job performance generalizes across jobs, firms, and industries (e.g. Barrick & Mount, 1991; Schmidt & Hunter, 1998). In doing so, the literature has largely ignored the role of context in shaping the relationship between human capital resources and job performance (Cappelli & Sherer, 1991; Cascio & Aguinis, 2008; Ployhart, Hale, & Campion, 2014; Ployhart & Schneider, 2012).

Context is defined as, "..situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables." (Johns, 2006: 386). Personnel selection researchers have taken a narrow view of context and only focused on contextual elements that potentially affect the validity of selection practices (Ployhart & Schneider, 2012). However, the notion of contextual impacts and validity generalization are not necessarily at odds.

If context and validity generalization are at odds, then there is a seemingly irreconcilable disconnect between the personnel selection literature and the OB/HR literature. The personnel selection literature has focused on, and shown, validity generalization (e.g. Campbell, 1990; Schmidt & Hunter, 1977) while the OB/HR literature has focused on, and shown, contextual relationships that influence employee behavior. There is a substantial amount of literature in OB and HR that shows context does influence job performance. The system of HR practices (Combs, Lui, Hall, & Ketchen, 2006), the quality of leadership (Liao & Chuang, 2007) and team-level process (Kozlowski & Ilgen, 2006; Marks, Mathieu & Zaccaro, 2001) can influence the relationship between individual-level human capital resources and performance in a given context. For example, Chen (2005) examined the link between empowerment, team expectations, initial team performance and a newcomer's individual-level job performance. Initial team performance predicted change in the newcomer's individual performance. Liao and Chuang (2004) examined individual and store-level predictors of individual-level service performance. They found that service climate and employee involvement moderated the relationship between conscientiousness, extraversion and employee sales performance. Liao and Chuang (2007) showed that service climate enhanced the relationship between transformational leadership and individual-level service performance. These, and other studies show that contextual qualities can influence individual job performance above and beyond individual differences in human capital resources (Ployhart & Schneider, 2012; Schneider, Smith, & Sipe, 2000; Sonnentag & Frese, 2012).

Ployhart and Schneider (2012) outlined a framework of contextual qualities at the unit, organization and market level that can influence employee's job performance and the role of personnel selection. At the market level, they highlighted culture and legal environment. At the organization level, they highlighted strategy and HR systems. At the unit-level they highlighted leadership, climate, and workgroup differences.

Concerning leadership, unit context can influence the role and performance of specific leaders. For example, the relevant KSAOs of leaders in the military, public service, social service, and banking are likely different (Ployhart & Schneider, 2012). At the same time, the leaders themselves can have an effect on team, organizational performance (Peterson, Walumbwa, Byron, & Myrowitz, 2009) and other employee outcomes (Warr, 2007). Therefore, the context can influence the characteristics of leaders selected and characteristics of leaders can influence the way that employees with similar human capital resources perform.

Climate is the meaning employees attach to a unit's policies, practices, procedures, and behaviors that get rewarded (Schneider, Ehrhart, & Macey, 2011). The meaning employees attach to these things can influence how employees feel about their value to the organization and drive the things that they focus on. Therefore, units with different climates and the same level of human capital resources may experience different levels of effort focused in different directions.

Group performance results from a dynamic process. Group performance begins with inputs (individual-level human capital resources), that influence processes, which influence emergent states, that influence group performance (Kozlowski & Ilgen, 2006). It is a social process that involves combining individual-level human capital resources to create unit-level human capital resources (Ployhart et al., 2014). Therefore, individual employees with the same level of human capital resources are likely to perform very differently depending on the number and type of individual and unit-level human capital resources that exist in their work group.

These contextual influences (leadership, climate, and group processes) seemingly contradict validity generalization; however, they do not contradict validity generalization. Validity generalization is concerned with the *relationship* (rank ordering) between human capital resources and job performance, not the *mean* level of job performance given a particular context. Validity is operationalized as correlation. The correlation between a predictor measure and job performance is related to the predicted level of job performance; but they are not the same. The correlation between individual-level human capital resources and job performance is related to the predicted level of job performance such that:

Equation 2.1 Relationship Between Correlation, Beta and Intercept

$$Beta = r_{xy} \frac{SD_y}{SD_x}$$

where:
Beta = The predicted change in job performance (y) given a one-unit change in the predictor (x)
r_{xy} = The correlation between the predictor (x) and job performance (y)
SD_y = The standard deviation of job performance (y)
SD_x= The standard deviation of the predictor (x)

and

$$Intercept = \overline{y} - Beta\overline{x}$$

From the equation, it is possible that the correlations in two different contexts are exactly the same while the predicted relationship between individual-level human capital resources and job performance (the intercept and beta) are entirely different. This can be true if either the standard deviation in predictors or the standard deviation in job performance is different between units. In addition to difference in beta, it is possible that the mean level of performance can differ between contexts; resulting in different predicted intercepts (without impacting validity generalization).

Therefore, it is possible that two different units applying the same measure of individual-level human capital resources can have different levels of predicted performance given the contextual difference outlined above; even if the form of human capital has validity generalization. Schneider et al. (2000) calls these differences the organizational direct effect.

In addition, these contextual influences are likely to be dynamic. When the same individual-level human capital resource is combined with different human capital resources it can impact the way in which an individual's human capital resources are manifest over time (e.g. group processes; Kozlowski & Ilgen, 2006). So, when the element of time is introduced into the model, I expect that the unit will have a direct effect on the initial level of job performance and the change in job performance over time. Therefore, because employee value is linked to employee performance, initial employee value and employee value over time will be impacted by contextual (or unit-level) differences.

2.2.4 *Probability of Employment Over Time*

In order to deliver value to an organization, an employee must be associated with the organization. Therefore, employee value is also contingent on the probability that an employee is employed at any given time. The probability of employment at any particular time is simply one minus the cumulative probability of turnover.

As with job performance, there are natural relationships between time on the job and turnover probabilities. Several meta-analysis have shown that there is a negative relationship between tenure and turnover probabilities. Hom and Griffeth (1995) found a correlation between tenure and turnover of -.17; while Griffeth and colleagues (2000) updated the 1995 analysis and in 53 samples with 29,313 employees found a correlation of -.20. Cotton and Tuttle (1986) used a sample of 22 studies and also found a strong negative relationship between tenure and turnover probabilities.

While these meta-analyses show a negative correlation between job tenure and turnover, they do not explain why time on the job is negatively related to turnover probabilities. Like job performance, time is not the causal mechanism that links job tenure to turnover across time. Instead, job tenure is associated with increased levels of job embeddedness (Crossley, Bennett, Jex, & Burnfield, 2007). Job embeddedness is comprised of “the combined forces that keep a person from leaving his or her job” (Yao, Lee, Mitchell, Burton, & Sablynski, 2004: 159). They include organizational and community-related forces that cause a person to stay in a particular job (Lee, Mitchell, Sablynski, Burton, & Holtman 2004; Mitchell, Holtom, Lee, Sablynski, & Erez, 2001; Mitchell & Lee, 2001). Someone who has been in a job for some period of time is likely to have closer relationships with coworkers, comfort with the work context, and job specific knowledge they can leverage in the organization. These resources are hard to replicate and take time to develop. Therefore, these resources make the person more embedded in their current job (Allen, 2006). As a result, there are likely to be intra-individual differences in turnover probability over time.

The link between job embeddedness and job tenure helps to explain intra-individual changes in turnover probability across time. However, there are also likely to be inter-individual differences in turnover probabilities. While much research has examined the link between employee performance, employee attitudes, and employee demographics (Cotton & Tuttle, 1986; Griffeth et al., 2000; Hom & Griffeth, 1995), very little is known about the relationship between individual-level human capital resources and the probability of turnover (Maltarich, Nyberg, Reilly, 2010). Therefore, there is very little theory linking individual KSAOs to differences in turnover probability.

Maltarich et al. (2010) did examine the link between cognitive ability and turnover probabilities. In their investigation, they leveraged ability-demands fit (McCormick, DeNisi, & Staw, 1979, McCormick, Jeanneret, & Mechan, 1972; Wilk, Desmarais, & Sackett, 1995) and the push and pull model (Jackofsky, 1984) to create a theoretical link between cognitive ability and turnover probability. The fit perspective suggests that employees seek to match their cognitive ability with the cognitive demands of a job (McCormick et al., 1972, 1979). Employees with low cognitive ability will be more likely to find the cognitive demands of the job too high and employees with high cognitive ability are likely to find the demands too low – and become board or frustrated with the job (Johnson & Johnson, 2000).

The push and pull model suggests that high performing employees will experience forces that are more likely to pull them away from the organization (e.g. recruitment and job offers (Gerhart, 1990; Schwab, 1991)) while low performers will experience forces that push them out of the organization (e.g. lower raises (Jackofsky, 1984)). Both of these perspectives suggest that the relationship between cognitive ability and turnover should follow a U shape. However, in the empirical section of their paper, Maltarich et al. (2010) found limited support for the U shape relationship. In jobs with low levels of cognitive demand, the relationship between cognitive ability and turnover was only negative. In jobs with higher cognitive demands, the relationship between cognitive ability and turnover did follow a U pattern; but turnover increased only when cognitive ability was substantially higher than average.

While Maltarich and colleagues focused on cognitive ability, the same theoretic framework can be applied to other forms of individual-level human capital resources. From an ability-demands perspective, employees with high or low levels of human capital resources are likely to experience disconnects between their abilities and the demands of the jobs (McCormick et al., 1979, Mccormick et al., 1972; Wilk, et al., 1995). In addition, individual with different levels of human capital resources are likely to experience the same push and pull mechanisms faced by employees with different levels of cognitive ability. The push and pull model suggest that characteristics of the unit and the individual employee work together to influence the probability of employee turnover. Therefore, the probability of turnover (and therefore the probability of realizing employee value) over time is a function of within-individual changes, between-individual differences, and between-unit differences.

2.2.5 *Relationship Between Performance and Employee Value*

Employee job performance is one of the primary ways that employees generate value. However, employee job performance and employee value are distinct constructs. Prior research has suggested that good measures of job performance are necessarily linearly related to the value of that performance (e.g. Hunter & Schmidt, 1982). However, outside of any theoretical arguments, this is not empirically true.

For example, the archival study in Chapter 3 examines employee value in the context of a phone center. There are two primary ways that these customer service representatives deliver value. The first is by answering phone calls and dealing with customer problems. Employees who do this more efficiently, will reduce the cost of this process. On this dimension, the performance metric is the number of calls answered per hour. CSRs who take less time will answer more calls per hour thereby reducing the cost per call. This basic relationship is non-linear. Figure 2.2 shows the cost per call based on number of calls answered per hour. The relationship is curvilinear such that changes in performance do not necessarily accrue the same value for the organization. For example, at the rate of $20/hour, moving from 5 calls per hour to 6 calls per hour reduces the cost per call by $.70 while moving from 10 to 11 calls per hour reduces cost per call by only $.20. Therefore, the incremental value of performance increases is contingent on where the improvement occurs on the performance curve.

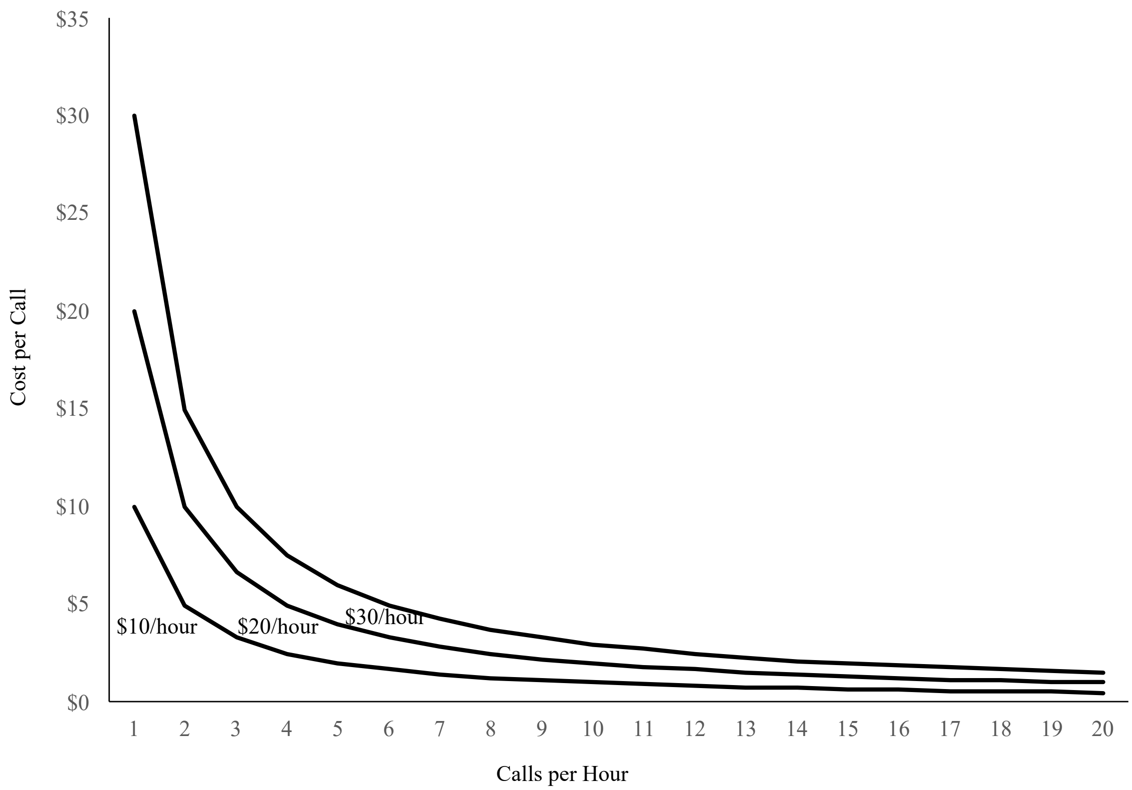

Figure 2.2 Cost per Call by Calls per Hour and Wage Rate

In addition to the non-linear effect of call handle time, there is also a multiplicative impact on revenue per call. CSRs with higher level of job specific human capital could answer more calls (lowering cost per call) and have more revenue per call. So, the incremental value would include number of calls multiplied by revenue per call.

In this chapter, I have outlined a conceptualization of individual employee value that does a few things. First, it is focused on the employee instead of the particular practices or resources. Employees may have many characteristics which are valuable to the focal firm, but most of the prior HRM and HCR research has focused on the value of HR practices or specific underlying constructs like human capital resources. Ultimately, companies hire employees, not their human capital and HR practices are only valuable in as much as they somehow impact an employee's value creation. Therefore, employee value provides a construct which integrates the impact of multiple constructs and research streams. Third, this conceptualization distinguishes employee job performance from employee value; but it also recognizes the close relationship between the two. Fourth, this conceptualization of employee value recognizes the impacts of time, inter-individual differences, and context on both employee value and the probability that the employees value creation will be realized by the firm.

This conceptualization of employee value in this chapter generates several benefits. First, it provides a more theoretically precise way to evaluate the value portion of the VRIN framework commonly applied in the SHRM and SHC literatures. Second, this conceptualization of employee value allows for the integration of multiple streams of literature across level and discipline. Third, this conceptualization creates the ability to create stronger theory which addresses questions of when and how employee value is realized.

2.3 UNIT-LEVEL EMPLOYEE VALUE

In the previous section, I outlined the salient characteristics and qualities of employee value at the individual-level. However, employees are often embedded in units and firms are often concerned about the value created by units and not individual employees. Therefore, in this section, I will outline several propositions related to employee value at the unit-level.

2.3.1 *Emergence and Employee Value*

The quality of human capital resources that develop at the unit level will be associated with differences in performance and value at the unit-level. While employee value and human capital resources are distinct constructs, unit-level human capital resources are a significant driver of unit-level performance and resulting value. Therefore, models of employee value must be able to incorporate the same processes that lead to the development of unit-level human capital resources. Emergent theory provides a set of theoretical statements to guide our unit-level model (e.g. Bell & Kozlowski, 2002; Kozlowski, Chao, Grand, Braun, & Kujanin, 2013).

First, there are distinct levels in organization—micro, meso, and macro (Kozlowski et al., 2013). While different disciplines have historically focused on different levels (e.g. I/O at the micro, OB at the meso, and Strategy at the macro), recent developments in theory (e.g. Kozlowski & Klein, 2000) and methods (e.g. LeBreton & Senter, 2008; Bryk & Raudenbush, 1989) have increased the number of organizational studies across levels (Kozlowski et al., 2013). There are two distinct processes that operate across levels in organizations. The first processes are top-down contextual processes where higher-level phenomenon influence lower-level ones. Quantitative research across levels has mainly focused on top-down processes (Cronin, Weingart & Todorova, 2011; Kozlowski & Chao, 2012). The second process is a bottoms-up process whereby interaction processes among lower level entities manifest collective phenomenon at higher levels that emerge over time (Kozlowski et al., 2013). Fewer quantitative studies have examined emergence processes.

The conceptualization of employee value in the previous chapter captures top-down effects via the contextual effects that influence individual job performance over time. However, in order to capture the full value of human capital resources, we must be able to model the bottoms up, emergent, effect of individual-level human capital

(Kozlowski et al., 2013). Therefore, any conceptualization of employee value must capture the top-down effects of context and the bottoms up effects of emergence.

Second, emergence theory gives some insight into how emergence occurs. Emergence is multilevel, process oriented, and temporal (Kozlowski et al., 2013). Specifically, "A phenomenon is emergent when it originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interaction, and manifests as a higher-level collective phenomenon" (Kozlowski & Klein, 2000: 55).

In our context, unit-level human capital resources emerge through the combinations of lower level human capital resources (Ployhart et al., 2014). Therefore, we must understand how unit-level human capital resources emerge. The emergent model of human capital provides a set of theoretical propositions that relate individual-level human capital resources to unit-level human capital resources (Ployhart & Moliterno, 2011). First, the emergent model of human capital proposes that unit-level human capital resources and individual-level human capital resources are partially isomorphic because they have different antecedents. Individual-level human capital resources are largely dependent on genetics and person-level environment (Lubinski, 2000). Unit-level human capital resources are dependent on the context (e.g. staffing and turnover cycles). Therefore, unit-level human capital resources emerge from individual-level human capital resources, but they are distinct. The partially isomorphic nature of human capital resources means that individual and unit-level performance will also be distinct and partially isomorphic (Ployhart & Moliterno, 2011).

Second, the emergent model proposes that task complexity will influence the way that unit-level human capital resources emerge from individual-level human capital resources. Task complexity can be categorized based on workflow structure (Bell & Kozlowski, 2002; Van de Ven, Debecq, & Koening, 1976). Pooled workflow structures include situations where workers do not have to synchronize their outputs (asynchronous) and task related linkages are weak. In a pooled workflow structure, unit-level outcomes are simply a sum of individual-level contributions. In a sequential workflow structure, the output of one member becomes the input of another. In sequential workflow structures, workers do have to synchronize their outputs, and linkages between employees become more important. In a reciprocal workflow structure, outputs flow back and forth between employees. The synchronization of outputs and linkages between employees become even more important in a reciprocal workflow structure. Lastly, intensive workflow structures require workers to work simultaneously, collaboratively, and interactively. Intensive workflow structures require the highest level of synchronization and employee linkages. Workflow structures will have a direct impact on the level of isomorphism between employee and unit level value. In a pooled environment, unit value will be a summation of employee value. However, in other workflow structures, the relationship may be more complicated. In the most extreme cases, individual performance may have no independent value. In an intensive workflow structure, the lowest level of meaningful value creation may be the unit. Therefore, the lowest level of value creation and the way in which individual employee value is aggregated will be a function of task complexity.

Third, the emergent model proposes that emergent enabling states will influence the level of unit-level human capital resources that emerge from individual-level human capital resources (Ployhart & Moliterno, 2011). Emergent enabling states are the glue that transform individual-level human capital resources into unit-level human capital resources. Emergent enabling states can be behavioral, cognitive, or affective (Ployhart & Moliterno, 2011). Behavioral states are the actual behaviors unit members utilize to complete their work. Behavioral processes include coordination, communication, and regulatory processes (Kozlowski & Ilgen, 2006). Cognitive emergent enabling states include unit-level constructs such as climate (e.g. Schneider, White, & Paul, 1998), knowledge (e.g. Grant, 1996; Youndt & Snell, 2004), mental models (e.g. Klimoski & Mohammed, 1994), and transactive memory (e.g. Wegner, 1995). Affective states are what individuals feel as a result of being a part of the unit. Affective states include constructs such as cohesion (e.g. Hackman, 1987) and trust (Nahapiet & Goshal, 1998). According to the emergent model of human capital, emergent states have three important properties. First, emergent enabling states are a property of the unit. Second, even though they are a property of the unit, they have the ability to influence individual-level performance. Third, the impact of emergent enabling states increases as task complexity increases. Therefore, because human capital resources are associated with performance and resulting value, unit-level employee value will also be impacted by the emergent enabling states of the organization.

2.3.2 *Time and Human Capital Resource Emergence*

Emergent processes are temporal (Kozlowski et al., 2013). Therefore, we must understand how lower-level phenomenon relate to higher-level phenomenon and we must be able to understand how this relationship unfolds dynamically. The emergent model of human capital suggests that human capital resources will “emerge” within a unit (Ployhart & Moliterno, 2011). Implicit in the emergent model is an element of time. However, the theory makes no specific prediction about when changes in individual

KSAOs will begin to impact human capital resources, how long changes in human capital resources will last, or how long it will take before the unit-level performance changes begin to wane. This is not an issue specific to the emergent model of human capital.

In general, HR scholarship lacks the ability to explain the timing or duration of the impacts of HR practices (Gerhart, 2005; Wright & Haggerty, 2005; Ployhart & Hale, 2014b). At the unit-level, very little research has given attention to the temporal issues associated with HR interventions (Ployhart & Hale, 2014a). The little research that has been done suggests that HR interventions take significant amounts of time to implement and vary dramatically in how long it takes for the intervention to impact unit-level performance. For example, Wright, Dyer, and Takla (1999) found that there are 19 to 22 months between the conception and implementation of HR systems. Birdi et al. (2008) found that it takes as much as ten years for an HR system to impact organization performance. However, these articles are the exception. Wall and Wood (2005) found that only 2 out of 25 articles related to the role of HR had a longitudinal design. Wright, Gardner, Moynihan, and Allen (2005) found that 50 of 70 articles related to HR practices actually measured HR practices after the performance window. If we do not know the timing, duration, and functional form (linear increase, diminishing returns, etc.) of HR practices and how they affect emergence, we cannot fully understand the financial impact of HR interventions (Bourdreau, 2010; Boudrequ & Ramstad, 2003; Cascio & Aquinis, 2008; Cascio & Boudreau, 2010; Ployhart & Hale, 2014b).

Ployhart and Hale (2014a) leveraged previous models of time (Mitchel & James, 2001; Roe, 2008) to create a temporal framework of HR interventions. In the temporal model, HR practices have an onset, an onset lag, a rate of emergence, an asymptote, and a practice offset. The onset is the point at which the HR practice is implemented. The onset lag is the amount of time it takes for the HR practice to influence individual behavior (the onset lag can be almost instantaneous). The rate of emergence is the rate at which the collective resource emerges after the onset lag. The asymptote is the point at which the emergent resource reaches its peak, and the offset is the point at which the HR practice is discontinued. The way that the HR practice influences each of these phases determines the functional form of the temporal impact. Therefore, because unit-level employee performance varies over time, unit-level employee value will also vary over time.

In order to define the qualities of unit-level employee value, I leverage theoretical propositions in multi-level theory (e.g. Kozlowski & Klein, 2000) and the emergent model of human capital (Ployhart & Moliterno, 2011) to define several characteristics of unit-level employee value. First multi-level theory suggests that there will be top-down contextual and bottoms-up emergent processes at play in multi-level outcomes. Individual-level employee value captures the top-down effect, but it does not capture the bottoms up. Second, unit-level employee value is a unique construct which is only partially isomorphic with individual-level employee value. Third, the emergent model of human capital proposes that workflow structure will help determine the way in which individual job performance emerges into unit-level performance. For example, in a pooled work structure, the emergent model of human capital proposes that unit-level performance will be the sum of individual-level performance. Because performance is a direct antecedent to employee value, it also suggests that workflow structure will impact the functional relationship between individual-level employee value and unit-level employee value. Fourth, both emergence theory and the emergent model of human capital resources, propose that unit-level resources will develop over time. Changes in unit-level human capital resources will impact unit-level performance and unit-level employee value. Therefore, within-unit employee value is dynamic and changes over time. Lastly, because emergent enabling states differ by unit and are dynamic, unit-level performance and the resulting employee value will differ between units-over time.

2.4 SUMMARY OF EMPLOYEE VALUE

In this chapter, I have explored the nature and characteristics of employee value. This exploration points out a few things. First, employee value is different than employee or job performance. The implications are that some forms of employee performance may not have any associated value and that any value associated with employee performance may not have a direct linear relationship. Second, employee value is multi-level. The implication is that individual-level employee value is related to unit-level employee value but the two are only partially isomorphic. Third, employee value is dynamic within and between employees; meaning that the differences in value created by employees or groups of employees may change over time. Fourth, employee value is a function of individual and unit-level characteristics; meaning that there is a top down and bottoms up relationship between individual and unit-level employee value. In the next chapter, I will explore ways to measure financial employee value.

CHAPTER 3

EMPLOYEE FINANCIAL VALUE FRAMEWORK

3.1 INTRODUCTION

While the conceptualization of employee value outlined in Chapter 2 allows for non-pecuniary benefits, it is especially important to be able to measure the financial value of employees for several reasons. First, employees are often described as the "most important asset" of an organization (Fulmer & Ployhart, 2014), but the inability to measure employee financial value makes this an impossible assertion to test. Second, managers in organizations make continuous tradeoffs with regards to investments and the deployment of financial capital. An inability to measure the financial value of employees prevents effective decision making. Third, an inability to measure the financial value of employees prevents managers and investors from fully understanding the competitive position of organizations in specific markets (Fulmer & Ployhart, 2014). Fulmer and Ployhart (2014: 162) defined human capital financial valuations as, "the systematic process of conceptualizing and denominating in monetary terms the expected economic benefits to be provided by human capital resources."

Measuring the financial value of human capital resources is difficult for several reasons. First, employees own intangible resource linked to latent constructs such as cognitive ability, personality, or specific skills (e.g. Schmidt & Hunter, 1998). Second, human capital value is manifest through human behavior that is inherently variable and related to a variety of factors that exist at different levels including, the individual-level, unit-level, organization-level, and market-level (e.g. Lepak et al., 2006; Ployhart & Moliterno, 2011). Third, employees engage in a voluntary relationship with employers. Organizations do not own their employees, and as such employees can exit the organization at any time (Coff, 1997). Fourth, organizations can influence employee behaviors via HR practices, but HR practices are often implemented in a system of interrelated practices that impact employee performance and value in complex ways (e.g. Combs et al., 2006; Jian, Lepak, Hu, & Baer, 2012; Rabl, Jayasinghe, Gerhart, & Kuehlmann, 2011; Sabramony, 2009). Therefore, methods to measure human capital resource financial value must be able to incorporate intra-individual or intra-unit changes in value over time and individual or unit-level probabilities of realizing an employee's value over time. In addition, methods to measure the financial value of human capital resources must be able to assess the impact of multiple HR practices working together through complex interactions. The complexity of measuring the financial value of human capital resources is reflected in the current state of the employee valuations literature in which there is no widely accepted framework for measuring the value of employees or human capital resources (Grojer & Johanson, 1990; Fulmer & Ployhart, 2014).

In addition to the inherent complexity of measuring employee value, there are also multiple purposes for employee valuations. Fulmer and Ployhart (2014) outlined three key questions that employee valuations must deal with:

- What is the financial value of human capital resources to an organization at a given point in time?
- What is the net effect of planned interventions (e.g. specific management practices, HR interventions) on human capital resource financial value?

- How can organizations measure the effectiveness of managers in managing the financial value of human capital resources within an organization? How can external stakeholders compare the stewardship of human capital resources across companies? (Fulmer & Ployhart, 2014: 171)

While all of these questions are important, for the purposes of this dissertation, I focus on the first and second questions.

One of the key issues is that most research related to the effect of planned interventions has been focused on valuing specific practices or policies, not the human capital resource itself. In this line of research, utility analysis has been the primary means used to value HR practices such as personnel selection (Fulmer & Ployhart, 2014). However, traditional utility analysis has several limitations. First, utility analysis makes several simplifying assumptions. For example, utility analysis does not account for any wage differences that might exist for employees with higher levels of human capital. Second, traditional utility analysis does not incorporate changes in performance over time. Third, utility analysis depends on population averages and therefore assumes the relationships between performance and value are linear. Fourth, Utility analysis is couched in a language and vernacular that is familiar to I/O psychologists, but unfamiliar to managers and decision makers who are more familiar with financial models like ROI and NPV (Carson, Becker & Henderson, 1998). Fifth, Utility analysis does not equip decision makers with the ability to make marginal trade-offs and decisions with regards to people related decisions (Jones & Wright, 1992). As a result, Utility analysis has waned in popularity (Boudreau & Ramstad, 2003; Fulmer & Ployhart, 2014), received criticism for not reflecting reality, and is discounted by managers who make decisions (e.g. Whyte & Latham, 1997). More recent attempts have been made to incorporate financial models such as ROI and NPV (e.g. Boudreau, 2010). However, the state of employee valuations remains murky and disjointed (Fulmer & Ployhart, 2014).

Fortunately, other scholarly disciplines face similar valuation challenges and are much further along in exploring these issues. In specific, the marketing discipline faces a very similar set of challenges. First, customer value and brand are intangible resource (Boudreau & Ramstad, 2003). Second, the value of customers to an organization is influenced by factors at the individual-level, the organization-level, and the market-level (Gupta, et al., 2006). Third, customers are not owned by the firm and engage in a voluntary relationship that can be terminated at any time (Gupta et al., 2006). These similarities suggest that much of the theory related to customer valuations may be applicable to employee valuations (Whetten, Felin, & King, 2009).

Within the customer valuations literature, customer lifetime value (CLV) is a framework that enables firms to differentiate the value of different customers; much like a firm's desire to differentiate the value of different employees. CLV provides a framework to aid in the acquisition, development, and divestiture of customer resources. In this section of the paper, I leverage the CLV framework within marketing's customer valuations to create an employee financial value (EFVal) framework for human capital resource valuations. CLV is defined as, the present value of all future profits obtained from a customer over his or her relationship with the company (Gupta, et al., 2006). I define EFVal as the present value of all future benefits generated by an employee's human capital resources.

The EFVal framework has several implications for the employee valuations literature. First, the EFVal framework leverages theoretical models that have already been established in the marketing literature. In doing so, the EFVal framework is a novel exploration of similar theoretical concepts found in very disparate literatures. Second, the EFVal framework will allow organizations and scholars to differentiate the expected value of potential employees by differentiating the current value of their future contributions to the organization. This is especially beneficial in situations where individual differences exist in the trajectory of job performance over time. Second, the EFVal framework helps organizations and scholars understand how different characteristics of the individual and the firm are contributing to an employee's value creation. Therefore, contextual factors such as coworker synergies can be included in the model. Third, the EFVal framework provides a means to identify managerial levers to increase the expected value of different employees. Fourth, the EFVal framework allows managers to understand the marginal value of changes in HR policies (Jones & Wright, 1992). Last, the EFVal framework provides the foundation to understand the aggregate value of employees at the unit and firm-level; which will aid in understanding the contribution of employees to the competitive advantage of firms. This integrated perspective of employee value can help facilitate the integration of theory and research between disciplines and levels of the SHRM and SHRC literatures.

3.2 BACKGROUND AND THEORY

3.2.1 *Valuing Human Capital Resources in the Management Literature*

Utility analysis is the primary way scholars have tried to value HR interventions and employees (Fulmer & Ployhart, 2014). Utility analysis was originally introduced to help managers make decisions about the relative value of HR interventions (Cabrera & Raju, 2001). Utility analysis was introduced by Brogden (1949) and modified by Cronbach and Gleser (1965) to include the cost of testing applicants. The Brogden Cronbach Gleser (BCG) model is represented as:

Equation 3.1 Utility

$$\Delta U = N_s SD_Y (r_{XY})(\mu_{X_s}) - NC$$

In this case, ΔU is the aggregate change in utility, N_s is the number of applicants hired under the new policy, SD_Y is the standard deviation of job performance in monetary units, r_{XY} is the correlation between the predictor and monetary performance, μ_{X_s} is the mean predictor score for selected employees, N is the total number of applicants, and C is the average cost per applicant of administering the selection procedure.

The BCG model makes several assumptions. First, the model assumes that the relationship between a predictor and job performance is linear. Historically, this assumption has been empirically validated (e.g. Hunter & Schmidt, 1982), but more recent literature on the performance of stars has brought this into question (e.g. Aguinis & O'Boyle, 2014). Second, the model assumes that the correlation between the predictor and value creation is equivalent to the correlation between the predictor and performance. Third, the model assumes that selection happens top down. This assumption does not account for the fact that top applicants do not always accept the employment offer (Murphy, 1986). A violation of any of these assumptions will diminish the accuracy of the utility model in predicting value creation.

These assumptions notwithstanding, the difficulty in calculating SD_Y slowed the use of utility analysis for over two decades (Cabrera & Raju, 2001). It was not until

Schmidt, Hunter, McKenzie, & Muldrow (1979) offered a process to estimate the value of SD_Y that utility analysis gained some level of acceptance. They suggested estimating the monetary value of performance at the 15^{th}, 50^{th}, and 85^{th} percentile; and then using the differences (85^{th}-50^{th} and 50^{th}-15^{th}) as a measure of SD_Y. To obtain the estimates, Schmidt et al. proposed asking supervisors to estimate the value of performance at each of the three points (15^{th}, 50^{th}, and 85^{th} percentiles).

The Schmidt et al. (1979) innovation sparked a proliferation of utility analysis in the literature during the 1980s and 1990s. Between 1979 and 1991, a review by Boudreau (1991) found over 40 studies in the area of utility analysis. Much of the literature (28 of the articles in the Boudreau (1991) review) focused on estimating SD_Y. Cascio and Ramos (1986) proposed a method that weighted the value of various job tasks compared to salary in order to calculate SD_Y, Hunter and Schmidt (1982) used a review of previous literature to estimate the value of SD_Y as 40% to 70% of mean salary, and several authors compared the various methods of calculating SD_Y (Bobko, Karren, and Kerkar, 1987; Bobko, Karren and Parkington 1983; Reilly and Smither, 1985; Weekly, Frank, O'Connor and Peters, 1985). This literature generated several findings. First, there was a great deal of variability in managers' perception of value creation at the 15^{th}, 50^{th}, and 85^{th} percentiles (Burke & Frederick, 1986). Second, the method proposed by Hunter and Schmidt (1982) and the method proposed by Cascio and Ramos (1986) produced similar estimates of SDy. Third, compared to other methods, the Schmidt et al. (1979) method produced much higher estimates of SD_Y. Fourth, the method used to calculate SD_Y influenced manager's perceptions of utility analysis credibility (Hazer & Highhouse, 1997). Lastly, the estimates provided by utility analysis were found to be upwardly biased (Boudreau, 1983).

These findings resulted in two additional streams of research. The first stream focused on extending the BCG model to include other dimensions of cost and performance. Boudreau (1983a) incorporated changes in variable costs, taxes, and the opportunity costs of future cash flows. Boudreau (1983b) incorporated the flow of employees in and out of the organization. DeCorte (1996) added the effects of a probationary period and recruitment costs. Each of these extensions are valuable attempts to address issues in the BCG model; however, the BCG model remains the basis for utility analysis.

The second stream of research focused on manager's perceptions of utility analysis. Latham and Whyte (1994) reported that utility analysis reduced manager support for an HR program. In an attempt to understand the negative effect of utility analysis on manager support, Whyte and Latham (1997) ran a second study where an expert was provided to explain and answer questions about utility analysis. Unfortunately, introducing an expert only made the negative impact worse. Others have focused on the "understandable" presentation of utility analysis (e.g. Carson et al., 1998) with favorable results.

Despite the high level of interest in the 1980s and 1990s, utility analysis research has declined since then (Cascio & Aguinis, 2008; Cascio & Fogli, 2010, Fulmer & Ployhart, 2014). Several potential reasons have been offered to explain the decrease in utility analysis research. First, it is possible that manager skepticism about the value of utility analysis has decreased interest (Latham & Whyte, 1994; Cascio & Fogli, 2010).

The skepticism likely stems from the complicated nature of the estimation (Fulmer & Ployhart, 2014), the overly optimistic estimates (Cabrera & Raju, 2001), and the fact that utility analysis is not aligned with accounting or economic principles (or language) that are familiar to managers (Cascio, 2000; Casio & Fogli, 2010). Second, it is possible that managers and scholars generally accept the value of HR interventions like selection based purely on the relationship between individual differences and individual performance (Ployhart, 2012c). Third, utility analysis could be discounted because it assumes that findings at the individual-level generalize to the organization-level and it does not capture the true nature of the underlying construct (Schneider, Smith, & Sipe, 2000).

While utility analysis has been the dominant methodology for valuing HR interventions, recent research has explored more traditional valuations techniques such as cost-benefit analysis, NPV calculations, and ROI analysis (Boudreau, 2010; Director, 2012). However, these techniques have not gained wide acceptance (Sturman, Cheraimie, & Cashen, 2003, Sturman, 2012). As a result, the literature on valuing employee value remains focused on HR interventions and remains mired in utility analysis (Fulmer and Ployhart, 2014).

3.2.2 *Valuing Marketing Activities*

At the highest level, marketing and HR interventions are very similar. In both cases, a firm is engaged in practices with people in the hopes that those practices will produce changes in behavior that enable value creation for the firm. Within the marketing literature, CLV is an attempt to enable scholars and managers to pair marketing decisions with value creation. CLV is the present value of all future profits obtained from a customer over his or her relationship with a firm. (Gupta et al., 2006). CLV is calculated at the customer-level and can be represented with the following equation (Gupta, Lehmann, & Stuarty, 2004; Reinartz & Kumar, 2003):

Equation 3.2 Customer Lifetime Value

$$CLV = \sum_{t=0}^{T} \frac{(p_t - c_t)r_t}{(1+i)^t} - AC$$

where

p_t = price paid by consumer at time t,
c_t= direct cost of servicing the customer at time t,
i = discount rate or cost of capital for the firm,
r_t = probability of customer repeat buying or being “alive” at time t,
AC = acquisition cost, and
T = time horizon for estimating CLV

CLV has many benefits. First, CLV disaggregates cost and value to the individual customer (Gupta & Lehman, 2003; Rust, Lemon, & Zeithaml, 2004). Second, CLV allows firms to understand how different marketing decisions may differentially impact individual customers or segments of customers by modeling the marketing decision’s impact on the values of each of these parameters (Kumar & Reinartz, 2006). Third, the CLV incorporates time and future value creation into the estimate of customer value. Fourth, it creates an economic measure of value creation (by using the firm’s discount rate or cost of capital) that is comparable to other investments a firm might make. Lastly, because CLV is a bottoms up approach, it allows firms to roll up value creation to the unit or firm-level (Gupta, et al., 2004). The CLV framework is consistent and provides useful insights in the marketing literature.

While the core relationships defined in the CLV model are consistent across applications, the techniques used to model the underlying relationships are not (Gupta et. al, 2006). Some marketing scholars have used recency, frequency, and monetary value

(RFM) models to construct CLV models (e.g. Fader, Hardie, Lee, 2005). Others have relied on probabilistic models (e.g. Reinhartz & Kumar, 2000), econometric models (e.g. Thomas, 2001), and computer science (e.g. data mining, machine learning, and nonparametric) models (e.g. Cui & Curry, 2005). Each of these models attempts to use individual characteristics, organization practices, and market conditions to predict the parameters of the CLV equation. While there is considerable disagreement on how to model the underlying behavior, there is still considerable agreement on the CLV model outlined in equation 3.2. One of the core strengths of the CLV model is that specific theory can drive the relationships between constructs that influence the underlying parameters.

The employee valuations literature has struggled to create a consistent methodology to evaluate the financial impact of various HR practices and policies. The CLV model in the marketing literature is much more mature in this area. However, before leveraging CLV theory in the realm of employee valuations it is important to understand the appropriateness of borrowing and applying this theory to the HR context (Morgeson & Hofmann, 1999; Rousseau, 1985; Whetten et al., 2009). In order to understand the appropriateness of borrowing a theory, it is necessary to understand any level and context differences between the original application and the application for which the theory is being borrowed (Whetten, et al., 2009).

In this case, I must compare the marketing context to the personnel selection context. First, CLV theory, like employee valuations, is focused on individual differences in behavior. CLV also assumes that individual behavior is driven by organization actions (in the form of marketing activities), market conditions (product choices), and individual differences (e.g. classes of consumers). Similarly, employee valuations seek to understand the effects of organizational actions (in the form of HR practices and policies), market conditions (employment choices), and individual differences (e.g. cognitive ability) on individual behavior. Therefore, both applications are concerned with multi-level moderators of individual-level constructs.

Second, in terms of context, CLV theory, like employee valuations, is concerned with human beings' voluntary actions toward a particular organization. In both cases, individuals are making decisions in a social context driven partially by individual differences in cognition, personality, values, and preferences. Therefore, CLV and personnel selection valuations are concerned with similar levels and similar contexts.

The differences between CLV and personnel selection valuations come when investigating the causal relationships that underlie the parameters in the valuations model. For example, equity theory (Adams, 1965) may link pay decisions to individual behavior in an employment context; but have no applicability to behavior in a customer relationship. However, as seen by the diversity of models in the marketing literature, these differences do not impact the CLV equation in equation 3.2, instead they are differences in how the assumptions for the various parameters are derived. Indeed, the ability to use different theories and techniques is a strength of the CLV framework that enhances our ability to apply the CLV framework to employee valuations. Therefore, as a construct, the CLV model in marketing is similar, robust, and flexible enough to apply in the personnel selection domain.

3.3 INDIVIDUAL-LEVEL EMPLOYEE VALUE FRAMEWORK

CLV is the present value of all future profits obtained from a customer over his or her relationship with a firm (Gupta et al., 2006). Similarly, I define EFVal as the present value of all future benefits generated by employees' human capital resources. Whereas CLV is codified in equation 3.2, EFVal is codified in equation 3.3:

Equation 3.3 Employee Value

$$EFVal_n = \sum_{t=0}^{T} \frac{(o_{nt} - c_{nt})}{(1+i)^t} r_{nt} - PC_n$$

where
o_{nt} = operational value generated by employee n at time t,
c_{nt}= cost (wages+benefits+taxes) of employee n at time t,
i = discount rate or cost of capital for the firm,
r_{nt} = probability of employee n being employed at time t,
PC_n = program cost of employee n
T = time horizon for estimating EFVal

Operational value (o_{nt}) is the operational value that can be directly attributed to the activities of employee *n* at time *t*. Operational value is the product of job performance of employee *n* at time *t* (jp_{nt}) and the marginal operational value generated by job performance of employee *n* at time *t* (vjp_{nt}):

Equation 3.4 Operational Job Performance

$$o_{nt} = jp_{nt} * vjp_{nt}$$

where:
o_{nt} = operational value generated by employee n at time t,
jp_{nt} = job performance of employee n at time t
vjp_{nt} = operational value of each unit of job performance at time t

It is important to note that performance can manifest itself along multiple dimensions. For example, as I examine in our empirical tests of this model, customer service representatives may generate value by answering customer calls and selling additional products. In such cases, operational revenue is the sum of operational value created in each category. The cost of an employee (c_{nt}) includes wages, benefits, and other marginal costs incurred as a result of employee *n* being employed at time *t*. Marginal costs are all incremental costs incurred as a result of employee *n* being employed. For example, a firm may pay a fixed cost to a third-party vendor for building and equipment, regardless of the number of employees. In that case, there is no marginal building and equipment cost associated with employee *n.* The discount rate or cost of capital (i) for the firm captures the time value of money. The probability of being employed (r_{nt}) captures the voluntary nature of the employee/employer relationship and can be operationalized as:

Equation 3.5 Employment Probability

r_{nt} = 1-p(cumulative turnover)$_{nt}$

where:
r_{nt} = probability of employee n being employed at time t,
p(turnover)$_{nt}$ = cumulative probability of employee *n* turning over by time *t*

Program costs (PC_n) are costs directly associated with the implementation of any particular intervention of interest. For example, in the context of personnel selection, this includes the cost of advertising, online testing, interviewing, drug testing, and any other expense incurred during the process of sourcing, hiring, or onboarding employee *n*.

3.4 INDIVIDUAL-LEVEL EFVAL DISTINCTIONS

The EFVal framework represents an improvement over utility analysis on several dimensions. First, EFVal enables the calculation of value creation at the individual employee level. Employee level value calculations enable a more fine- grained examination of the impact of an HR intervention on value creation by examining the marginal value of an employee given a set of interventions (Jones & Wright, 1992). It is possible, for example, that overall a particular HR policy has a positive impact on value creation within the firm, but that there are sub populations in which the policy has a negative effect. It is important for managers to understand the marginal impact of HR interventions (Jones & Wright, 1992). Understanding the marginal value of an HR intervention may allow organizations to target HR interventions differentially; thereby matching specific interventions to specific employees based on the optimal level of value creation.

Second, the EFVal framework incorporates time into employee value calculation at the individual-level. This enables an understanding of the timing of benefits and gives us the ability to model the discounted value of those benefits when examining the value of an HR intervention. Timing at the individual-level also provides the flexibility to model individual-level differences that impact the trajectory of job performance over time even if the relationships are non-linear.

Third, the EFVal framework simultaneously incorporates the expected value of employee performance with the probability that the firm will experience those benefits. This is especially useful if characteristics associated with better job performance are also associated with higher turnover rates. Because the EFVAL is calculated at the individual-level, it can capture the non-linear relationship between interventions and expected value creation generated by interventions that are also correlated with turnover probabilities.

Fourth, the EFVal framework can include context effects that impact the relationships between interventions or individual differences and job performance. These contextual effects can be captured at the individual-level and help identify sub-population that are positively or negatively affected by the unit-level context.

Finally, the EFVal framework exists at the most granular level, and therefore it can be rolled up to understand the value of HR policies or employees at the unit and firm-level. Because the value exists at the individual-level, any functional form can be used to translate individual job performance to the unit-level. In the next section, I will discuss the unit-level version of the EFVal framework.

3.5 UNIT-LEVEL EFVAL FRAMEWORK

Emergent models provide theoretical propositions to guide the EFVAL framework (Ployhart & Molterno, 2011). First, emergent models suggest that the function used to aggregate individual performance to unit-level performance will vary depending on the workflow structure of the unit. Second, emergent models propose that unit-level performance will vary over time. Third, emergent models suggest that emergent enabling states will impact the quality of emergent human capital resources and therefore unit level performance. Therefore, I propose the following as the unit-level EFVal framework:

Equation 3.6 UNIT-LEVEL EFVAL

$$EFVal_u = \int_1^n f(EFVal_n)$$

where:
$EFVal_u$ = Unit-level expected value of employees
n = Number of employees
$EFVal_n$ = Expected lifetime value of employee n

In this context, $EFVal_n$ is the unit-level employee financial value. It is a function of the individual-level value of the unit's employees ($EFVal_n$). The key to this model is the f can be defined based on job structure, emergent enabling states or other characteristics of the unit. The unit-level EFVal framework has several advantages over commonly used utility analysis. First, utility analysis assumes that the unit-level benefit of implementing a new policy is fully captured by its impact on mean level of performance multiplied by the number of people impacted. This calculations implicitly assumes that unit-level and individual-level employee value is fully isomorphic (or simply additive). Utility analysis cannot account for differences in job type (e.g. pooled vs. reciprocal) or emergent enabling states. Also, because utility analysis is focused on the HR practice, it cannot account for the timing or duration of its impact on aggregate employee value over time. In contrast, the unit-level EFVal framework can account for difference in aggregation due to job type (e.g. pooled vs. reciprocal), emergent enabling states, and account for the timing of changes in aggregate employee performance over time. Table 3.1 is a summary of the benefits of the EFVal framework as compared to Utility analysis.

As noted earlier, the EFVal framework allows individual components of the model to be estimated based on specific and relevant theoretical relationships in a particular context. There are no implicit assumptions (e.g. linear relationship between job performance and value creation). Therefore, in order to extract the benefits of the EFVal framework, we must understand the relationship between relevant factors and outcomes of each of the individual-level parameters of the model in a given context. In the next chapter, I will turn to relevant theory and generate specific hypotheses about specific model assumptions in the context of a personnel selection example.

Table 3.1 Differences Between Utility Analysis and EFVal

Dimension	Utility Analysis	EFVal
Individual Value	Assumes each individual has average value	Models value creation at the individual-level
Individual Timing	Assumes mean level of performance changes over time	Allows modeling individual differences in job performance trajectory
Context Effects	Can accommodate differences in mean performance	Allows modeling context effects that differ between-employee and across time
Relationship Between Predictor and Job Performance	Assumes the relationships are linear and performance is normally distributed	Does not assume the relationship is linear or the distribution of performance is normal
Relationship Between Job Performance and Value Creation	Assumes the relationship is linear and perfectly correlated	Does not assume job performance and value creation is linear and perfectly correlated
Relationship Between Individual-level and Unit-level Value Creation	Assumes value creation is perfectly isomorphic; therefore, a simple sum	The relationship can take on any functional form between individual and unit-level

CHAPTER 4

EFVAL MODELS IN AN EMPLOYEE SELECTION CONTEXT

4.1 INTRODUCTION

In this chapter, I apply the EFVal framework in the context of personnel selection in a large U.S. firm that has multiple call center locations. These call centers employee Customer Service Representatives (CSRs) that have two major outcome-based measures of performance: calls answered per hour (a function of call handle time) and additional revenue (as a result of additional sales) per call. Thus far, I have focused on the generic concept of EFVal frameworks and human capital resource value. Therefore, before applying the EFVAL framework to the selection process of the focal firm, I first provide a high-level overview of research in the personnel selection literature. In the overview, I summarize the particular tenants of the personnel selection literature that are salient to the current study, provide a high-level overview of research in the RBT tradition, summarize the theoretical tenants of RBT that provide a basis for examining the relationship between employee selection and value, and I provide a brief review of the small body of literature that has attempted to link selection practices to the value creation and competitive advantage of firms. The review in this chapter is not exhaustive as the literature on both personnel selection and RBT is large and beyond the scope of the current paper. In addition, both personnel selection (e.g. Guion, 2011; Ployhart, 2006; Sackett & Lievens, 2008; Van Iddekinge & Ployhart, 2008) and RBT (e.g. Acedo, Barroso, & Galan, 2006; Armstrong & Shimizu, 2007; Barney, Ketchen, & Wright, 2011; Kraaijenbrink, Spender, & Groen, 2010; Lockett, Thompson, & Morgenstern, 2009; Newbert, 2007; Nyberg et al., 2014) have had recent reviews that provide detailed histories and summaries of the literature. Instead, I focus on the high-level findings of research that are important to the theoretical framing of the relationship between employee selection and employee value.

4.2 PERSONNEL SELECTION LITERATURE

Personnel selection is among the HR practices, policies and procedures of an organization. HR practices are "specific organizational actions designed to achieve some specific outcomes" (Lepak et al., 2006: 221). HR policies are "the firm or business unit's stated intentions about the kinds of HR programs, processes, and techniques that should be carried out in the organization" (Wright & Boswell, 2002: 263-264). HR systems are a collection of HR policies and practices. The HR system drives employee perceptions and resulting behaviors (Bowen & Ostroff, 2004; Delery, 1998; Lepak et al, 2006). Therefore, much of the recent organization-level research has focused on specific HR systems that are designed to produce specific behavioral outcomes. HR systems include occupational safety HR systems (Zacharatos, Barling, & Iverson, 2005), customer service HR systems (Liao & Chuang, 2004), and knowledge intensive HR systems (Jackson, Chuang, Harden, & Jiang, 2006).

HR practices are nested within HR policies that are nested within HR systems (e.g., Becker & Gerhart, 1996, Lepak et al., 2006; Schuler, 1992). Because HR policies are what is intended and HR practices are what employees actually experience (Wright & Boswell, 2002), HR practices are more directly related to employee cognition, affect, and behavior (Bowen & Ostroff, 2004; Lepak et al., 2006; Wright & Boswell, 2002). HR systems, policies, and practices do not impact firm performance directly; instead they impact firm-performance via mediating processes (e.g. Becker, Huselid, Pickus & Sprat, 1997). Several multi-level models have proposed that HR systems have a direct impact on employee human capital, motivation, and opportunity which, when aggregated, have a direct impact on unit performance (Lepak et. al, 2006; Ostroff & Bowen, 2000; Ployhart & Hale, 2014b). I conceptualize employee selection as the set of HR policies and practices a firm employs to select the individual-level human capital resources of the firm. Personnel selection practices shape the generic human capital resources pool of organizations and in turn, the pool of human capital impacts firm performance (Jiang et al., 2012; Nyberg & Ployhart, 2013).

Second, personnel selection is often thought of as a part of the organizational staffing process. Staffing includes recruiting and personnel selection. Staffing as a whole is concerned with the identification, attraction and hiring of the kinds of talent needed to perform specific jobs (Ployhart, Schneider, & Schmidt, 2006). Within staffing, personnel selection is concerned with the process of utilizing individual differences to select the best person for a particular job (Ployhart et al., 2006; Ryan & Tippins, 2009; Schmitt, Cortina, Ingerick, & Wiechmann, 2003). Individual differences are differences in KSAOs that exist between people (Ployhart, 2006). Therefore, within this literature, personnel selection is a subset of organizational staffing that is comprised of the HR policies and practices that determine how an organization selects the individual-level human capital resources of employees for specific jobs.

The process of defining personnel selection practices generally occurs in three steps. First, the development of personnel selection practices begins with a job analysis.

Job analysis is used to determine the nature and critical tasks of the job (Binning & Barrett, 1989; Guion, 2011; Schmitt & Chan, 1998). Second, the critical tasks of a job are linked to KSAOs that are needed to perform those tasks (Binning & Barrett, 1989; Ployhart, 2006; Ployhart et al., 2006). Third, measures of critical KSAOs are developed to identify individual differences in the relevant KSAOs (Arthur & Villado, 2008). Through this process, the nature of the job defines critical outcomes, critical outcomes define which KSAOs are desired, and the desired KSAOs drive the measures and methods that are used. The process ensures that applicants with the highest level of job-relevant KSAOs are being selected (Ployhart, 2006).

The latent nature of KSAOs is one of the key challenges of the personnel selection process. KSAOs are latent in the sense that they cannot be directly observed (Binning & Barret, 1989; Arthur & Villado, 2008). Therefore, selection experts must develop tools that measure an otherwise unseen construct. For example, cognitive ability cannot be directly observed; however, it can be measured via test, simulations, or even interviews (Arthur & Villado, 2008). Therefore, the success of a personnel selection process depends on the ability to identify and measure KSAO constructs that are related to job performance (Ployhart, 2006; Ployhart et al., 2006). The relevant KSAOs are predictor constructs, the ways of measuring those constructs are predictor methods, and the level of relationship between the KSAO and job performance is predictor validity (Ployhart, 2006). A substantial portion of personnel selection literature has been focused on predictor constructs, predictor methods, and predictor validity.

4.2.2 *Predictor Constructs*

The literature on predictor constructs can be divided into cognitive and non-cognitive predictors. General cognitive ability is one of the most robust predictors of job performance (Hunter & Hunter, 1984; Schmidt & Hunter 1998). The validity (ability to predict job performance) of general cognitive ability has been shown across job, industry, culture, and country (Hunter & Hunter, 1984; Schmidt & Hunter, 1998). However, general cognitive ability also has large racioethnic subgroup mean differences (Sackett & Wilk, 1994). Therefore, much of the recent literature on cognitive predictors has focused on reducing subgroup differences (Aguinis & Smith, 2007; Ployhart & Holtz, 2008; Sackett, Borneman, & Connelly, 2008; Sackett, DeCorte & Lievens, 2010). This research has shown that one of the most effective ways to reduce subgroup differences is to include additional valid KSAO constructs in the selection process (Schmitt et al., 2009). Therefore, an entire stream of literature has focused on combining cognitive and noncognitive predictors in hopes of maximizing overall validity while minimizing subgroup differences (DeCorte, Lievens, & Sackett, 2006, 2007; Finch, Edwards & Wallace, 2009).

Within noncognitive constructs, the five-factor model of personality (FFM; Barrick & Mount, 1991) has received much of the attention (Ployhart, 2012a,b). The FFM tends to have smaller subgroup differences (Foldes, Duehr, & Ones, 2008), but findings on the relationship between the FFM and job performance have been mixed. Some (e.g. Morgeson, Campion, Dipboye, Hollenbeck, Murphy, & Schmitt , 2007) have questioned the validity of personality measures, while others (e.g. Ones, Dilchert, Viswesvaran, & Judge, 2007) have provided evidence that personality is a valid predictor of job performance. Those who question the validity of personality often focus on faking, the idea that applicants fake their personality on tests. However, the evidence on faking is divided with some showing faking is not an issue (e.g. Ellingson, Sackett, & Connelly, 2007; Hogan, Barrett, & Hogan, 2007; Kim, 2011; Sackett & Lievens, 2008) while others show that faking is an issue (e.g. Hausknecht, 2010; Landers, Sackett, & Tuzinski, 2011; Schmitt & Oswald, 2006). Those who support the validity of personality measures propose that the choice of job performance measures may be decreasing the validity of personality measures (Oh & Berry, 2009). Others support using alternative methods such as forced-choice formats to increase the validity of performance measures (e.g. Heggestad, Morrison, Reeve, & McCloy, 2006; Vasilopoulos, Cucina, Dyomina, Morewitz, & Reilly, 2006).

Recent research in noncognitive predictor constructs has examined other conceptualizations of noncognitive individual differences. For example, emotional intelligence (Joseph & Newman, 2010), integrity test (Van Iddekinge, Roth, Raymark, & Odle-Dusseau, 2012), and interest measures (Van Iddekinge, Putka, & Campbell, 2010) have been examined in relationship to job performance. While many of these constructs have lower subgroup differences, open questions remain about their validity (e.g. Joseph & Newman 2010; Grubb & McDaniel, 2007).

4.2.3 *Predictor Methods*

Predictor methods are the techniques used to measure the underlying predictor constructs (Arthur & Villado, 2008). Methods include interviews, situational judgment test (SJT), assessment centers, work samples, and assessment tests. Research on predictor methods has uncovered several points that are salient to the present paper. First, methods can influence what KSAOs are being measured. For example, assessment tests are often structured to measure a specific KSAO, while it is unclear what KSAOs are being captured in assessment centers (Lievens, Tett, & Schneider, 2009). Assessment centers allow candidates to participate in exercises (e.g. leaderless group discussion), but it is unclear whether assessment centers are capturing exercise effects or underlying KSAOs. In addition, SJTs explain incremental variance in job performance over job knowledge (Lievens & Patterson, 2011). It is not clear what predictor construct is being measured beyond job knowledge (Motowidlo & Beier, 2010; Hodgkinson, Sadler-Smith, Sinclair, & Ashkanasy, 2009).

Second, how the methods are applied can also influence their validity. For example, interviews can differ in their level of structure. More structured interviews lead to higher levels of validity (Ployhart, 2006). SJTs ask applicants to declare how they would or should act in particular job situations. The choice between "should" and "would" influences the validity of the SJTs (McDaniel, Hartman, Whetzel, & Grubb, 2007).

From this research, it is clear that different methodologies can more or less effectively measure different underlying predictor constructs. At the same time, it is also clear that choices within method can either increase or decrease the validity of a particular method. This is of significance because even though the underlying predictor constructs may generalize across contexts, individual organizations may choose different predictor methods or implement those predictor methods in different ways. Therefore, even though the personnel selection literature is concerned with constructs that generalize across context, there is enough complexity and ambiguity that even organizations trying to follow the scientific evidence may choose different personnel selection processes.

4.2.4 *Summary of Personnel Selection Literature*

Personnel selection uses differences in individual-level KSAOs to identify applicants who are more likely to perform better on the critical outcomes of a focal job (Ployhart, 2006). The personnel selection literature is focused on identifying the KSAO predictor constructs and predictor methods that have the highest level of validity across contexts (Schmidt & Hunter, 1977). However, KSAOs are latent constructs for which there are many measures and methods. Some relationships seem relatively stable across context (e.g. general cognitive ability; Schmidt & Hunter, 1998) and the resulting recommendation is clear (e.g. use cognitive testing; Schmidt & Hunter, 1998). But, general cognitive ability generates relatively high subgroup mean differences. As a result, many organizations apply multiple predictor constructs and multiple predictor methods to try and reduce subgroup differences by reducing the degree to which they are assessing general cognitive ability (DeCorte et al., 2006, 2007; Finch et al., 2009). However, predictor constructs and predictor methods can vary substantially in their validity. In many cases, there is still open debate about what predictor constructs are being measured (e.g. assessment centers; Lievens et al., 2009) or what level of validity is being generated (e.g. FFM; Morgeson et al., 2007; Ones et al., 2007). These ambiguities represent the practical realities of trying to predict who is likely to succeed in a given job. Therefore, even though the personnel selection literature is trying to generate insights that generalize across context (e.g. Schmidt & Hunter, 1977); it is likely that well-intentioned organizations will vary in their actual personnel selection practices. In the context of the current study, I will examine how a well-designed selection assessment differentiates employee value by identifying employees who exhibit different behaviors (Model Assumptions in the context of EFVal models) over the course of their employment relationship. I will develop specific hypothesis about intra-individual job performance over time, inter-individual differences in job performance over time, contextual differences in job performance over time, and individual and context related difference in employee turnover.

4.3 HYPOTHESIS REGARDING EFVAL MODEL ASSUMPTIONS

4.3.1 *Intra-Individual Job Performance Over Time*

One of the key parameters of the EFVal model is how intra-individual performance is expected to change over time. As outlined in chapter 2, there is a robust body of literature examining intra-individual job performance over time. Much of the literature has focused on job tenure, seniority or age. In the present study, I am concerned with the relationship between job tenure and job performance over time. Theoretically, both human capital theory and learning theory suggest that individual performance should improve as individuals accumulate job relevant KSAOs (Ehrenberg & Smith, 2000; Sturman, 2003; Weiss, 1990). Job tenure is not a direct measure of differences in the quality of job experience (Quinones, Ford, & Teachout, 1995; Tesluk & Jacobs, 1998). However, even though differences in quality of experience may drive between-employee differences, the within-person accumulation of job-related experience will enhance the stock of individual-level human capital resources the individual possesses. Thus, within-person job performance should increase with changes in tenure. There are a variety of empirical studies linking increases in job tenure to increases in job performance (Avolio, Waldman, & McDaniel, 1990; McDaniel et al, 1988; Ployhart & Hakel, 1998; Schmidt, Hunter, Outerbridge, & Goff, 1986). However, the incremental advantage of increased job tenure is significantly greater at lower levels of job experience (McDaniel, Schmidt & Hunter, 1988; Schmidt et al., 1986). Given the amount of theoretical and empirical evidence for an individual-level "learning curve," I expect that the relationship between job tenure and individual job performance (calls per hour and revenue per call) will follow a curvilinear (specifically quadratic) pattern such that employee performance will increase at a decreasing rate as job tenure increases.

Hypothesis 1a: As job tenure increases, individual-level calls per hour will increase at a decreasing rate.

Hypothesis 1b: As job tenure increases, individual-level revenue per call will increase at a decreasing rate.

4.3.2 *Inter-Individual Differences in Job Performance Over Time*

One of the key aspects of the EFVAL model is being able to understand how performance over time differs between individuals. To answer this question, I now turn to inter-individual differences in performance over time. One of the key findings in the Personnel Selection literature is that individual differences are associated with differences in job performance (Ployhart, 2006). However, the stability of job performance has been an open question for many years (see Sturman, Cheramie, & Cashen, 2005 for more detail).

In this study, I will leverage the work of Schmidt and colleagues (1988). Schmidt et al. (1988) boiled the complexities of these points into three basic relationships between individual-level human capital resources and job performance over time. They tested whether the relationship between general cognitive ability and job performance was divergent, convergent, or noninteractive. The divergent hypothesis tested whether or not the relationship between general cognitive ability and job performance increased over time. The convergent hypothesis tested whether or not the relationship between general cognitive ability and job performance decreased over time. The noninteractive hypothesis tested whether or not the difference in performance stayed constant over time. Using data from four different jobs, Schmidt and colleagues found that the relationship between general cognitive ability and job performance was noninteractive. While these findings are specific to the relationship between general cognitive ability and job performance, the three hypotheses (divergent, convergent, and noninteractive) form an effective categorization of the potential relationships between individual-level human capital resources and job performance over time.

In this study, I am concerned with the relationship between individual-level human capital resources and job performance over time. I operationalize individual-level human capital resources as a bundle of KSAOs that are valuable and relevant to the focal job. In this case, individual-level human capital resources are not a direct measure of cognitive ability; however higher levels of KSAO attainment are related to higher levels of cognitive ability (Schmitt et al., 2003), and the attainment of these skills is indicative of a higher level of absorptive capacity (Jensen, 1998). Therefore, individual-level human capital resources are a proxy for individual differences in cognitive ability and a direct measure of individual differences in job-specific skills, ability and knowledge. As outlined above, individual-level human capital can impact job performance over time, but the impact can be different depending on the parameter of the job performance curve being estimated.

In regard to the initial level of performance, job specific skills and knowledge are related to job performance (Ployhart, 2006). Therefore, I expect that employees with higher levels of human capital resources will have a higher level of initial job performance. This is consistent with prior research such as Ployhart and Hakel (1998) and Zickar and Slaughter (1999). Ployhart and Hakel (1998) showed that previous salary is positively related to job performance while Zickar and Slaughter (1999) showed that previous film making is positively related to creative performance. In neither case are individual-level human capital resources measured, but salary and prior experience are both related to job-specific human capital.

The hypothesized link between individual-level human capital resources and initial job performance does not imply a specific link between individual-level human capital resources and change in job performance over time. However, the employment stage model (Murphy, 1998 outlined above) suggests that cognitive ability is positively related to changes in job performance during the transition phase of employment. Given individual differences in human capital resources are linked to differences in cognitive ability and absorptive capacity, I expect that individuals with higher levels of job specific human capital will experience a more rapid growth in job performance early in their job tenure. This means the linear growth rate in job performance will be positively related to individual-level human capital resources.

The employment stage model also suggests that the importance of cognitive ability decreases during the maintenance phase of employment. However, our measure of individual-level human capital resources also includes dimensions of personality. According to the multi-stage model of employment, personality becomes more important in the maintenance stage of employment. Therefore, even as employees enter the maintenance stage, human capital resources will be positively related to job performance. Together with the relationship between individual-level human capital resources and initial performance, the employment phase model suggests that the relationship between individual-level human capital resources and job performance will follow a divergent path (Schmidt et al, 1988). Figure 4.1 is a visual representation of the expected relationship between individual-level human capital resources and job performance over time. The framework in Schmidt et al., (1988) does not make any predictions about the

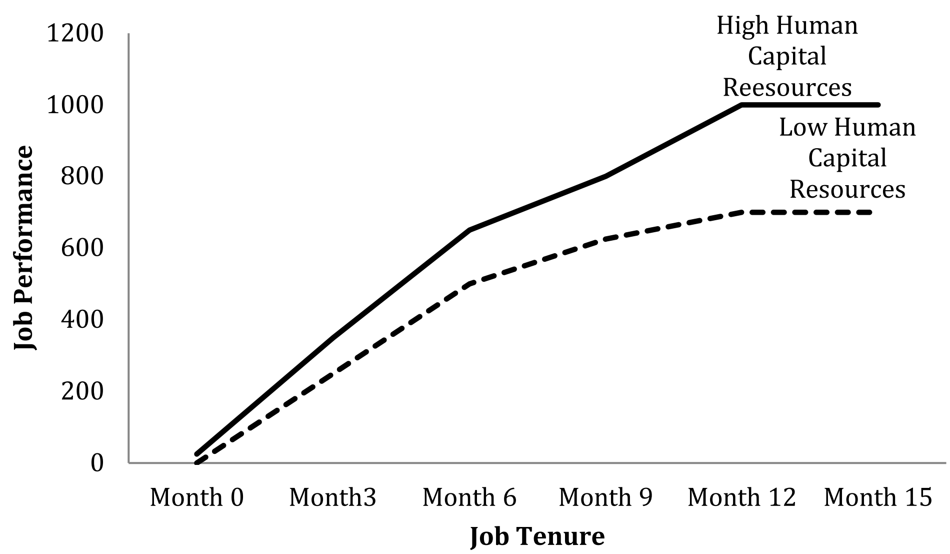

Figure 4.1 Hypothesized Relationship Between Generic Human Capital and Job Performance Over Time

long-term differences in performance over time. From a practical perspective, the differences in performance can’t continue to diverge forever as employees with high and low levels of human capital should both reach some asymptotic level of performance.

However, in this example, I am concerned about the performance in the first 14 months of employment. Therefore, I make no hypothesis about the long-term differences, but based on the expected relationship between individual-level human capital resources and job performance, I hypothesize the following:

Hypothesis 2a: Individual-level human capital resources will be related to employee performance such that high levels of human capital resources will (a) be positively related to initial calls per hour, and (b) positively related to the linear growth rate of employee calls per hour over time.

Hypothesis 2b: Individual-level human capital resources will be related to employee performance such that high levels of human capital resources will (a) be positively related to initial revenue per call, and (b) positively related to the linear growth rate of revenue per call over time.

4.3.3 *Context and Job Performance Over Time*

One of the key differentiators of the EFVal framework is an ability to account for unit-level impacts on job performance over time. As noted in previous chapters, the personnel selection literature has traditionally focused on relationships between individual-level human capital resources and individual-level job performance that generalize across contexts. In fact, research in the personnel selection literature has gone to great lengths to show that the relationship between some individual-level human capital resources and job performance generalizes across jobs, firms, and industries (e.g. Barrick & Mount, 1991; Schmidt & Hunter, 1998). In doing so, the personnel selection literature has largely ignored the role of context in shaping the relationship between human capital resources and job performance (Cappelli & Sherer, 1991; Cascio & Aguinis, 2008; Ployhart, Hale, & Campion, 2014; Ployhart & Schneider, 2012).

Context is defined as, "..situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables" (Johns, 2006: 386). Personnel selection researchers have taken a narrow view of context and only focused on contextual elements that potentially affect the validity of selection practices (Ployhart & Schneider, 2012). In this study, the employee's unit represents different contexts.

It is possible that two different units applying the same measure of individual-level human capital resources can have different levels of predicted performance given contextual differences. Schneider et al. (2000) calls these differences the organizational direct effect. The sample for this study has 34 different work units that are geographically dispersed, differ in their historical origin (many acquisitions), and have local leaders. Even though they exist in the same organization, the context of these units is substantively different. Therefore, I expect there to be unit-level effects that influence job performance of employees.

In addition, these contextual influences are likely to be dynamic. When the same individual-level human capital resource is combined with different human capital resources it can impact the way in which an individual's human capital resources are manifest over time (e.g. group processes; Kozlowski & Ilgen, 2006). So, when the element of time is introduced into the model, I expect that the unit will have an effect on the initial level of job performance and the change in job performance over time.

Therefore, I hypothesize the following:

Hypothesis 3a: Unit-level context will have an effect on the relationship between individual-level human capital resources and employee performance such that (a) the intercept of calls per hour will vary by unit and (b) the linear growth rate of calls per hour will vary by unit.

Hypothesis 3b: Unit-level context will have an effect on the relationship between individual-level human capital resources and employee performance such that (a) the intercept of calls per hour will vary by unit and (b) the linear growth rate of calls per hour will vary by unit.

4.3.4 Human Capital Resources and Probability of Employment

As outlined previously, another advantage of the EFVAL model is the ability to simultaneously incorporate predictors of job performance and predictors of employment probabilities. In order to understand the probability of employment at any given time, we must first understand the probability that an employee has left the organization.

Maltarich et al. (2010) did examine the link between cognitive ability and turnover probabilities. In their investigation, they leveraged ability-demands fit (McCormick, DeNisi, & Staw, 1979, Mccormick, Jeanneret, & Mechan, 1972; Wilk, Desmarais, & Sackett, 1995) and the push and pull model (Jackofsky, 1984) to create a theoretical link between cognitive ability and turnover probability. The fit perspective suggests that employees seek to match their cognitive ability with the cognitive demands of a job (McCormick et al., 1972, 1979). Employees with low cognitive ability will be more likely to find the cognitive demands of the job too high and employees with high cognitive ability are likely to find the demands too low – and become board or frustrated with the job (Johnson & Johnson, 2000).

The push and pull model suggests that high performing employees will experience forces that are more likely to pull them away from the organization (e.g. recruitment and job offers (Gerhart, 1990; Schwab, 1991)) while low performers will experience forces that push them out of the organization (e.g. lower raises (Jackofsky, 1984)). Both of these perspectives suggest that the relationship between cognitive ability and turnover should follow a U shape. However, in the empirical section of their paper, Maltarich et al. (2010) found limited support for the U shape relationship. In jobs with low levels of cognitive demand, the relationship between cognitive ability and turnover was only negative. In jobs with higher cognitive demands, the relationship between cognitive ability and turnover did follow a U pattern; but turnover increased only when cognitive ability was substantially higher than average.

While Maltarich and colleagues focused on cognitive ability, the same theoretic framework can be applied to other forms of individual-level human capital resources. From an ability-demands perspective, employees with high or low levels of human capital resources are likely to experience disconnects between their abilities and the demands of the jobs (McCormick et al., 1979, Mccormick et al., 1972; Wilk, et al., 1995). In addition, individuals with different levels of human capital resources are likely to experience the same push and pull mechanisms faced by employees with different levels of cognitive ability. Therefore, based on the same theoretical logic as Maltarich et al. (2010), I propose that the relationship between job specific human capital and turnover probability will follow a U-shaped pattern. It is important to note that this is inconsistent with some of the empirical findings in Maltarich et al. (2010). However, there are three major differences between their study and this one. First, Maltarich et al. (2010) is focused on a single KSAO, while I am focused on a bundle of human capital resources that are measured because they are relevant to the job of interest. Second, Maltarich et al. (2010) is a single sample based on individuals employed across a number of firms and jobs. It is impossible to rule out selection bias (higher cognitive ability individuals do a better job of selecting fit) when comparing across jobs and firms. Our sample is of employees in a specific job in a specific company. Third, Maltarich et al. (2010) did find a U-shaped relationship between cognitive ability and turnover in jobs with high cognitive demands. The job I am focused on has significant cognitive demands, and as outlined earlier, our measure of individual-level human capital resources is at least partially reflective of cognitive ability. Therefore, I hypothesize the following:

Hypothesis 4: The relationship between individual-level human capital resources and employee turnover probabilities will follow a U-shaped pattern such that employees with high and low levels of human capital resources will experience higher than average turnover probabilities.

4.3.5 ***Employee Context and Turnover***

As outlined in prior hypothesis, the sample for this study has 34 different work units that are geographically dispersed, differ in their historical origin (many acquisitions), and have local leaders. Even though they exist in the same organization, the context of these units is substantively different. Leadership (e.g. Mathieu, Fabi, Lacoursière, & Raymond, 2016), climate (e.g. Carr, Schmidt, Ford, & DeShon, 2003) and other unit-level characteristics have been associated with differences in turnover probabilities. Therefore, I hypothesize the following:

Hypothesis 5: Unit-level context will impact employee turnover rates.

4.4 SAMPLE

The sample for this analysis consists of customer service representatives (CSRs) employed at multiple locations by a large communications company in North America. All employees occupy the same job and the sample includes 4,196 customer service representatives hired between October of 2013 and June of 2015. The customer service representatives are nested within 34 units. All of the customer representatives engage customer by phone and are tasked with two primary responsibilities. First, the representative has to answer calls, understand the customer's issue or question, and work to resolve the issue as quickly as possible. Second, the representative must try and meet additional customer utility by selling additional products and services that the company offers.

4.5 MEASURES

Job performance. The sponsoring organization has identified two primary outcomes for the CSR role. First, CSRs must answer and complete calls as efficiently as possible. Therefore, one primary job performance outcome for the CSR role is the number of calls completed in a given hour (initially measured as call handle time). Second, the CSR can sell additional products and services to help meet additional customer demands. Therefore, revenue per call is the second measure of job performance. I collected data from internal databases on each of these metrics for the first 14 months of each employee's tenure from October of 2013 to December of 2015. The data was collected on a monthly basis and because the data is used in pay and performance processes it undergoes a high degree of scrutiny and quality control.

Job tenure. Job tenure is calculated monthly. It is the difference between the calendar date and job start date rounded to the nearest month. Because job tenure within person changes each month, it is also a time varying covariate.

Individual-level human capital resources. The sponsoring organization utilizes a third-party testing solution to measure individual-level human capital resources. The third party was founded by, and employs, a number of Ph.D. psychologists. The solution was developed on the basis of stringent job analysis and overseen by a PhD. psychologist within the sponsoring organization. The solution itself is delivered online and every applicant takes the same set of tests. There are two tests that comprise the overall solution. The first test is a simulation that measures navigation, applicant's problem solving, service orientation, data entry speed, and data entry accuracy. The second is a battery of five unique instruments that measure the applicant's call center professionalism, ability to work with information, sales focus, and employee retention. Together, the two tests measure elements of cognitive and noncognitive individual-level, job specific human capital resources. The scores of the two tests are weighted to create a composite score that is normalized such that 50 is average, and the range is 0 to 100.

Turnover. Turnover is a binary variable measured monthly such that any employee leaving the organization in a given month will receive a 1, while remaining employees will receive a 0. Turnover was captured from October 2013 to December 2015.

4.6 ANALYSIS

The analysis of these hypotheses is particularly complicated. I am simultaneously modeling within-person, between-employee, and between-unit effects over time. Random coefficient growth models (RCGM) are particularly well suited for these kinds of analysis (Lang & Bliese, 2009; Singer & Willett, 2003). These models allow us to look at intra-individual trajectories over time and then understand how differences between individuals and differences between units moderate these relationships. This approach mirrors the method employed by Lang and Bliese (2009) to investigate individual-level adaptation.

While the RCGM model is well suited for continuous outcomes, it is not well suited for binary outcomes. The hypotheses regarding turnover include a binary outcome. Binary outcomes are not normally distributed and violate the assumptions of the linear models used in RCGM (Singer & Willet, 2003). In addition, there are issues of data sensoring; meaning that some employees will still be employed at the end of our observation window. Employees that leave early in our observation window also have no opportunity to experience a turnover event in the later part of the observation window. In these situations, survival analysis is a standard way of examining differences in the probability of experiencing a specific binary event. Cox Proportional Hazard models are able to examine whether or not individual differences such as assessment score are associated with differences in how likely an individual is to experience a turnover event (Hom, Lee, & Shaw & Hasknecht, 2017; Morita, Lee, & Mowday, 1989, 1993).

Therefore, in order to test our hypotheses with continuous outcomes, I leverage the standard linear model approach of RCGM. However, in order to test our hypotheses regarding turnover, I utilize Cox Proportional Hazard Model to model both the individual-level differences in turnover probabilities.

For the relationships with job performance, I followed the procedures and model-testing approach common in the organizational literature (Bliese & Ployhart, 2002; Lang & Bliese, 2009; Singer & Willett, 2003).[1] First, in order to establish the baseline relationship between *performance* and *job tenure*, the first model includes only the fixed effects of *job tenure* and *job tenure squared* on job performance. Hypotheses 1 suggest that performance will increase at a decreasing rate relative to job tenure. A positive and significant coefficient of *job tenure* indicates that performance increases with increases in *job tenure* while a negative and significant coefficient of job tenure squared indicates that the rate at which job performance changes decreases as job tenure increases. Second, an AR(1) residual structure is added to account for the fact that within-person performance in one time period is likely related to within-person performance in the previous time period.

Third, in order to test whether the relationships between job tenure and job performance differ at the individual-level, random effects were sequentially added for intercept and job tenure. For this step, a significant improvement in model fit indicates that there are differences in the relationship between job tenure and job performance that are explained by individual-level differences between CSRs. Fourth, Assessment score and Assessment score X job tenure were sequentially added to the model. A positive and

[1] For brevity's sake, I did not include separate descriptions of the model for each form of job performance (calls per hour, revenue per call). Instead, the process for modeling "job performance" will be repeated two times (once for each measure of job performance). Also, the names of variables in this section are italicized in hopes of making it slightly easier to read.

statistically significant parameter estimate for *assessment score* indicates that *individual-level human capital resources are* positively related to initial *job performance*. A positive and statistically significant interaction between *individual-level human capital resources* and *job tenure* indicates that *individual-level human capital resources are* positively related to *job performance* growth rate.

Fifth, in order to understand the unit-level contextual impacts on initial *job performance* and the trajectory of *job performance* over time, I included random effects (between units) for the *intercept* and linear *job tenure* variables. Better model fit indicators for the random *intercept* indicates that the relationship between *individual-level human capital resources* and *job performance* differs between unit (in a systematic way). Said another way, better model fit means that unit-level context moderates the relationship between *individual-level human capital resources* and *initial job performance*. A better model fit for *job tenure* means that the rate of job performance increase varies between units. If the model fit is better, it can also be said that unit-level context moderates the relationship between *job tenure* and changes in *job performance*. I evaluate model fit via absolute changes in AIC where any decrease > 10 is considered significant model improvement (Burnham and Anderson, 2004).

CHAPTER 5

RESULTS

5.1 HYPOTHESIS TESTS

Table 5.1 shows the means, standard deviations, and correlations of the variables. The data in this sample contains repeated measures. Therefore, table 5.1 is presented at the observation level and contains multiple observations per CSR. In order to protect the competitive information of the sponsoring organization, all outcome variables and the assessment score (Assessment Score, Calls Per Hour, Revenue Per Call) have been converted to a standard normal distribution. The assessment score is positively and significantly related to calls per hour, sales yield, and average revenue per call ($p<.05$), indicating that the organization's measure of job specific human capital is significantly related to better job performance. It is important to note that this supports the criterion related validity of the assessment being used.

Hypotheses 1a predicted employee calls per hour would increase at a decreasing rate as employee tenure increases. Model 1 in Table 5.2 shows the results of a model including only the fixed effects of job tenure and job tenure squared. Job tenure is positive and significant (.12, $p<.05$) while job tenure squared is negative and significant (-.01, $p<.05$). This means that calls per hour increase at a decreasing rate with job tenure. Thus, Hypothesis 1a is supported. It is interesting to note that these coefficients indicate it takes about 9 to 10 months for CSAs to reach their peak level of performance.

Table 5.1 Means, Standard Deviations, and Correlations

Variable	Mean	Std. Dev.	1	2	3	4
1. Assessment Score	0	1	-			
2. Calls Per Hour	0	1	.10*	-		
3. Average Revenue	0	1	.05*	-.05*	-	
4. Months Since Hire	5.16	3.52	-.02*	.18*	.29*	-

*(*p*<.05) (n=29,259)
Note that all of the variables are at the associate, time level.

Hypothesis 2a predicted that there would be significant between-employee differences in the initial level of calls per hour and in the rate of calls per hour over time. In order to test this, we first allow the intercept to vary randomly. Model 2 in table 5.2 includes a random intercept term. In order to test the significance of the between-employee variability in intercept, we compare the change in AIC between model 1 and model 2 (Burnham and Anderson, 2004). The difference is >10 indicating there is statistically significant between-employee variability in the intercept of calls per hour. Therefore, the first part of hypothesis 2a is supported. Hypothesis 2a also predicted there would be significant between-employee differences in the change in calls per hour over time. In order to test this hypothesis, we added a random effect for the effect of tenure on performance. Model 3 in table 5.2 includes the random effect for job tenure. The change in AIC is >10 indicating that there is significant between-employee variability in the change of calls per hour over time.

Hypothesis 2a also predicted that individual differences in human capital would be related to individual differences in initial calls per hour. Model 4 in Table 5.2 includes the fixed effect for assessment score and shows that assessment score is positively and significantly (.10, $p<.05$) related to the initial level of calls handled per hour. This means that a one standard deviation increase in assessment score is associated with a .10 standard deviation increase in initial calls per hour.

Hypothesis 2a also predicted that individual differences in assessment score would be positively related to differences in the rate at which calls per hour increase with job tenure. Model 5 in table 5.3 shows the results when adding the interaction. The interaction between assessment score and job tenure is positive, and statistically significant (.01, p<.05) meaning that there is a statistically significant relationship between assessment score and the rate at which calls per hour increase with job tenure. Therefore, Hypothesis 2a is supported. This means that assessment score is positively related to the number of calls a CSR is initially able to complete per hour, and that difference grows over time.

Hypothesis 3a predicted that contextual differences between operating units would lead to differences in the initial level of calls per hours and the rate at which those calls per hour increased. In order to test this Hypothesis, I added a third level to the model so that model 6 would be nested within operating location. Model 6 in Table 5.3 shows the result of this model. When compared to Model 5, the change in AIC is greater than 10 indicating that there is a significant between operating unit variability in initial calls per hour and changes in call per hour over time. It is interesting, that once the impact of the operating unit is added, the interaction between assessment score and tenure is no longer statistically significant. Therefore, while Hypothesis 2a was supported without this effect, it is no longer supported when including the impact of operating unit. In future sections of this paper, I will use these models to predict individual performance within units; therefore, I removed the insignificant effect of assessment score X tenure and will use model 7 in table 5.3 for predictions related to calls per hour. All three metrics (loglikelihood, AIC, BIC) indicate that this model fits the underlying data better than a model that includes the interaction of assessment score and tenure when the impact of unit is included.

Hypotheses 1b predicted that revenue per call would increase at a decreasing rate as employee tenure increases. Model 1 in Table 5.4 shows the results of a model including only the fixed effects of job performance and job performance squared. Job tenure is positive and significant (.21, $p<.05$) while job tenure squared is negative and significant (-.01, $p<.05$). This means that revenue per call increases at a decreasing rate with job tenure. Thus, Hypothesis 1b is supported. It is interesting to note that it takes about 9 to 10 months for CSAs to reach their peak level of performance in regard to revenue per call.

Hypothesis 2b predicted that there would be significant between-employee differences in the initial level of revenue per call and in the rate of revenue per call over time. In order to test this, we first allow the intercept to vary randomly. Model 2 in table 5.4 includes a random intercept term. In order to test the significance of the between-employee variability in intercept, we compare the change in AIC between model 1 and model 2. The difference is >10 indicating there is statistically significant between-employee variability in the intercept of revenue per call. Therefore, the first part of hypothesis 2b is supported. Hypothesis 2b also predicted there would be significant between-employee differences in the change in revenue per call over time. In order to test this hypothesis, I added a random effect for the impact of tenure on performance. Model 3 in table 5.4 includes the random effect for job tenure. The change in AIC is >10 indicating that there is significant between-employee variability in the change of revenue per call over time. Hypothesis 2b is supported.

Table 5.2 Growth Model Results with Calls Per Hour as the Dependent Variable

Variable	Model 1 Coef.	Model 1 SE	Model 2 Coef.	Model 2 SE	Model 3 Coef	Model 3 SE	Model 4 Coef.	Model 4 SE
Fixed Effects								
Level 1 Model								
Intercept	-.40*	.02	-.46*	.02	.46*	.02	-.46*	.01
Tenure	.12*	.00	.14*	.00	.14*	.00	.14*	.00
$Tenure^2$	-.01*	.00	-.01*	.00	-.01*	.00	-.01*	.00
Assessment Score							.10*	.01
Assessment Score X Tenure								
Random Effects (variance components)								
Intercept			.83		.80		.79	
Tenure					.07		.07	
LogLik	-40974.67		-24653.62		-21355.73		-21330.78	
AIC	81957.33		49317.24		42727.46		42679.57	
BIC	81990.47		49358.66		42793.73		42754.12	

*Fixed Effects ($p<.05$)

Note: n = 4,196 employees; SE = coefficient standard error.

Table 5.3 Growth Model Results with Calls Per Hour as the Dependent Variable (cont'd)

Variable	Model 5 Coef.	Model 5 SE	Model 6 Coef.	Model 6 SE	Model 7 Coef	Model 7 SE
Fixed Effects						
Level 1 Model						
Intercept	-.46*	.02	-.38*	.07	-.38*	.07
Tenure	.14*	.00	.13*	.01	.13*	.01
$Tenure^2$	-.01*	.00	-.01*	.00	-.01*	.00
Assessment Score	.09*	.01	.08*	.01	.09*	.01
Assessment Score X Tenure	.01*	.00	.01	.00		
Random Effects (variance components)						
Intercept	.79		.74		.74	
Tenure	.07		.06		.06	
Intercept/Work Location			.38		.38	
Tenure/Work Location			.08		.04	
LogLik	-21333.05		-20956.06		-20952.02	
AIC	42686.10		41938.12		41928.04	
BIC	42768.94		42045.80		42027.45	

*(*p*<.05)
Note: *n* = 4,196 employees; SE = coefficient standard error.

Hypothesis 2b also predicted that individual differences in assessment score would be positively related to differences in the initial number of revenue per call. Model 4 in Table 5.4 includes the fixed effect for assessment score and shows that assessment score is positively and significantly (.06, $p<.05$) related to the initial level of calls handled per hour. This means that a one standard deviation increase in assessment score is associated with a .06 standard deviation increase in initial revenue per call.

Hypothesis 2b also predicted that individual differences in assessment score would be positively related to differences in the rate at which revenue per call increase with job tenure. Model 5 in table 5.5 shows the results when adding the interaction. The interaction between assessment score and job tenure is positive, but not statistically significant meaning that there is not a statistically significant relationship between assessment score and the rate at which revenue per call increases with job tenure. Therefore, Hypothesis 2b is not fully supported. This means that assessment score is positively related to the number of calls a CSR is initially able to complete per hour, but not related to the rate at which revenue per call grows over time.

Hypothesis 3b predicted that contextual differences between operating units would lead to differences in the initial level of revenue per calls and the rate at which those calls per hour increased. In order to test this Hypothesis, I added a third level to the model so that model 5 would be nested within operating location. Model 6 in Table 5.5 shows the result of this model. When compared to Model 5, the change in AIC is >10 indicating that there is significant between operating unit variability in call per hour. While this model fits the data better, the interaction between assessment score and tenure is still not statistically significant. In future sections of this paper, I will use these models to predict individual performance within unit; therefore, I removed the insignificant effect of assessment score X tenure and will use model 7 in table 5.4 for predictions related to revenue per call. All three metrics (Loglikelihood, AIC, BIC) indicate that this model fits the underlying data better than a model that includes the interaction of assessment score and tenure.

Hypothesis 4 predicted that higher levels of job-specific human capital would be related to turnover probabilities such that there would be a U-shaped pattern. The median time to turnover is 488 days meaning the average employee leaves the job in less than 1.5 years. In order to evaluate the link between assessment score and turnover probability, I ran a Cox Proportional Hazard model to test whether there is statistically significant impact of assessment score on turnover probabilities. Model 1 in table 5.6 looks at the effect of assessment score on turnover probability. While the coefficient is positive (meaning individuals with higher scores have a higher probability of turnover), it is not statistically significant. However, the hypothesis assumed the relationship would be U shaped. In order to test this, model 2 and model 3 in table 5.6 include the assessment score squared and the assessment score cubed terms. Neither of the terms are statistically significant. Together, these results do not support hypothesis 4, and there does not appear to be a relationship between assessment score and turnover probability.

Table 5.4 Growth Model Results with Revenue Per Call as the Dependent Variable

Variable	Model 1 Coef.	Model 1 SE	Model 2 Coef.	Model 2 SE	Model 3 Coef	Model 3 SE	Model 4 Coef.	Model 4 SE
Fixed Effects								
Level 1 Model								
Intercept	-.68*	.01	-.72*	.02	-.74*	.02	-.74*	.02
Tenure	.21*	.01	.22*	.01	.23*	.01	.23*	.01
Tenure^2	-.01*	.00	-.01*	.00	-.01*	.00	-.01*	.00
Assessment Score							.06*	.01
Assessment Score X Tenure								
Random Effects (variance components)								
Intercept			.56		.56		.56	
Tenure					.08		.08	
Intercept/Work Location								
Tenure/Work Location								
LogLik	-39963.21		-34804.37		-34364.64		-34352.12	
AIC	79934.41		69622.75		68745.28		68722.23	
BIC	79967.55		69627.45		68811.55		68796.78	

*(*p*<*.05*); Note: *n* = 4196 employees; SE = coefficient standard error.

Table 5.5 Growth Model Results with Revenue Per Call as the Dependent Variable (cont'd)

Variable	Model 5 Coef.	Model 5 SE	Model 6 Coef.	Model 6 SE	Model 7 Coef	Model 7 SE
Fixed Effects						
Level 1 Model						
Intercept	-.74*	.02	-.81*	.02	-.81*	.02
Tenure	.23*	.01	.23*	.00	.23*	.01
$Tenure^2$	-.01*	.00	-.01*	.00	-.01*	.00
Assessment Score	.05*	.01	.04*	.01	.04*	.01
Assessment Score X Tenure	.00	.00	.00	.00		
Random Effects (variance components)						
Intercept	.56		.48		.48	
Tenure	.08		.08		.08	
Intercept/Work Location			.32		.32	
Tenure/Work Location			.02		.02	
LogLik	-34356.39		-33844.10		-33839.54	
AIC	68732.77		67714.20		67703.08	
BIC	68815.61		67821.89		67802.49	

*(*p*<*.05*); Note: *n* = 4,196 employees; SE = coefficient standard error.

Given the impact of operational unit in the previous hypotheses, I also wanted to make sure that differences in operational unit were not masking the effects of assessment score on turnover probabilities. Therefore, as an additional piece of analysis, I utilized a Mixed Effects Cox Proportional Hazard model (MECPH) to include the effect of operational unit on these outcomes (Therneau, 2015). Model 1 in Table 5.7 contains the results of a MECPH model with assessment score as the predictor. Even after including the effect of operational unit, the assessment score coefficient in not statistically significant. Model 2 and Model 3 include the square and cubic terms of assessment score respectively. Neither of the terms is statistically significant and even after including possible effect of operational unit, there appears to be no relationship between assessment score and probability of turnover within this sample.

Hypothesis 5 stated that the contextual effect of operational unit would impact the probability of turnover. Model 1 in Table 5.8 is a Cox Proportional Hazard model using operational unit as a predictor. The effect of operational unit is statistically significant ($p<.05$) in all three of the standard tests applied to categorical variables in Cox Proportional Hazard models. Therefore, hypothesis 5 is supported as there is a statistically significant difference between turnover probabilities between operational units.

Table 5.6 Turnover as a Function of Assessment Score Using Cox Proportional Hazard Model

Variable		Model 1 Coef.	Model 1 SE	Model 2 Coef.	Model 2 SE	Model 3 Coef	Model 3 SE
Predictors							
	Assessment Score	.001	.001	-.001	.001	-.001	.000
	Assessment Score Squared			.000	.000	.000	.000
	Assessment Score Cubed					.000	.000

*(*p*<*.05*); Note: *n* = 4,196 employees; SE = coefficient standard error.

Table 5.7 Turnover as a Function of Assessment Score Using Mixed Effect Cox Proportional Hazard Model

Variable		Model 1 Coef.	Model 1 SE	Model 2 Coef.	Model 2 SE	Model 3 Coef	Model 3 SE
Fixed Effects							
	Assessment Score	.002	.001	-.001	.001	-.010	.050
	Assessment Score Squared			.000	.000	.000	.000
	Assessment Score Cubed					.000	.000
Random Effects (Variance Component)							
	Operational Unit	.13		.13		.13	
LogLik		-15623.64		-15515.10		-1515.22	

*(*p*<*.05*); Note: *n* = 4,196 employees; SE = coefficient standard.

Table 5.8 Turnover as a Function of Operational Unit

		Model 1	
Variable	Ratio Test	Wald Test	Logrank Test
Predictors			
Operational Unit	229.9*	192.3*	217.4*

*(*p*<.*05*)
Note: *n* = 34 operational units.

5.2 EFVAL MODELING

In the previous section, I explored hypotheses related to the selection of individual-level human capital resources and its impact on the various parameters in the EFVal model. However, the value of the EFVal model comes from including these relationships and calculating the value of employees. Therefore, in this section I will examine the implications of our findings on the EFVal model. I will also compare the findings to the results of a standard Utility model applied to the same sample. I will then explore the differences between the model and highlight the additional utility provided by the EFVal model.

EFVal Model

The first part of the of the EFVAL model involves calculating the net value of each employee at each time t. In this context of this study, value is created by answering calls and selling additional products. Figure 5.1 represents the modeled relationship between assessment score (a measure of job specific human capital) and calls per hour over an employee's tenure in the job. Figure 5.2 represents the modeled relationship between assessment score and revenue per call. In both cases, performance increases with job tenure and it takes several months for employees to reach their peak level of performance.

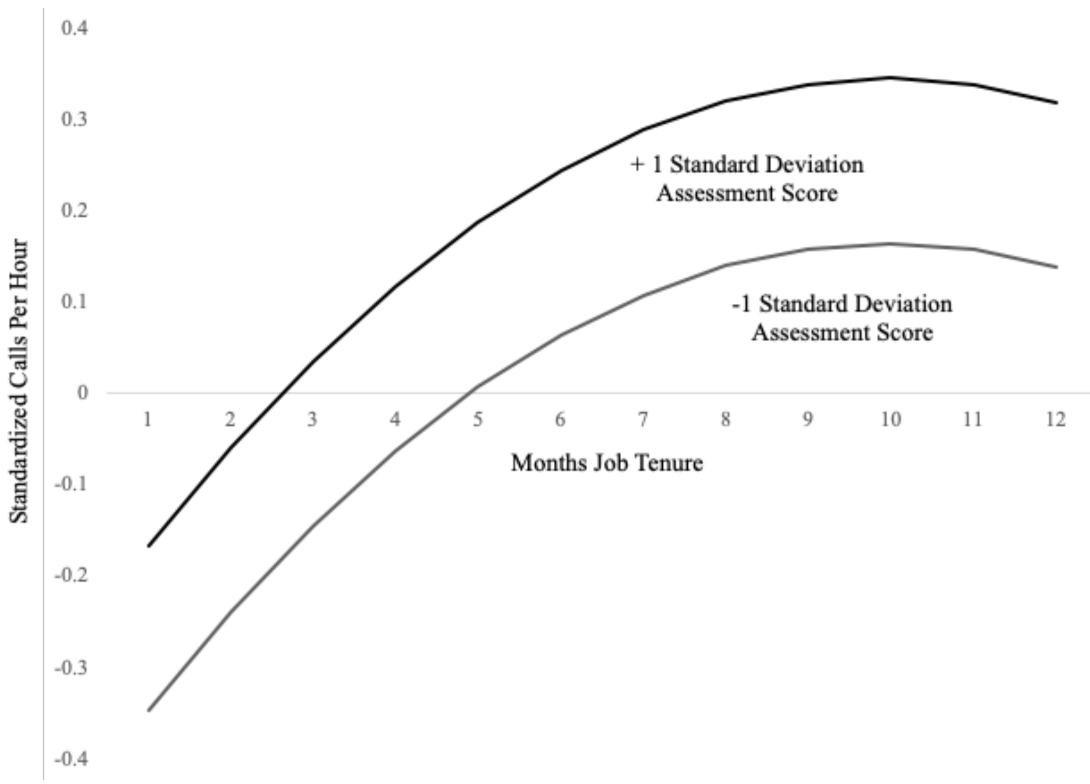

Figure 5.1 Predicted Relationship Between Assessment Score and Call Per Hour Over Time

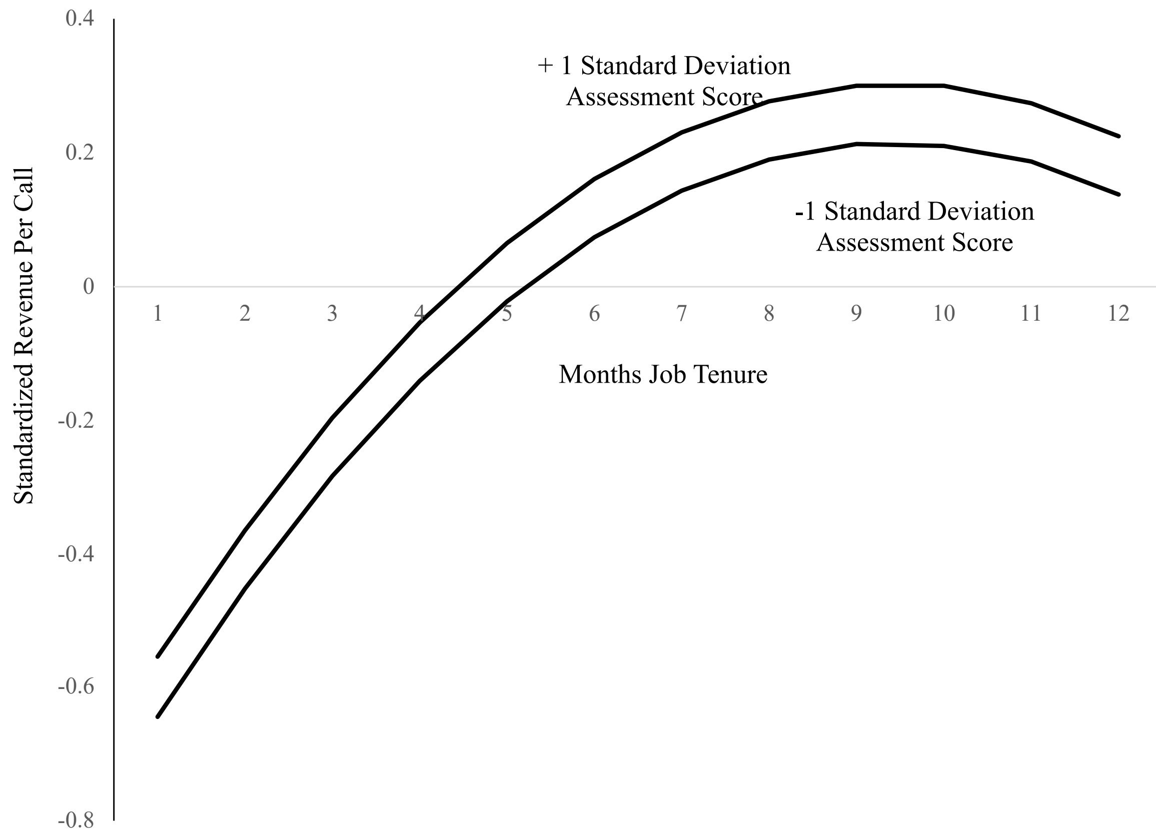

Figure 5.2 Predicted Relationship Between Assessment Score and Revenue Per Call Over Time

In order to complete EFVal or utility modeling, each of the metrics has to be translated into a dollar value. Revenue per call is already in dollars; however, calls per hour presents a different challenge. Answering more calls does not create revenue (outside of the sales revenue); however, answering more calls per hour does reduce costs. In order to capture this effect, I divided the employees' estimated hourly rate by the number of calls they complete. This creates a cost per call. I then added revenue per call to generate a net cost per call that captures the value of both answering more calls and generating more sales. While this metric is valuable for relative performance comparisons it does not create the ability to evaluate monthly value creation. In order to capture value creation per month I multiplied the net cost per call by the average number of calls an average employee answers in a given month. The net effect is to look at the net cost for a standard number of calls. By comparing the net cost per month to complete a standard number of calls, I am able to evaluate the difference in net cost.

Differences in net costs represent the net value of an employee in a given month. The second part of EFVal model includes the probability that an employee is still employed in a given month. In order to estimate this, I used the survival analysis results in table 5.8 to calculate a Survival probability for each employee each month. That probability was multiplied by net value to create an expected value for each employee, each month. In order to calculate an expected employee value over time, I then summed the expected value-taxes (assumed 30% rate) at a standard discount rate (assumed 6% cost of capital) for the first 14 months of employment. The result is an expected value for each employee at time of hire. Figure 5.3 looks at the marginal (value-mean) employee financial value by the standardized assessment score.

This graph demonstrates a few things. First, it shows that the assessment score does indeed differentiate the expected value of an employee over time. Also, even though the coefficient of the assessment score is significant, it is relatively small. Even with a relatively small coefficient, the differences in value between someone with a mean assessment score and someone with an assessment score one standard deviation above the mean is between one and two thousand dollars. Given the volume of hires this organization undertakes, that difference translates into millions of dollars of value. Second, it is difficult to detect visually, but the relationship between assessment score and employee value is curvilinear.

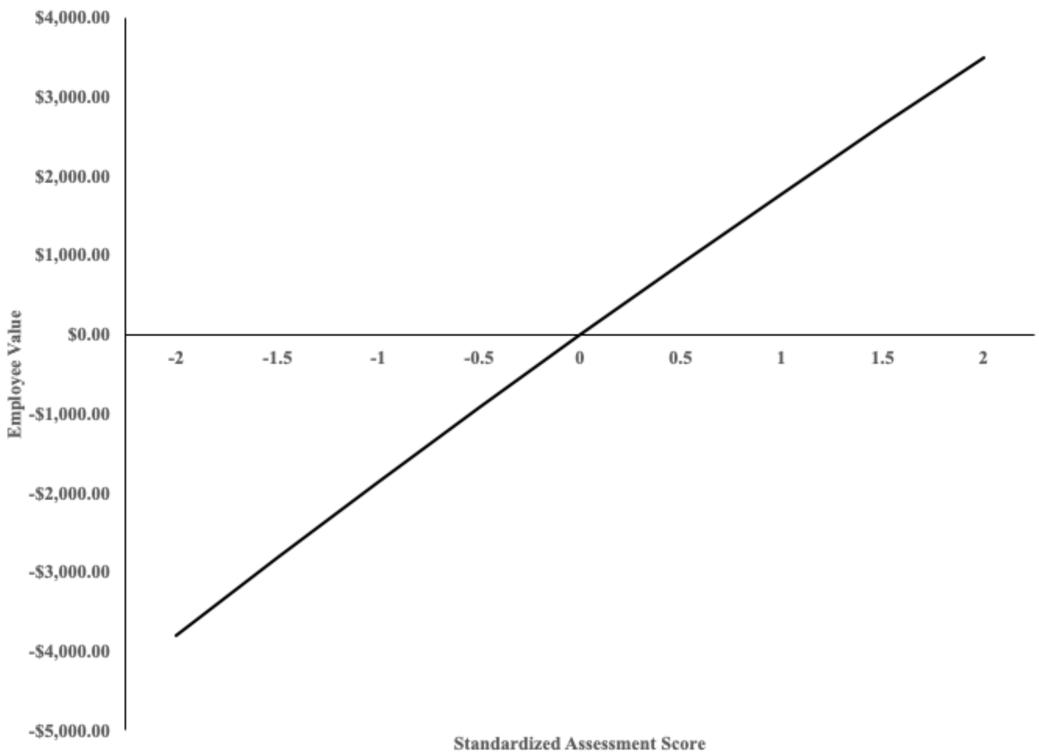

Figure 5.3 Marginal Employee Financial Value by Standardized Assessment Score

The curvilinearity is a result of the mathematical relationships between performance and cost. It is not more curvilinear only because the relevant range of performance lies in the region which is relatively flat. Third, figure 5.4 shows the relationship between unit and employee value over time. It is split between a relatively high and low performing unit. Interestingly, the unit-level effect is much larger than the assessment score effect. In addition, the line is not parallel showing that the differences in employee value cannot be captured by simply adding a unit effect. This is because unit impacts the initial level of performance as well as the level of growth over time and probability of turnover. This is not contrary to any form of validity as the assessment score rank orders performance in all units, but different units are able to leverage the differential human capital resources more or less effectively.

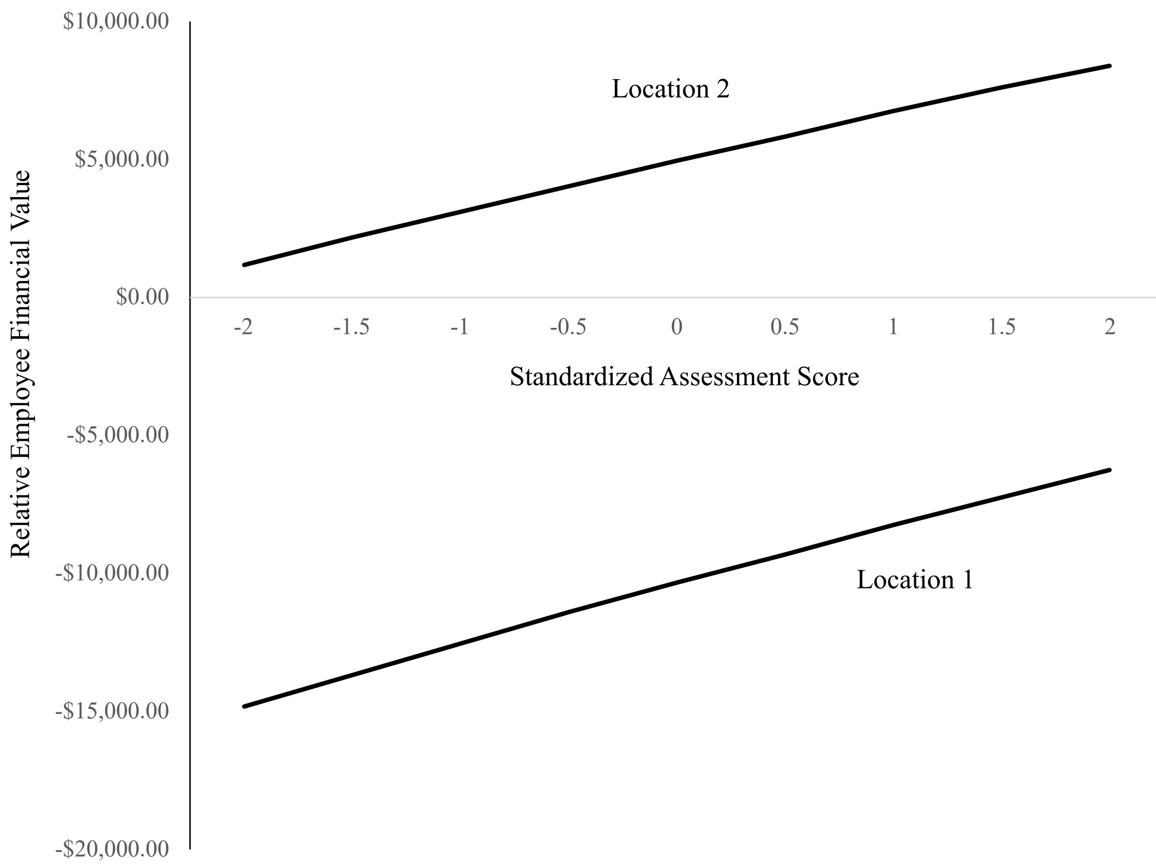

Figure 5.4 Marginal Employee Financial Value by Location

The unit-level effect in Figure 5.4 is much larger than that of assessment score. So much so, that if a senior manager was choosing between an applicant with an assessment score 2 standard deviations above the mean in location 1 vs 2 standard deviations below the mean in location 2, the manager would choose the applicant with a score 2 standard deviations below the mean assessment score in location 1. This shows the power of understanding employee financial value on the margin (Jones and Wright, 1992).

There are a few things to note about this finding. First, the two locations were chosen because of their relative size and performance. Location 1 has 659 hires in the focal time period while Location 2 has 1,560 hires in the focal time period. Other units have differences which are larger or smaller. Second, the two locations vary on a number of dimensions including managers, technology (as a result of acquisitions they are using different systems), and geographic location. So, while it is clear there are large differences between the units, I do not have data to pinpoint the exact drivers of the differences. Third, it is likely that differences this large would show up in standard performance reports which would drive managers to understand there are major differences between the units. However, some of the impact may be masked depending on distributions and tenure of other employees who are not new hires. Even if managers where able to realize the major differences in performance, this view of performance differences would give managers the ability to answer questions such as, "how much would value increase if I made across-the-board changes in the hiring threshold vs. if I could export half of the incremental benefit from location 2 to location 1?"

5.3 EFVAL VS UTILITY ANALYSIS

In order to compare the results of the EFVal model to utility analysis, I also conducted a standard utility analysis using the same data. This is a situation in which there are multiple criterion. In this case, both criterion are equally weighted and can be converted to specific dollar values. Therefore, I simply used performance on both calls per hour and revenue per call at each interval of assessment score to create a dollar value of performance. Figure 5.5 shows the utility analysis compared to the EFVal model. There are two things to note. First, the utility analysis is not able to capture the non-linearity of the relationship between assessment score and employee value. Second, the utility analysis shows a lot more slope when looking over the range of assessment scores. This is because the utility analysis is not able to capture the impact of unit on the relationship between assessment score and performance over time. As a result, it is capturing the overall correlation between assessment score and employee value without being able to differentiate the amount of variability that is actually due to different performing units having different distributions of employees. The implication is that utility analysis would overstate the value of changes in selection criteria. It should be noted that this is not a generalizable finding. Not all unit-level differences will lead to a lower correlation between the assessment score and employee value. In fact, it could go the other direction. It does point out the need for accurate employee valuations models to be able to account for this effect. It also points out that the relationship between valid assessments and employee value can be contingent on contextual factors that cannot be captured by simply including a linear additive value.

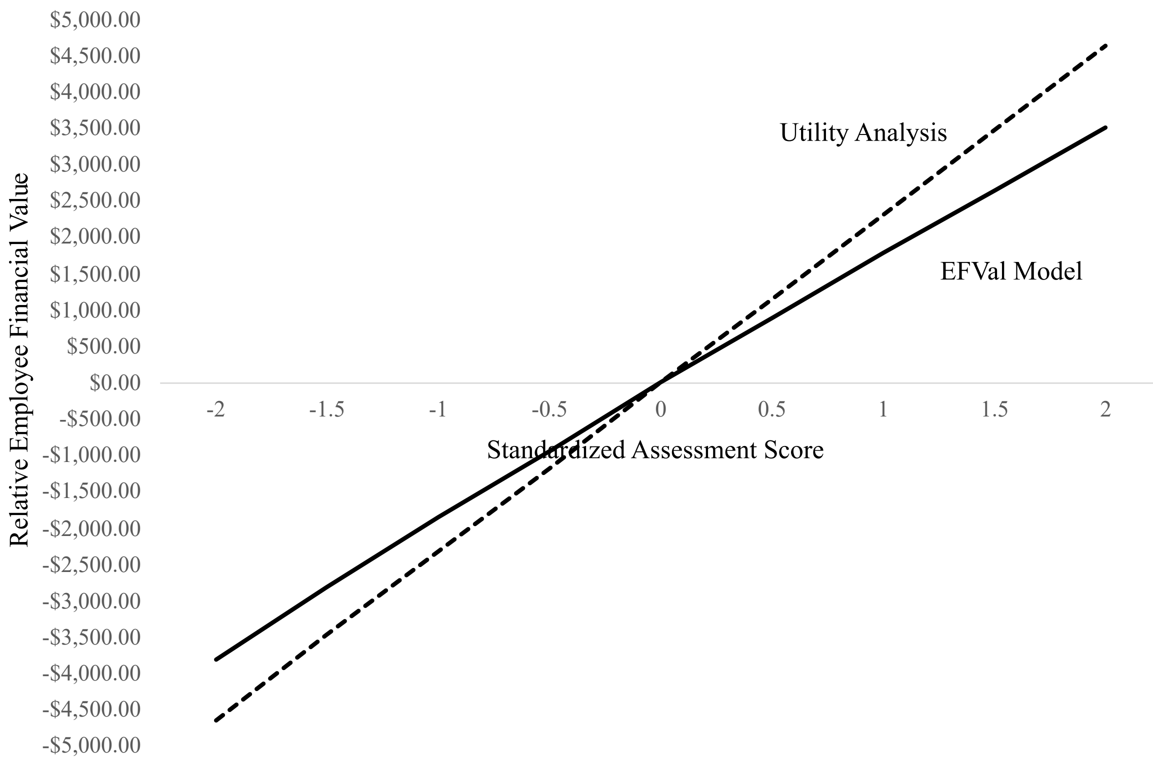

Figure 5.5 EFVal Model vs. Utility Analysis

The added benefit of the EFVal model is that it can be used to answer two different questions. Whereas the utility analysis is focused on the value of the intervention, the EFVal model can be used to discount employee value to the time or acquisition, or to value the portfolio of customer service representatives at any given time. A manager could simply use a unit's distribution of assessments scores and tenure to predict the overall performance of CSRs in any given month. In addition, the impact of additional interventions can be incorporated into the analysis by simply incorporating their impact on any of the particular dimensions of performance.

CHAPTER 6

DISCUSSION

The idea that people are the most important asset to any organization has become almost axiomatic in the 21st century (Hitt, Bierman, & Shimizu, 2001; Wright & McMahan, 2011, Fulmer & Ployhart, 2014). People and the value they create are theoretically central to the SHRM and HCR literature which rely heavily on the VRIN framework of RBT (e.g. Nyberg et al., 2014). However, measuring the value of employees has proven difficult over the past several decades (Fulmer & Ployhart, 2014, Sturman, 2012). Utility analysis has been the most popular method to value people related constructs. However, that research has waned, and the conceptual structure of utility analysis has received criticism on multiple dimensions (Sturman, 2012). This is problematic as the relationship between employees and value is a central question facing management scholars (Barney & Clark, 2007; Bowman & Ambrosini, 2010; Call & Ployhart, 2020; Lepak, Smith, & Taylor, 2007; Sundaram & Inkpen, 2004).

Therefore, the purpose of this dissertation is to contribute to the literature defining and measuring employee and human capital resource value. First, I identified the theoretical importance of employee value in the SHRM and HRC literature (e.g. Call & Ployhart, 2020; Chadwick, 2017; Ployhart et. al, 2014). Second, I offer a more precise conceptualization of employee value which matches its theoretical underpinnings. Third, I leverage similar constructs in the marketing literature to define EFVal models to measure employee value. Fourth, I validate the EFVal model in a sample of Customer

Service Representatives from a large communications company. Fifth, I show the benefit of the EFVal model relative to utility analysis which is currently the most common way of evaluating people-related value (Fulmer & Ployhart, 2014; Sturman, 2012). These contributions have important implications for theory and managers.

6.1 THEORETICAL IMPLICATIONS

The EFVal model and the results of our hypotheses have several theoretical implications. First, the results of the EFVAL model show that job performance and value creation are not perfectly linearly correlated. This violates a basic assumption of utility analysis and implies that utility analysis may be an inaccurate representation of the value of personnel selection (or other interventions) when value is calculated separately from performance (Call & Ployhart, 2020).

Second, the results of the EFVAL model show that employee value can be related to job performance and other behaviors such as turnover. In order to correctly estimate employee value creation over time, these effects must be included in an employee valuation model. This means that utility analysis or any other framework needs to simultaneously accommodate these behavioral differences in order to accurately value employees and HR related interventions.

Third, the results of the EFVAL model show that unit-level context can moderate the relationship between individual-level human capital resources and expected value creation over time (Ployhart & Moliterno, 2011; Call & Ployhart, 2020). However, perhaps the most interesting thing is that these results do not contradict validity generalization. Instead they show that selection practices with the same level of validity can have different relationships with the expected level of value creation in different contexts (Schneider et al., 2000).

Fourth, there have been calls to integrate theory and empirical research across levels and disciplines in the SHRM and SHCR literatures (Nyberg & Wright, 2015; Ployhart et al., 2014). The conceptualization of employee value offered in this dissertation distinguish it from employee performance and provide a platform in which to examine the multi-level, multi-discipline constructs related to employee value. Understanding when and how these constructs integrate within the employee can lead to additional theoretical insights.

Fifth, theory and methods go hand in hand (Antonakis et al., 2010; Cucina & McDaniel, 2016). In general, much of the managerial literature has suffered from an inability to measure employee value and make specific predictions about how various constructs will affect it (Fulmer & Ployhart, 2014; Sturman, 2012). The ability to build strong theory is contingent on the ability to make specific as opposed to directional predictions (Schmidt & Pohler, 2018). The EFVal models provide a way to measure when, how, and by how much different HR interventions are likely to impact employee value. This ability to make specific predictions will increase the ability of researchers to build stronger theory.

Lastly, in order to understand the strategic value of resources, the RBT relies on the VRIN framework. The concept of value is a primary consideration when identifying which resources can contribute to competitive advantage. Therefore, in order to understand whether or not Human Capital Resources or HR policies are strategic, we must understand how value is created and how it is measured (Call & Ployhart, 2020).

The conceptualization of employee value and the EFVal framework presented in this dissertation provide mechanisms to link employees to value creation and answer questions like: How does an intervention change employee value? Which employees are more valuable? Which interventions impact the value of employees most? When will the impact of an intervention create value and how long will it last? The ability to answer these questions will create more precise understanding of strategic value and more specific theory which can increase the ability to make causal inferences in the SHRM and SHRC literatures (Cucina & McDaniel, 2016).

6.2 MANAGER IMPLICATIONS

The EFVal framework has several implications for managers. First, The EFVal framework helps managers understand how different HR policies, practices, or systems of practices will affect employee value individually, simultaneously, or in combination. Therefore, this framework is a platform on which managers can understand the value of different HR levers and have more confidence in their HR and HCR related investments (Ulrich & Brockbank, 2005). It also provides a framework in which managers can understand the interactive dynamics of multiple HR policies and therefore have greater clarity about how HR systems are creating value for the organization. This will give managers the ability to make tradeoff decisions as they evaluate the most effective ways to invest in their employees. For example, in the empirical test of the EFVal framework in this dissertation, managers could tradeoff investments in improved selection tests vs. transporting best practices from the better performing units.

Second, the employee value framework and model in this dissertation show that managers decision making can be enhanced by integrating multiple levels and time. It is not enough to look at simple correlations and utility analysis. In order to accurately understand employee value, managers need to understand intra-individual changes in performance over time, inter-individual changes in performance over time, and contextual drivers of employee performance over time. In addition, it is necessary to understand how employee value at the individual-level integrates to create employee value at the unit level. The EFVal model and framework show that unit-level employee value is not necessarily simple summations of individual value creation. In other words, more is not always better (Ployhart & Hale, 2014).

Third, EFVal models become a mechanism to integrate employee value of other constructs such as social capital and personal brand. By integrating these constructs into a single measure of value, managers can better understand the integrated value created by employees (e.g. Rafiee & Bynum, 2020). By integrating the value of these constructs, managers can make better decision about investments in employees, in aggregate and on the margin.

Taken together, the findings in this dissertation show the benefits of a more flexible and comprehensive framework to measure the financial value of employees and their human capital resources. It should be noted that, in practice, the EFVal framework expands and augments utility analysis but both may have places in a practitioner's toolbox. In order to create an EFVal model, the assumptions have to be grounded in data, and the value becomes more apparent in larger organizations where things like unit-level differences matter. In small businesses, businesses without data, or businesses relying exclusively on third-party tools, the simplicity of utility analysis may be enough to give directional guidance about the differential value of specific interventions. In such cases, it may be impractical or impossible to create a specific EFVal model. In addition, the flexibility of the framework could mean that two different organizations implement the models in different ways. For example, in the personnel selection context presented in this dissertation, I chose to model performance and then input those predictions into the EFVal model framework. Other options include calculating the EFVal for each employee at each time and then using EFVal as the dependent variable. Differences in these two approaches might yield different results and have different benefits depending on the purpose.

6.3 LIMITATIONS AND FUTURE DIRECTIONS

This dissertation has several limitations that should be pointed out. First, while one of the major benefits of the EFVal framework is integration, this dissertation focuses explicitly on the human capital resources of employees. This was done because human capital resources are a major driver of employee performance and value. In addition, the theoretical considerations of the human capital resources literature are similar to those of the employee value construct. However, the framework is flexible enough to include additional drivers of employee value. Future research can continue to identify how additional constructs might interact with human capital resources to drive employee value.

Second, the sample used to test the EFVal framework consists of a single organization, in a single industry applying a single HR policy. While this has the benefit of controlling for industry, it also prevents broad statements about generalizability. Future research can examine the framework in different industries or with different interventions. Testing across multiple industries and interventions will further the generalizability and help identify ways in which the framework can be altered to be more effective across contexts.

Third, the test of the EFVal framework in this dissertation is specific to a pooled workflow environment. In such a case, it is appropriate to focus on employee value at an individual level since the unit's employee value creation is a simple summation of individual-level employee value creation. While it is appropriate given the specific application, it is also the simplest form of the EFVal framework. Future research can continue expanding the theoretical and empirical base to include specific tests in other workflow structures; specifically, those where unit performance may be the lowest level of performance.

Fourth, in the test of the EFVal framework, I do not have measures of salary over time. Compensation is largely composed of hourly wages and does not change much in the first year, but employees do get small bonuses based on sales performance and it is likely there are minor changes in salary over time. It is possible that some of the turnover dynamics are driven by increased pay for high performers. It is also possible that higher pay over time is lowering the value of higher performance for the firm. Future research can examine how pay policy and increases impact employee value over time.

Fifth, in the test of the EFVal model, it is clear that unit-level context matters. However, I do not have measures of specific unit-level characteristics such as local labor market, climate, technology, or leadership style. In line with Call & Ployhart (2020), it would be interesting to understand which of the unit-level characteristics are driving the impacts to employee performance and turnover across time. Future research can continue to explore these unit-level constructs and their relationship to employee value creation.

Lastly, the employee value conceptualization in this dissertation has the capacity to integrate non-financial benefits such as customer satisfaction while the EFVal model is focused only on financial benefits. Future research can continue to explore how to integrate the value of constructs which are hard to denominate in dollars. For example, customer satisfaction is important to organizations but hard to quantify with direct dollar attributions. Future research can continue to explore how to integrate these constructs in a way that helps managers make integrated decisions which incorporate all forms of employee value.

CHAPTER 7

CONCLUSION

In order to add to the literature on the measurement of employee value, this dissertation, first, explores the importance and centrality of the employee value concept in the SHRM and HRC literatures. Value is critical to understanding how HR interventions and human capital resources contribute to the strategic position of organizations. However, measuring the value of employees has proven difficult because of the nature and complexity of the construct. Therefore, this dissertation provides a more precise conceptualization of employee value which recognizes it as multi-level, multi-dimensional, and time dependent. This conceptualization has important implications for the qualities of an appropriate measurement framework as the measurement framework must be able to accurately reflect these characteristics. In order to develop a more aligned measurement framework, I leveraged concepts from the marketing literature to outline the EFVal framework. The EFVal framework is specific enough to account for the theoretical complexities of employee value, but generic enough to allow flexibility in terms of how specific dimensions are measured or built. A test of the EFVal framework shows the value and importance of a measurement framework that matches the theoretical qualities of the construct it is meant to capture. Together these findings, provide additional theoretical and empirical precision to a value concept that is important in understanding the relationship between HR practices, human capital resources, and the strategic position of firms.

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