Journal of Applied Psychology
2014, Vol. 99, No. 3, 361–389

0021-9010/14/$12.00 DOI: 10.1037/a0035408

MONOGRAPH

The Effects of Staffing and Training on Firm Productivity and Profit Growth Before, During, and After the Great Recession

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This study integrates research from strategy, economics, and applied psychology to examine how organizations may leverage their human resources to enhance firm performance and competitive advantage. Staffing and training are key human resource management practices used to achieve firm performance through acquiring and developing human capital resources. However, little research has examined whether and why staffing and training influence *firm-level* financial performance (profit) *growth* under different environmental (economic) conditions. Using 359 firms with over 12 years of longitudinal firm-level profit data, we suggest that selective staffing and internal training directly and interactively influence firm profit growth through their effects on firm labor productivity, implying that staffing and training contribute to the generation of slack resources that help buffer and then recover from the effects of the Great Recession. Further, internal training that creates specific human capital resources is more beneficial for prerecession profitability, but staffing is more beneficial for postrecession recovery, apparently because staffing creates generic human capital resources that enable firm flexibility and adaptation. Thus, the theory and findings presented in this article have implications for the way staffing and training may be used strategically to weather economic uncertainty (recession effects). They also have important practical implications by demonstrating that firms that more effectively staff and train will outperform competitors throughout all pre- and postrecessionary periods, even after controlling for prior profitability.

Keywords: staffing (recruiting and selection), training, strategic human resources, recession

Understanding the factors that contribute to firm heterogeneity, growth, and competitive advantage has captivated the attention of organizational scholars for decades (e.g., Penrose, 1959). A rich literature in strategic management and economics has helped identify many of these factors, but the role that people play in this process has been rather simplistic and frozen in time. This historical view is beginning to unthaw, as strategic management researchers are increasingly examining the psychological origins of organizational effectiveness through the study of human capital resources (see Ployhart & Hale, in press). A natural progression in human capital research would be to connect to the psychological literature on staffing (recruiting and personnel selection) and training, as these human resources (HR) practices profoundly shape the nature of human capital resources (e.g., Coff & Kryscynski, 2011). However, this integration has been slow to occur. One reason is because even after a century of research on staffing and training, we still know relatively little about whether they influence firm-level performance, and why any such effects may occur (Schneider, Smith, & Sipe, 2000). Nearly all of the prior research has been conducted at the individual level, and although it has generated many important insights, recent research has been calling for direct examinations of staffing and training on firm-level performance (Schneider, Ehrhart, & Macey, 2012). For example, Ployhart (2012) questioned, ". . . when viewed from the lens of strategic management, one might question the extent, or at least the certainty, to which use of valid personnel selection can contribute to an organization's competitive advantage" (p. 69).

One of the reasons strategy research is often dismissive of "micro-level" research is because the latter tends to ignore the role of context and environment. In contrast to the individual level research on staffing and training, strategy research suggests that the relationships found at the firm level will be dependent on the firm's strategy and environmental influences (Delery & Doty, 1996; Jackson & Schuler, 1995; Youndt, Snell, Dean, & Lepak, 1996). One profound type of environmental influence is an *economic recession*, defined as a significant decline of economic activities lasting several months (National Bureau of Economic Research [NBER], 2001). Recessions occur with regular frequency, yet sometimes with little warning and broadly transform the competitive landscape for organizations (Tvede, 1997). Severe

This article was published Online First December 30, 2013.

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This article greatly benefitted from the advice of Matt Call, Michael C. Campion, Donnie Hale, Yasemin Kor, Lynn McFarland, Anthony Nyberg, DJ Schepker, Mike Ulrich, and Patrick Wright.

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recessions require fundamental changes to organizational strategy (Latham & Braun, 2011), and hence have the potential to influence the value of staffing and training on firm performance.

The purpose of this study was to integrate scholarship on economics, strategy, and firm performance, with industrial-organizational scholarship on staffing and training, to examine whether firms that use more rigorous staffing and training outperform firms that do not—before, during, and recovering from the Great Recession.[1] We show that such an integration leads to several new insights that contradict long-standing findings within each literature independently. First, the findings demonstrate the firm-level strategic value of staffing and training, suggesting that such practices enhance not only internal performance but also financial performance growth that differentiates the firm from competitors. Examining effects on firm-level performance growth responds to criticisms that staffing and training are not strategic and has, as Schneider et al. (2012) put it, ". . . severely held back progress . . ." (p. 97). Second, we demonstrate that at the firm level, staffing and training contribute to financial performance growth due to enhancing the firm's labor productivity. This mediated model connects micro scholarship (which tends to focus on internal firm performance) with macro scholarship (which tends to focus on external firm performance) to illuminate "the black box" between HR practices and external firm performance (B. E. Becker & Huselid, 2006). Finally, we show that the mediated effects of staffing and training on financial growth differ between pre- and postrecession periods. These conditional effects are consistent with predictions from the strategy literature, but somewhat inconsistent with the contextually invariant findings typically observed at the individual level. We use a longitudinal design that precedes and encompasses the Great Recession, which offers a "naturalistic experiment" to test this question. A focus on financial growth further helps demonstrate the use of staffing and training to build a firm's competitive advantage (Peteraf & Barney, 2003) and adds rigor into theory building and testing (Mitchell & James, 2001; Wright & Haggerty, 2005). It also contributes to a broader call for understanding the effects of recessions on organizations (Latham & Braun, 2011). In terms of practical contributions, we show how staffing and training help firms buffer the deleterious effects of economic recessions and recover more quickly.

To develop these contributions, we examine the relationships between selective staffing, internal training, labor productivity, and firm financial performance (profit) growth using a sample of 359 firms with objective financial performance data collected from 1999 to 2011. Staffing and training are operationalized in terms of the firm's selection ratio (number of full-time hires/number of full-time applicants) and proportion of full-time employees trained internally (measured in 2005). Utility analyses suggest that selection ratio is one of the strongest determinants of the overall quality and value of staffing systems (Boudreau & Rynes, 1985; Cabrera & Raju, 2001; Cascio, 2000; Cronbach & Gleser, 1965; Taylor & Russell, 1939). Because all firms in this study used at least one type of formal staffing practice (e.g., interview, cognitive tests), selection ratio represents a proxy for the quality of generic human capital resources, where more selective systems produce higher quality (Cabrera & Raju, 2001). Percentage of employees internally trained has been widely used as an indicator of a firm's development activities that enhance firm-specific human capital resources (e.g., Delaney & Huselid, 1996; Russell, Terborg, & Powers, 1985; Tharenou, Saks, & Moore, 2007).

Theoretical Framework

The psychology and strategic human resource management (SHRM) literatures provide a rich theoretical foundation suggesting that HR should play an important role in achieving a firm's competitive advantage (Combs, Liu, Hall, & Ketchen, 2006; Huselid, 1995; Wright, McMahan, & McWilliams, 1994). Staffing and training are particularly vital HR functions for influencing the acquisition and development of employees' knowledge, skills, abilities, or other characteristics (KSAOs; Jiang, Lepak, Hu, & Baer, 2012; Lepak, Liao, Chung, & Harden, 2006). In the aggregate, these employee KSAOs comprise organizational level forms of human capital resources that contribute to a firm's performance (Ployhart & Moliterno, 2011). Human capital resources are composed of two types (Barney & Wright, 1998). *Generic human capital resources* are based on KSAOs such as general cognitive ability or knowledge that are valuable in different contexts or organizations. *Specific human capital resources* are based on KSAOs such as knowledge and skills that are mainly valuable to a particular organization. The strategy literature suggests that specific human capital resources are the more proximal determinant of firm competitive advantage because they are harder to build and imitate (e.g., Hatch & Dyer, 2004). Staffing is expected to primarily impact the acquisition of generic human capital resources, whereas training is expected to primarily impact the development of specific human capital resources (Hatch & Dyer, 2004; Lepak et al., 2006; Ployhart, Van Iddekinge, & MacKenzie, 2011).

However, it is still relatively unclear how and why staffing and training generate financial performance *growth* over time. To address this neglect, we draw from multilevel staffing models (Ployhart, 2006; Ployhart & Schneider, 2002) and human capital research (Crook, Todd, Combs, Woehr, & Ketchen, 2011; Ployhart & Moliterno, 2011) to develop a mediated model linking staffing and training to firm financial growth through their effects on internal firm performance. Internal performance and financial performance are related, but they are not interchangeable (Huselid, 1995; Richard, Devinney, Yip, & Johnson, 2009). Internal performance is sometimes known as *operational performance* and relates to the effectiveness and efficiency by which a firm deploys its internal resources, including human capital resources (Crook et al., 2011; Dyer & Reeves, 1995). Internal performance is more proximally linked to HR activities (Lawler, Levenson, & Boudreau, 2004), and ". . . closer to the actual competitive advantages created by superior human capital" (Crook et al., 2011, p. 445). In contrast, financial performance is determined by factors both external and internal to the firm. External influences include a firm's competitive market and economic conditions (White & Hamermesh, 1981). Internal influences include HR practices that affect costs or revenues (Barney & Wright, 1998).

In this study, internal performance is operationalized in terms of labor productivity (hereafter, simply productivity), and external performance is operationalized in terms of profit. Productivity is

[1] The Great Recession is defined as the recessionary economic period that existed between December 2007 and June 2009.

the efficiency of a firm's workforce to produce output. Most HR managers emphasize productivity because it is closely tied to HR activities and human capital while being less influenced by factors external to the firm. External performance is operationalized in terms of profit, which in this study is the widely reported accounting metric of earnings before interest and taxes (EBIT; hereafter, simply profit). Profit is the ultimate criterion for the firm, and growing profit is one of the most important strategic goals for organizations (Penrose, 1959).

Productivity is a particularly important internal determinant of profit, but profit is also affected by environmental factors (Crook et al., 2011; Curtis, Hefley, & Miller, 1995). For example, a firm may be highly productive but fail to generate profitability given intense market competition, a decrease in consumer demand, or powerful stakeholders that extract positive effects of resources (Crook, Ketchen, Combs, & Todd, 2008; Peteraf & Barney, 2003). However, greater productivity means human capital resources are efficiently deployed and hence generating above-normal returns. Enhancing productivity is therefore an important way to build slack resources. As production increases without corresponding increases in human capital inputs (e.g., hiring more staff), costs are reduced while profits are raised, thereby increasing financial slack resources. Slack resources can then be used to expand operations, pursue new product innovations, and reach new customers (Latham & Braun, 2008). A more productive workforce thus enables a firm to pursue additional profit-generating opportunities (Barney & Wright, 1998). For example, 3M expects employees to spend a portion of their time pursuing new product innovations, and they can enable such exploration because they have sufficient productivity to meet required operational performance objectives.

Cumulatively, these lines of theory suggest that productivity should contribute to profit growth over time due to greater returns from human capital and the generation of slack resources (Penrose, 1959). Yet, productivity is expected to be highly affected by HR interventions and the corresponding human capital resources they generate (Crook et al., 2011). We argue that the reason staffing and training contribute to profit growth is through their effects on productivity. However, in contrast to prior research, we expect the nature of these relationships to differ depending on whether they are examined before or after a recession.

Prerecession Hypotheses

The first set of hypotheses focus on the effects of staffing and training before the Great Recession (prior to 2008). This period is marked by a growing economy and high consumer demand. Firms faced enormous HR challenges in the period prior to the Great Recession. Unemployment was low and wages were high, which contributed to considerable mobility and hence difficulties in attracting, selecting, and retaining employees. Staffing and training thus played vital roles in enhancing productivity, profit growth, and competitive advantage.

Staffing is the means by which firms recruit and select applicants with higher quality KSAOs and generic human capital (Guion, 2011; Schmitt & Chan, 1998). In multilevel staffing models (Ployhart, 2006; Ployhart & Schneider, 2002), selective staffing enhances productivity and profit growth in two distinct ways. First, to the extent that KSAOs are job related and have been linked to performance outcomes (e.g., job analysis), firms that acquire higher quality KSAOs are more likely to have effective task and citizenship performance, both individually and collectively (e.g., Ployhart, Weekley, & Ramsey, 2009; Van Iddekinge et al., 2009). Costly turnover is also reduced because selective staffing increases the likelihood that employees have the KSAOs needed to effectively perform the work (Schneider, 1987). Therefore, the enhanced productivity of individuals contributes to productivity and then profit growth through increasing revenues and reducing costs (Cascio & Boudreau, 2008; Lepak et al., 2006; Ployhart & Schneider, 2002; Podsakoff, Whiting, Podsakoff, & Blume, 2009). Second, multilevel staffing models suggest selective staffing contributes to firm outcomes through the accumulation of generic human capital resources. Generic human capital resources are collective, firm-level constructs that are based on a process of emergence (Ployhart & Moliterno, 2011). Firms better able to attract and hire the best applicants build a generic human capital resource that is valuable, rare, and difficult to imitate (Ployhart et al., 2009), thus contributing to differentiating the firm and developing a competitive advantage. Generic human capital resources also contribute to firm-level productivity because higher quality generic resources contribute to knowledge sharing and accumulation (Felin, Zenger, & Tomsik, 2009), and enhance workforce efficiency and flexibility (Evans & Davis, 2005).

We operationalize *selective staffing* as a firm's overall selection ratio. Selection ratio captures the effectiveness of both recruiting and selection. Companies better able to source and attract candidates get a higher number of quality applicants who accept positions with the firm. Further, firms that employ rigorous selection methods (e.g., job-related cognitive or personality tests) will generate even higher applicant quality if they select only the highest scoring applicants on those assessments. Numerous studies in the personnel selection literature identify the fundamental role that the selection ratio has in shaping the economic utility of a selection system (Alexander, Barrett, & Doverspike, 1983; Boudreau & Rynes, 1985; Cabrera & Raju, 2001; Cascio, 2000; Sackett & Ellingson, 1997; Schmidt & Hunter, 1998).

Training is the means by which firms develop more firm-specific human capital resources (Aguinis & Kraiger, 2009; Noe, 2008; Tharenou et al., 2007). Providing extensive training enhances employees' knowledge of their firm's operations, markets, customers, coworkers, and products, thereby enhancing productivity by creating more efficient operational capabilities and routines (Aguinis & Kraiger, 2009; Arthur, Bennett, Edens, & Bell, 2003; Kozlowski, Brown, Weissbein, Cannon-Bowers, & Salas, 2000; Tharenou et al., 2007). However, *internal training* (training focused on developing knowledge specific to a firm) is a particularly strong determinant of productivity and profit growth. Internal training contributes to the accumulation of knowledge that is firm specific and tacit, and it is this form of knowledge that is the most proximal predictor to firm performance because it is embedded within a specific firm's context and tied to specific coworkers, processes, and customers (Grant, 1996a, 1996b; Hatch & Dyer, 2004). Such knowledge increases productivity because it enhances shared knowledge and mental models (DeChurch & Mesmer-Magnus, 2010; Evans & Davis, 2005), transactive memory ("who knows what"; Ren & Argote, 2011), and contributes to the formation of organizational routines (Parmigiani & Howard-Grenville, 2011). Routines are the ". . . repetitive patterns of interdependent organizational actions" (Parmigiani & Howard-Grenville, 2011, p.

417) that are socially complex, context dependent, and inimitable (Cyert & March, 1963). They are especially important for enhancing productivity because more firm-specific and tacit knowledge leads to interdependent and coordinated actions that facilitate knowledge transfer and learning by minimizing cost (Argote, 1999; Feldman & Pentland, 2003; March, 1991). Such knowledge also increases profitability because specific human capital resources are difficult for other firms to imitate (Grant, 1996a, 1996b). Because specific human capital resources are not easily transferred into other firms without cost of value (Mahony & Pandian, 1992), the competitors cannot easily deploy specific human capital in an equally productive manner (Koch & McGrath, 1996). Thus, internal training that develops firm-specific human capital resources are among the most important competitive resources (Hitt, Bierman, Shimizu, & Kochhar, 2001).

We operationalize the *extent of internal training* as a firm's overall percentage of full-time employees internally trained on the job. This operationalization is similar to prior SHRM research (Delaney & Huselid, 1996; Huselid, 1995; Mabey & Ramirez, 2005; Murray & Raffaele, 1997; Ployhart et al., 2011; Russell et al., 1985; Tharenou et al., 2007; Van Iddekinge et al., 2009). Specifically, the internal on-the-job training helps firms develop employees' knowledge and skills required to effectively perform tasks specific to their organizational context (Aguinis & Kraiger, 2009), and thus the higher the portion of employees who were internally trained on the job, the greater firm-specific knowledge and skills.

Further, workforce productivity should *partially* mediate the effects of staffing and training on profit growth. We posit partial mediation because when the economy is strong, building higher quality human capital resources through staffing and training also contributes to other favorable organizational outcomes beyond their effects on productivity. First, the slack resources generated through higher productivity can be put to productive service when the economy is strong (Latham & Braun, 2008). Firms with higher quality generic and specific human capital resources can leverage these resources to pursue new product innovations, additional capacity, or product extensions, which contribute to financial performance growth by generating new products, growing revenues, and cutting costs (Damanpour, 1991; Damanpour & Evan, 1984; Danneels, 2002; Subramaniam & Youndt, 2005). Second, higher quality generic and specific human capital resources contribute to social capital and hence growing relationships with new customers and businesses (Lengnick-Hall, 1996; Oldroyd & Morris, 2012). Therefore, when the economy is strong and growing, staffing and training will not only positively influence productivity but also directly and positively influence profit growth.

Hypothesis 1a, Hypothesis 1b: Prerecession, firms with more selective staffing have greater (a) productivity and (b) profit growth than firms with less selective staffing.

Hypothesis 2a, Hypothesis 2b: Prerecession, firms with more internal training have greater (a) productivity and (b) profit growth than firms with less internal training.

Hypothesis 3: Firm prerecession productivity has a positive effect on firm prerecession profit growth.

Hypothesis 4a, Hypothesis 4b: Firm prerecession productivity partially mediates the positive effects of (a) selective staffing and (b) internal training on prerecession profit growth.

Thus far, selective staffing and internal training have been conceptualized to relate directly to performance in an independent manner. In contrast, a more recent alternative theoretical view suggests that *complementarities* may exist between staffing and training, and the corresponding human capital resources they create (Campbell, Coff, & Kryscynski, 2012; Ployhart et al., 2011). Complementarities are defined as the ". . . interplay of the elements of a system where the presence of one element increases the value of others" (Ennen & Richter, 2010, p. 207). Proposing complementary, interactive relationships between selective staffing and internal training is somewhat counter to the direct relationships hypothesized above. Existing theory suggests either direct or interactive relationships may exist, yet there is only modest empirical evidence supporting either perspective (see Ployhart, Nyberg, Reilly, & Maltarich, in press). Therefore, we develop the following interactive hypotheses not as competing hypotheses to those presented above, but as alternative conceptualizations to determine whether data support one perspective more than another. There are two broad theoretical reasons to expect interactive complementarities.

First, SHRM theory suggests that HR practices combine into systems that influence internal firm performance. Research on these high-performance work systems suggest that synergistic effects of HR practices are stronger than the effects of any particular HR practice in isolation (Combs et al., 2006; Huselid, 1995; Jiang et al., 2012). The reason is because different practices have different effects on employee ability, motivation, and opportunity, yet all three are needed to enhance productivity and performance (Jiang et al., 2012). For example, selection and training are expected to have stronger effects on employee ability, whereas job design is expected to have a stronger effect on creating opportunity. Given that HR practices are most proximally linked to internal firm performance (Jiang et al., 2012; Lepak et al., 2006), we expect an interaction between selective staffing and internal training on firm productivity. Indeed, training is generally more effective (offers greater return) when more selective staffing has ensured higher quality candidates (Aguinis & Kraiger, 2009).

Second, theory in the strategy literature is increasingly emphasizing the study of resource complementarities as determinants of external firm performance (Adegbesan, 2009; Ennen & Richter, 2010; Schmidt & Keil, 2013). Human capital resource complementarities have the potential to generate above-normal financial returns relative to the resources deployed in isolation because resource complementarities are more difficult to imitate, do not have preexisting or efficient factor markets, and thus create synergistic effects on firm value creation (Campbell et al., 2012; Dierickx & Cool, 1989; Ployhart et al., in press). Such "interactive complementarities" between generic and specific human capital resources should lead to greater prerecession firm profit growth. The generally positive effect of generic human capital resources on profit growth should be enhanced by higher levels of specific human capital resources because employees have the capabilities to *both* exploit existing markets (through specific knowledge) and explore new markets (through generic knowledge). However, lower levels of specific human capital may actually weaken the

positive effects of generic human capital because the firm is unable to transform the generic skills into firm-specific capabilities. Thus, from both SHRM research on HR systems and strategy research on resource combinations, we expect:

Hypothesis 5: Prerecession, there is an interaction between selective staffing and internal training on productivity. The positive effect of selective staffing on productivity is stronger for firms whose employees have more internal training.

Hypothesis 6: Prerecession, there is an interaction between selective staffing and internal training on profit growth. The positive effect of selective staffing on prerecession profit growth is stronger for firms whose employees have more internal training.

Postrecession Hypotheses

The second set of hypotheses focus on the effects of staffing and training during and after the Great Recession (December 2007–June 2009). The Great Recession was the longest since World War II and radically transformed the global economic environment. Consumer demand changed, the global economy shrank, unemployment increased, and most firms experienced sharp declines in profitability (Ghemawat, 2009; Latham & Braun, 2011; Pearce & Michael, 2006; Tewari, 2010). Because a recession changes the nature of a firm's competitive environment and strategy, the effects of selective staffing and internal training may likewise differ from prerecession periods. Yet, this is where individual and firm-level theories differ. Most prior research (which is based on individual level data) gives little reason to suggest the benefits of staffing or training differ across economic periods, as much validity generalization research has observed (e.g., Colquitt, Lepine, & Noe, 2000; Schmidt & Hunter, 1998). However, firm-level SHRM and resource-based theory suggest the opposite, that the value of human capital created through selective staffing and internal training differs according to changes in the competitive environment and firm strategy (Delery & Doty, 1996; Jackson & Schuler, 1995; Youndt et al., 1996). As profit increases before the Great Recession (2007 and prior), drops at the *onset* of the recession (end of 2007-early 2008), and then recovers (turns back positive) through and after the recession (2009 and later), predictive relationships must necessarily change as well (Figure 1 provides an overview).

Recession Onset

The onset of the recession produces a significant reduction in firm profitability because the market radically changes (NBER, 2001).[2] Consequently, as the profit trajectory drops sharply at the recession onset, the relationships between staffing and training with profitability must change from positive to negative at this onset period, meaning that firms with better staffing and training should actually see a greater performance drop at the recession onset. This "sign reversal" may seem counterintuitive, but it is actually very consistent with the limited firm-level research on recession effects. For example, Latham and Braun (2008) argued (and empirically demonstrated) that firms that are outperforming competitors prior to a recession have maximized their fit to the competitive environment and are extracting more value from their existing resources. When the competitive environment changes, that fit is disrupted and the corresponding readjustment to a new economic reality is more dramatic. Thus, firms with more selective staffing and internal training should see greater performance reductions at the *onset* of the recession than competitors. However, we do not mean to imply that staffing and training become liabilities during a recession. First, we still expect firms with more effective staffing and training to have higher mean levels of performance at the recession onset than competitors. Second and more importantly, those firms that invested in staffing and training prior to the recession should manifest faster recovery during and after the recession.[3]

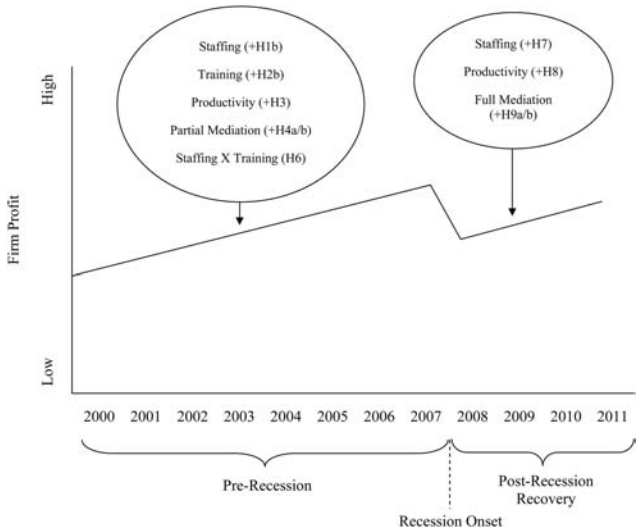

Figure 1. Firm profit growth, decline, and recovery as a result of recession events. H = Hypothesis.

Recession Recovery

Firms that used more selective staffing and internal training prior to the Great Recession should recover more quickly, as shown by greater profitability growth through the recession.[4] However, the explanation is different from the prerecession period because the competitive environment and corresponding strategic demands facing the firm have changed. Postrecession recovery demands rapid change, organizational flexibility, and adaptability (Latham & Braun, 2011; Pearce & Michael, 2006; Pearce &

[2] Productivity should be relatively unaffected because it is an internal performance metric, so our discussion of recession-onset effects is limited to firm profitability.

[3] We empirically show how the Great Recession dramatically altered firm profitability and predictive relationships to establish evidence for the effects of the recession, but we do not make specific hypotheses for these effects at the time of the recession's *onset*. There is clearly theory to do so, but we believe that such a time-specific focus draws attention away from the broader and more important point that selective staffing and internal training ultimately contribute to greater firm productivity and profitability. Across all time periods, we show that firms with more effective staffing and training outperform those that do not. Stated simply, "The bigger they are, the harder they fall, but the faster they get back up."

[4] Again, the emphasis is on profitability, as it is not expected that productivity will experience a change due to the recession.

Robbins, 2008; Tewari, 2010). The human capital needed to quickly learn new tasks is critical in rapidly changing environments (Ehrlich, 1994). By definition, generic human capital resources can be redeployed or rebundled for different environments and purposes and are particularly important for building organizational flexibility and adaptability (Ployhart & Moliterno, 2011; Way et al., 2012; Wright & Snell, 1998). This suggests that prerecession staffing, but not training, should be related to postrecession profit growth.

Indeed, recent studies suggest that enhancing skill flexibility contributes to firm productivity and performance in turbulent environments (e.g., Beltrán-Martín, Roca-Puig, Escrig-Tena, & Bou-Llusar, 2008; Bhattacharya, Gibson, & Doty, 2005; Ketkar & Sett, 2009, 2010; Ngo & Loi, 2008; Way et al., 2012). Hence, the acquisition of higher quality generic human capital resources through prerecession selective staffing should enable firms to better adapt and respond to change required by an economic recession, and hence be more profitable than competitors.

In contrast, developing specific human capital resources through internal training before the recession is unlikely to be related to postrecession profitability growth. Changing or shrinking demand for a firm's products or services may negate the value of internal training. The routines and specific knowledge that is built through internal training before a recession may no longer be as relevant to profitable growth postrecession (Collinson & Wilson, 2006; March, 1991; Szulanski, 1996). Routines and specific knowledge may even become sources of inertia that impede organizational flexibility for adapting to a postrecession environment (March, 1991; Parmigiani & Howard-Grenville, 2011). Szulanski (1996) further argued that the "stickiness" of routines and knowledge creates difficulties to transfer new routines within a firm. Adapting to a new postrecession reality requires developing new types of explicit and tacit knowledge and thus new routines, all of which are time-consuming (Grant, 1996b; Liebeskind, 1996; Teece, Pisano, & Shuen, 1997).

Notice that if supported, these predictions run counter to several prevailing findings in the extant literature. First, these predictions suggest that the acquisition of generic human capital resources (selective staffing) will be a stronger determinant of firm performance growth than the development of specific human capital resources (internal training)—directly contradicting research from the strategic human capital literature (e.g., Hatch & Dyer, 2004). Second, these predictions suggest that the value of internal training differs depending on broader economic conditions—directly contradicting research on training effectiveness at more micro levels (e.g., Colquitt et al., 2000).

Finally, just because internal training does not have a direct relationship with profit growth does not preclude the presence of an indirect effect. In contrast to the prerecession prediction for partial mediation, here we posit that prerecession productivity will *fully* mediate the effects of prerecession staffing and internal training on profit growth. The reason is because the slack resources generated prerecession that were used for exploring new profit-generating opportunities (e.g., new market development, product innovations, pursuing new customers) will now be consumed to counter the effects of the recession. In particular, postrecession periods are ones of reduced *environmental munificence*, which is the degree of resource abundance that firms can access externally (Latham & Braun, 2008). Consumer demand is stagnant, equity markets dry up, and firms have difficulties accessing alternative sources of capital (Pearce & Michael, 2006; Richardson, Kane, & Lobingier, 1998). Firms have incremental pressures for sustaining cost structures and cash flow that prevent them from accessing external resources (Zarnowitz, 1999). Thus, firms must "turn inward" and leverage their internal resources. Firms that better recover from this constrained environment must rely on prerecession slack resources to mitigate the recession effects (Latham & Braun, 2008). Then, as the constraints begin to lessen, any remaining slack resources enable more flexible responses to new environmental opportunities, which generate faster recovery and profit growth (Cheng & Kesner, 1997; Tan & Peng, 2003). Thus, prerecession productivity fully mediates the effects of prerecession staffing and training on postrecession profitability growth because the slack resources that previously contributed to above-normal returns are now being fully consumed and devoted to core aspects of the business needed to recover from the Great Recession.

> *Hypothesis 7:* Firms with more selective staffing (prerecession) have greater postrecession profit growth than firms with less selective staffing.

> *Hypothesis 8:* Firm prerecession productivity has a positive effect on firm postrecession profit growth.

> *Hypothesis 9a, Hypothesis 9b:* Firm prerecession productivity fully mediates the positive effects of (a) selective staffing and (b) internal training on postrecession profit growth.

Unlike the prerecession hypotheses, we do not expect an interaction between selective staffing and internal training on postrecession profit growth. Again, the reason is because the economic and competitive landscape has been transformed as a result of the Great Recession. The generic knowledge generated through selective staffing may be redeployed to pursue new or different market opportunities, whereas the tacit and firm-specific knowledge generated through internal training is no longer as relevant. Therefore, we do not expect an interaction between selective staffing and internal training. We test this interaction to provide further insight into the theory and postrecession effects but do not formally propose a null hypothesis.

Finally, the unique nature of the data set examined in this research affords an opportunity to consider several additional research questions that, although not central to the purposes of the present study, add meaning by putting the findings within the broader organizational and economic context. The first research question examines whether there are changes in firm staffing and training programs from 2004 to 2011. This informs questions as to the variability of HR practices and whether the Great Recession affected these practices. The second research question examines the role of collective turnover as a substantive variable that has the potential to attenuate the effects of selective staffing and internal training. There is a great deal of interest in collective turnover (Hausknecht & Trevor, 2011), and recent theory conceptualizes collective turnover as the erosion of human capital resources (Nyberg & Ployhart, 2013; Shaw, Park, & Kim, 2013). Hence, it is informative to examine whether the deleterious effects of collective turnover are affected by the Great Recession. The final research question considers whether support for the hypotheses is found with a different firm financial measure.

Method

Sample and Procedure

The Korean Research Institute for Vocational Education and Training (KRIVET, 2012) provided data from their Human Capital Corporate Panel (HCCP) Survey, and corporate annual financial data came from the Korean Information Service (KIS, 2013) that collected Korean corporate financial data from 1999 to 2011. HCCP data have been officially approved by the Korea National Statistical Office, and KRIVET provided HCCP data with the accounting performance data set together. The HCCP survey has been conducted every 2 years (2005, 2007, 2009, and 2011) and includes a battery of questions relating to HR practices. For hypothesis testing, we focused on the data in 2005 (which was collected at the end of December 2005) because it fully preceded the recession and we could model relations with performance growth over the longest period of time. The HCCP survey in 2005 was administered using on-site interviews with two HR managers. KRIVET contacted the persons at targeted firms, and HR managers were asked to rate staffing survey items, whereas HR development managers were asked to rate the training and development survey items. The referent for these items was the firm. Although the staffing or training items were completed by a single rater, there is evidence that managers from within the same firm can reasonably agree and produce ratings of reasonable reliability (Takeuchi, Chen, & Lepak, 2009). The survey for managers asked them to respond to the items in reference to 2004, and thus the survey items were designed to capture (retrospectively) all of 2004. In addition, KRIVET provided accounting performance data, cooperating with KIS through matching with the same firm code. KRIVET basically established five firm selection guidelines: (a) firms are within South Korea; (b) firms are listed in KIS corporate data collected in 2005; (c) firms employ more than 100 workers; (d) public firms are excluded; and (e) firms within agriculture, fishery, forestry, and mining industries are also excluded. On the basis of these guidelines, KRIVET generated the sampling frame encompassing 1,899 firms. Through the survey procedure, 454 firms responded with response rates of 23.91%. We further had to drop 95 firms because they did not recruit or select any new employees, or invest in any internal training programs in 2004. Thus, the final sample size is 359 firms nested in three industries: manufacturing (n = 257), finance (n = 31), and nonfinance service (n = 71; see Table 1). As the data in this study are part of a large multiyear public panel data set, we may pursue additional studies on HR investments that significantly build from the present findings.

Measures

Selective staffing. Selective staffing was operationalized as the firm's overall selection ratio for full-time employees. Each HR manager reported how many applicants applied to their firm in 2004, and how many of those applicants accepted offers. With these numbers, we calculated the selection ratio according to standard practice (Schmitt & Chan, 1998), such that selection ratio is equal to the proportion of applicants hired divided by the total number of applicants (for full-time positions). Although this is a proxy measure of applicant quality and generic human capital, it should be a reasonable approximation for our purposes. First, selection ratio is historically used in utility models to gauge the quality of a firm's human capital acquisition (Boudreau & Rynes, 1985; Cascio & Boudreau, 2008; Cronbach & Gleser, 1965; Taylor & Russell, 1939). Firms with lower selection ratios are more selective and thus have more employees with higher quality generic KSAOs. Selection ratio is also a gauge of the value of the overall selection system, and firms will see greater returns on staffing investments with more selective ratios (Cabrera & Raju, 2001; Cascio & Boudreau, 2008; Schmitt & Chan, 1998; Taylor & Russell, 1939). Second, focusing on selection ratio avoids the difficult challenge of having different KSAOs present for different jobs or firms. Even though different jobs may use different types of predictors, and regardless of which specific KSAOs are relevant for a job, the selection ratio provides an index of the quality of those KSAOs (Cabrera & Raju, 2001). Finally, other studies have used selection ratio to gauge quality of staffing practices (e.g., Huselid, 1995). Thus, the lower the selection ratio, the more likely the firm is acquiring high-quality KSAOs and generic human capital resources. However, to more easily interpret selection ratio as a proxy of applicant quality, we reverse scored it (1 – selection ratio) so that higher numbers indicate higher quality selective staffing. The average of the reversed-scored selection ratio was .76.

To further support the inferences of using selection ratio as a proxy measure for generic human capital, we examined the extent to which firms used job-related selection predictors (e.g., cognitive

Table 1
Distribution of Firms Across Industries

Industry	Subindustry	Number of firms	Industry	Subindustry	Number of firms
Manufacturing	Food	21	Manufacturing	Electronic	63
	Textile/Cloth	9		Automobile/Transportation equipment	34
	Petrochemical	35	Finance	Finance & Insurance	31
	Rubber/Plastic	13	Service (nonfinance)	Communication & Information service	5
	Metal/Nonmetal	45		SW/SI/online DB service	27
	Machine/Equipment	20		Professional service	17
	Computer/Office machine	5		Education service	18
	Electric	12		Art & leisure service	4
Overall					359

Note. Table is based on data from the Korean Research Institute for Vocational Education and Training. SW = software; SI = system integration; DB = database.

tests, personality, interviews). HR managers completed an item in the 2005 survey that asked them which selection procedures they used in hiring (across all employee groups) for the 2004 year. All firms used at least one predictor, with the mean number being 3.76 (min = 1, max = 12). Approximately 30% of firms used personality tests, 26% used cognitive and aptitude tests, and 77% used individual interviews. Further, selection ratio and the number of selection tools are positively related ($r = .20$, $p < .05$), the number of selection tools predicted prerecession productivity ($\beta = 8{,}714.71$, $p < .05$), and the number of selection tools predicted prerecession ($\beta = 16{,}924{,}809.00$, $p < .05$) and postrecession profit growth ($\beta = 20{,}073{,}930.00$, $p < .05$). Thus, to the extent these selection predictors ensure applicant quality (which is the very basis of selection), the measure of selection ratio should serve as an appropriate proxy for quality KSAOs and generic human capital resources (Boudreau & Rynes, 1985; Cascio & Boudreau, 2008; Cronbach & Gleser, 1965; Ployhart & Moliterno, 2011; Taylor & Russell, 1939).

Internal training. Internal training was operationalized as the proportion of total internal training programs completed by full-time employees, relative to the number of full-time employees in the firm. Employees could participate in formal in-house training programs for job- and firm-specific knowledge and skills. Thus, this training measure only includes training activities that firms internally provide. We calculated the training measure by dividing the total number of full-time employees who participated in the internal training programs into a total number of full-time employees in each firm. Because many firms enable their employees to participate in multiple internal training programs, the ratio can be greater than one (i.e., more than 100%). This measure can reflect the quality of internal training (e.g., knowledge acquired through training; Delaney & Huselid, 1996; Hatch & Dyer, 2004; Huselid, 1995; Mabey & Ramirez, 2005; Murray & Raffaele, 1997; Ployhart et al., 2011; Russell et al., 1985; Tesluk & Jacobs, 1998; Tharenou et al., 2007; Van Iddekinge et al., 2009) because it captures the firm-specific KSAOs' possessed from total internal training programs. In this regard, the higher the ratio of employees who were internally trained, the greater the amount of firm-specific knowledge. The average of internal training was 1.48.

To support whether the internal training measure serves as a proxy measure for firm-specific human capital development, we tested the relative magnitudes between internal training, external training, and firm profit. Specifically, we focused on two external training measures: (a) external training programs provided by external training institutions and (b) funding for university coursework in domestic and foreign regions that may produce more general KSAOs that are applicable across firms. Because developing firm-specific human capital can contribute more to sustainable competitive advantage than generic human capital (e.g., Barney & Wright, 1998), we expect that the internal training measure is more highly related to firm performance than external training measures. For external training and university training measures, HR development managers were asked to rate the total number of full-time employees who participated in training programs of other training or education-related institutions, or who were supported by funding for university coursework in domestic and foreign regions. The correlation results show that internal training is more highly correlated with average financial performance (EBIT) from 2000 to 2011 ($r = .20$, $p < .05$) than external training ($r = -.03$, *ns*) and university training ($r = .10$, *ns*). The difference in correlations is significant only between internal and external training ($z = 3.25$, $p < .05$). These results strengthen the validity inferences that internal training captures the quality of firm-specific human capital.

Firm profit. Firm profit is operationalized as EBIT, a widely used financial accounting metric. To investigate the change of EBIT before (prerecession), during, and after (postrecession) the Great Recession, we used an 8-year period of 2000–2007 for prerecession and a 4-year period of 2008–2011 for postrecession analyses. EBIT is an accounting performance metric calculated by revenue minus costs of products sold and administrative and selling costs related to a firm's operations. This is a popular measure of firm profit and has the added benefit of being a generally accepted accounting performance metric (see Richard et al., 2009). The average EBIT from 2000 to 2011 was 50,369,766.00 thousand won.[5]

Productivity. Firm labor productivity is operationalized as a ratio of firm operating revenue to total number of employees. The productivity measure is an indicator of total output to labor input (Samuelson & Nordhaus, 1989), and thus it captures the efficiency of a workforce to produce output. Because firm productivity is closely related to HR systems and human capital, productivity is considered as an important workforce performance metric (Crook et al., 2011; Delery & Shaw, 2001) and has high validity for HR managers (Dyer & Reeves, 1995). In addition, this productivity measure has been widely used in other SHRM studies (e.g., Huselid, 1995; Ployhart et al., 2009; Shaw, Gupta, & Delery, 2005; Siebert & Zubanov, 2009). Firm productivity is the average of the scores between 2004 and 2007. We did this because our primary interest is in determining the extent to which prerecession productivity serves as a buffer against postrecession performance declines. The average firm labor productivity from 2004 to 2007 was 22,681.00 thousand won.

Controls. Several control variables are used to provide more stringent tests of the hypotheses. However, internal firm performance (productivity) and external firm performance (profit growth) are different theoretically and empirically (Jiang et al., 2012; Richard et al., 2009). Following the guidance of T. E. Becker (2005), we sought to only include those control variables theoretically relevant to each outcome. Firm productivity is an internal performance metric, and so we focused on those controls that prior research consistently finds as most relevant to affecting internal firm operations. First, we controlled for average firm size (2004–2007) because different-sized firms face very different operating challenges (e.g., Huselid, 1995; Sun, Aryee, & Law, 2007), and larger firms may invest more in staffing and training to acquire and develop human capital resources (e.g., Collins & Clark, 2003). Second, we indirectly controlled for industry via the use of a random coefficient model allowing between-industry differences in intercepts to be modeled.

Firm profit growth (2000–2011) is an external performance metric and hence is potentially affected by a broader range of organizational and economic factors. First and most importantly, we control for prior firm profit. Guest, Michie, Conway, and Sheehan (2003) and Wright, Gardner, Moynihan, and Allen (2005) showed that ignoring past performance may lead to inaccurate model estimates. Thus, each firm's EBIT scores in 1999 and 2007 were used as control variables

[5] EBIT scores are based on Korean monetary unit (one thousand won) ($1 = approximately 1,000 ~ 1,200 won).

for random coefficient growth analyses involving the 2000–2007 (prerecession) and 2008–2011 (postrecession) performance data, respectively. Second, we control for industry (manufacturing, financial, service [nonfinancial]) because firms in different industries face different competitive environments and are distinctively affected by economic recessions (Datta, Guthrie, & Wright, 2005; Pearce & Michael, 2006). Third, we control for firm size because larger firms may not only be more profitable but also have greater expenses. In addition, firm size may play an important role in responding to changing environments (i.e., recession) because smaller firms can possess and leverage flexible organizational processes and structures for adapting to environmental changes (Latham, 2009). Note that firm size differs over time, so we used firm size as a time-varying control for pre- and postrecession analyses.

Analyses

Random coefficient growth models (RCGMs; Bliese & Ployhart, 2002; Lang & Bliese, 2009) are used to test the hypotheses. RCGMs are particularly well suited to the present study. First, the models are able to estimate the rate of profit change over time to operationalize growth. Second, the models can use the growth in profit over time as the dependent variable to be predicted by selective staffing and internal training. Third, the models can be used to estimate and test mediation using bootstrapping procedures. Fourth, the RCGM provides estimates of within-firm variance over time, and between-firm variance in the form of profit growth and recession effects. Finally, the models account for both preexisting firm differences and the control variables.

We followed the recommendations of Raudenbush and Bryk (2002) and Bliese and Ployhart (2002) when developing and testing the RCGMs. There are two basic sets of analyses. The first set is descriptive and focuses on modeling the profit growth trend over time. This is known as Model 0 because it contains no predictors or control variables. The baseline model uses a discontinuous term to model the effect of the recession onset (Lang & Bliese, 2009). The second set of analyses focus on testing the hypotheses using either prerecession productivity and profit or postrecession profit data. These models first test the relationships between selective staffing and internal training with firm productivity. We then examine the relationships between selective staffing, internal training, and firm productivity, with profit growth for prerecession and postrecession periods. Finally, for the mediation Hypotheses 4a and 4b and 9a and 9b, we follow the "product of coefficients" approach (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) to test the statistical significance of indirect effects. We use the indirect effect estimation method based on a parametric bootstrap procedure (Monte Carlo method; MCM), as suggested by MacKinnon, Lockwood, and Williams (2004) and Selig and Preacher (2008). Because Hypotheses 4a and 4b and 9a and 9b are based on mediation models for longitudinal data, these mediation models have multiple and different types of indirect effects for intercepts and slopes. We thus model effects for both intercepts and slopes, but focus on indirect effects for slopes because they are the tests of the hypotheses. All RCGMs estimated between-firm variability for the intercept and trend effects. In this manner, any preexisting firm differences not captured by the control variables are modeled within the intercept variability. All control and predictor variables are standardized to allow more straightforward interpretations (see Raudenbush & Bryk, 2002).

Results

Baseline Analyses

Table 2 presents the descriptive statistics. Note that the negative score for firm profit in 1999 reflects the fact that some firms actually generated negative earnings, reinforcing the importance of controlling for prior firm profit (e.g., firms with lower earnings may invest less in staffing or training). Model 0 is a baseline model with profit growth as the dependent variable (years 2000–2011). Model 0 is a discontinuous growth curve model because it is coded in such a way as to recognize the onset of the Great Recession and dramatic reduction in firm profit that occurred at the end of 2007. Following Lang and Bliese (2009), this model has longitudinal firm profit regressed on the estimate of growth over time (TIME), the recession onset effect (REC), and the postrecession effect (PRC). The coding for TIME, REC, and PRC are shown in Table 3. TIME estimates the rate of profit change over time; REC estimates the amount of drop in profit occurring when the reces-

Table 2
Descriptive Statistics and Correlations

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Industry Dummy 1	.72	.45	—									
2. Industry Dummy 2	.09	.28	−.49*	—								
3. Prior firm profit (99)	−4,035,653.00	247,312,429.00	.15*	−.25*	—							
4. Prior firm profit (07)	87,107,710.00	431,344,296.00	−.10	.26*	.13*	—						
5. Firm size (00–11)	1,113.00	2,784.00	−.05	.18*	−.00	.77*	—					
6. Turnover (04)	.13	.14	−.00	−.07	.04	−.12*	−.11*	—				
7. Staffing (04)	.76	.27	.03	.01	−.02	.12*	.13*	−.31*	—			
8. Training (04)	1.48	3.45	−.08	.04	.18*	.16*	.10	.01	.06	—		
9. Labor productivity (04–07)	22,681.00	62,636.00	−.05	.20*	.08	.37*	.25*	−.19*	.14*	.13*	—	
10. Firm profit (00–11)	50,369,766.00	257,320,935.00	−.06	.20*	.28*	.90*	.63*	−.12*	.11*	.20*	.42*	—

Note. $N = 359$ firms. Industry 1 (1 = manufacturing, 0 = nonmanufacturing); Industry 2 (1 = finance, 0 = nonfinance). Staffing = selective staffing; Training = internal training. Labor productivity (04–07) is the 2004–2007 average. Firm profit (00–11) is the average of earnings before interest and taxes (EBIT) from 2000 to 2011. Monetary unit is 1 thousand won ($1 = approximately 1,000 ~ 1,200 won). 99 = 1999.
* $p < .05$.

Table 3
Coding and Interpretation of Change Variables (Baseline Model 0)

Variable	Year												Interpretation
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Prerecession (TIME)	0	1	2	3	4	5	6	7	8	9	10	11	Linear firm profit growth
Recession onset (REC)	0	0	0	0	0	0	0	0	1	1	1	1	Firm profit drop as a result of recession
Postrecession (PRC)	0	0	0	0	0	0	0	0	0	1	2	3	Linear firm profit growth in the postrecession period, relative to the prerecession period

Note. TIME = prerecession; REC = recession onset; PRC = postrecession.

sion began, and PRC is rate of postrecession profit change relative to the prerecession period.[6]

This baseline model revealed that firm profit increased linearly over time ($\beta = 13{,}106{,}234.00$, $p < .05$). The recession produced a $-63{,}650{,}000.00$ ($p < .05$) drop in profit. The slope for postrecession profit was positive but not significantly different than the slope for prerecession profit ($\beta = 2{,}236{,}933.00$, *ns*). However, the variance components for all three terms and the intercept were large and statistically significant (see Table 4). Further, an ICC(1) revealed that 52% of the variance in profit across time was due to between-firm differences. To demonstrate that the recession onset changes the profit growth trajectory and hence predictive relationships, we examined how selective staffing, internal training, and productivity related to firm profit at the *onset* of the recession (REC). Firms with more selective staffing ($\beta = -40{,}930{,}000.00$, $p < .05$), internal training ($\beta = -65{,}600{,}000.00$, $p < .05$), and firm prerecession productivity ($\beta = -98{,}600{,}000.00$, $p < .05$) have greater reductions in profit at the onset of the recession. This suggests that firms that performed better due to selective staffing, internal training, and greater productivity before the recession actually suffered worse when the recession hit. These effects are shown in Figure 2. Having demonstrated the effect of the Great Recession, we now proceed to test the hypotheses using the prerecession (2000–2007) and postrecession (2008–2011) data separately, because this allows us to better test the effects of selective staffing, internal training, and productivity on profit growth in each recession period.[7]

Table 4
Results of Functions for Time Predicting Profit (00–11)

Variable	Baseline Model 0	
	β	*SE*
Intercept	−3,115,261.00	10,718,384.00
Change predictors		
TIME	13,106,234.00*	2,985,312.00
REC	−63,650,000.00*	17,364,076.00
PRC	2,236,933.00	6,174,401.00
Variance components		
Intercept	2.44×10^{16}*	2.82×10^{15}
TIME	2.23×10^{15}*	2.42×10^{14}
REC	5.25×10^{16}*	8.62×10^{15}
PRC	3.44×10^{15}*	9.43×10^{14}
−2 log likelihood	167,396.50	
Akaike's information criterion	167,406.50	

Note. 00–11 = 2000 to 2011; TIME = prerecession; REC = recession onset; PRC = postrecession.
* $p < .05$.

Hypothesis Tests

Table 5 shows the models with controls and tests for Hypotheses 1a and 2a. Hypothesis 1a predicted that firms with more selective staffing would be positively associated with greater firm productivity than firms with less selective staffing before the recession (prerecession). Model 2 shows that selective staffing is positively and significantly related to productivity. For every one standard deviation increase in selective staffing, there is a corresponding 7,057.90 increase in productivity ($p < .05$). Hypothesis 2a predicted that firms with more internal training would be positively related to greater firm productivity than firms with less internal training. Model 3 shows that internal training is a significant predictor of firm productivity. For every one standard deviation increase in internal training, there is a corresponding 6,901.52 increase in productivity ($p < .05$). Thus, Hypotheses 1a and 2a are supported.

For prerecession hypotheses, Model 6 in Table 6 shows the basic growth model with controls. Only prior firm profit in 1999 was a significant control variable. The growth parameter (TIME) suggests that firm profit increased 12,415,964.00 per year ($p < .05$) prior to the recession. Finally, there was significant between-firm variability in profit change during the prerecession periods (TIME) and the intercept.

[6] Although the recession began in December 2007, we coded 1 in 2008 and 2009 because we only have yearly data, and the recession effects actually influenced firm performance reduction *after* 2007.

[7] We also tested whether the recession affects productivity using the same model shown in Table 4. Productivity increases over time ($\beta = 417.86$, $p < .05$), but there is no effect for the recession onset ($\beta = 5{,}909.89$, *ns*), supporting the inference that productivity, as an internal performance metric, is less affected by recession effects.

Figure 2. Firm profit trends for the years 2000 to 2011 (00–11) with staffing and training. a: Staffing on firm profit 00–11 trends. b: Training on firm profit 00–11 trends.

Table 6 also shows the growth model and tests for Hypotheses 1b, 2b, and 3. Hypothesis 1b predicted that firms with more selective staffing would be positively related to greater profit growth than firms with less selective staffing prior to the recession. Model 7 shows that selective staffing is a significant predictor of profit growth. For every one standard deviation increase in selective staffing, there is a corresponding 7,833,589.00 increase in profit ($p < .05$). This increase is large, but keep in mind that increasing selection ratio by one standard deviation is neither simple nor easy. Hypothesis 2b predicted that firms with more internal training would be positively related to greater profit growth than firms with lower internal training prior to the recession (prerecession). Model 8 shows that internal training dramatically increases profit. For every one standard deviation increase in internal training, there is a 25,752,244.00 increase in profit ($p < .05$). Note that for both hypotheses, these effects are found and statistically significant even after controlling for profit in 1999. Hypothesis 3 predicted that firm prerecession productivity has a positive effect on profit growth prior to the recession. As presented in Model 10 in Table 6, firm prerecession productivity significantly and positively relates to profit growth prior to the recession. For every one standard deviation increase in prerecession productivity, there is a 25,020,182.00 increase in prerecession financial performance ($p < .05$). Thus, Hypotheses 1b, 2b, and 3 are supported, although it should be noted that the effects of staffing were no longer significant when entered simultaneously with training (Model 9).

Hypotheses 4a and 4b predicted that the effects of selective staffing and internal training on prerecession profit growth are partially mediated by firm prerecession productivity. Models 11 and 12 in Table 6 show the prerecession mediated models. The effect size for selective staffing is reduced and no longer significant when firm prerecession productivity is entered into the model, but the effect of internal training is still significantly related. This suggests that firm prerecession productivity fully mediates the relationship between selective staffing and profit growth, yet partially mediates the relationship between internal training and profit growth prior to the recession. To confirm whether the indirect paths between selective staffing, internal training, and firm prerecession performance growth via firm prerecession productivity were significant, we conducted bootstrapping analyses using MCM by using the partial estimates and the standard errors of the predictors in Models 2 and 11 (for staffing and prerecession profit growth) and Models 3 and 12 (for training and prerecession profit growth).[8] The Monte Carlo procedure provided the 95% confidence interval (CI) derived from 20,000 repetitions to analyze the indirect effects among the variables (see Table 7). The results show that there is a positive and significant indirect relationship between selective staffing (indirect effect $= 1.55 \times 10^{11}$, $p < .05$, 95% bootstrap CI [1.23×10^{10}, 3.14×10^{11}]) or internal training (indirect effect $= 1.51 \times 10^{11}$, $p < .05$, 95% bootstrap CI [9.93×10^{9}, 3.09×10^{11}]) and firm prerecession profit growth via firm prerecession productivity. There are no significant indirect effects on the intercepts. Overall, Hypothesis 4a is not supported, but Hypothesis 4b is supported.

Hypothesis 5 predicted an interaction between selective staffing and internal training on prerecession productivity. Model 5 in Table 5 shows this interaction effect was not significant, although both main effects remained significant. Hypothesis 6 predicted an interaction between selective staffing and internal training on prerecession profit growth. Model 14 in Table 6 finds that this effect is significant ($\beta = 25{,}433{,}703.00$, $p < .05$). Hypothesis 5 is thus not supported, but Hypothesis 6 is supported.

For postrecession hypotheses, Model 15 in Table 8 shows the basic growth model with controls. Industry dummies, time-varying firm size (08–11), and prior profit in 2007 were significant control variables. The growth parameter (TIME) demonstrates that firm profit increased 17,618,133.00 per year ($p < .05$) during and after the recession. In addition, there was significant between-firm variability in profit change during the postrecession periods (TIME) and the intercept.

Table 8 also shows the growth model and tests for Hypotheses 7 and 8. Hypothesis 7 predicted that firms with more selective prerecession staffing would be positively related to greater post-

[8] We used the models with staffing and training predictors independently because these are the models used to test the hypotheses, and our interest is in assessing these independent, indirect effect sizes rather than the joint (conditional) indirect effects.

Table 5
Direct Effects of Staffing and Training on Labor Productivity

Variable	Model 1		Model 2 (H1a)		Model 3 (H2a)		Model 4		Model 5 (H5)	
	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	28,430.00	11,328.00	28,027.00	10,909.00	27,072.00	10,881.00	26,572.00	10,328.00	25,437.00	10,681.00
Firm-level control										
Firm size (04–07)	13,972.00*	3,244.48	12,435.00*	3,351.70	12,521.00*	3,311.04	11,449.00*	3,408.90	10,444.00*	3,436.51
Predictors										
Staffing (04)			7,057.90*	3,329.31			6,352.98*	3,472.82	8,039.19*	3,575.93
Training (04)					6,901.52*	3,328.69	6,563.90*	3,372.99	3,851.43*	3,663.18
Interactions										
Staffing (04) × Training (04)									14,147.00	7,621.42
Variance component										
Intercept	3.27×10^8	4.24×10^8	2.97×10^8	3.99×10^8	2.95×10^8	3.96×10^8	2.57×10^8	3.65×10^8	2.78×10^8	3.85×10^8
−2 log likelihood	8,761.80		8,425.60		8,122.80		7,836.60		7,813.40	
Akaike's information criterion	8,765.80		8,429.60		8,126.80		7,840.60		7,817.40	

Note. The dependent variable is average firm productivity for the years 2004 to 2007 (04–07). These analyses are estimated using random coefficient models, in which industry is treated as a Level 2 variable. Hence, differences across industry groups are modeled via differences in the intercept rather than dummy codes. H = Hypothesis.
* $p < .05$.

recession profit growth than firms with less selective staffing. Model 16 shows that selective staffing is positively and significantly related to postrecession profit growth. For every one standard deviation increase in selective staffing, there is a corresponding 13,742,680.00 ($p < .05$) increase in postrecession profit. Although we did not hypothesize a significant effect of internal training on postrecession financial performance, we tested the relationship to confirm whether internal training has buffering effects during and after the recession. The result (Model 17 in Table 8) shows that the relationship between internal training and postrecession profit growth is not significant (although the effect for the intercept is significant). Further, the interaction between selective staffing and internal training was not significant (Model 23 in Table 8). Together these findings suggest that internal training may become less valuable for generating postrecession profit growth. Hypothesis 8 predicted that firm prerecession productivity has a positive effect on postrecession profit growth. Model 19 in Table 8 shows that this effect is significant; for every

Table 6
Longitudinal Random Coefficient Growth Models (Prerecession)

Variable	Model 6		Model 7 (H1b)		Model 8 (H2b)		Model 9	
	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	−1,517,589.00	24,883,950.00	−5,085,186.00	25,783,329.00	298,623.00	26,839,273.00	−2,305,932.00	27,632,378.00
Firm-level controls								
Industry Dummy 1	−8,840,716.00	27,517,386.00	−7,945,437.00	28,492,733.00	−10,830,000.00	29,539,040.00	−10,830,000.00	30,452,483.00
Industry Dummy 2	25,820,561.00	46,661,013.00	50,991,716.00	47,902,772.00	6,007,074.00	49,288,864.00	26,953,169.00	50,512,195.00
Prior profit (99)	79,719,469.00*	10,989,802.00	77,700,625.00*	11,177,891.00	75,543,242.00*	11,474,007.00	72,320,054.00*	11,658,520.00
Firm size (00–07)	−17,210,000.00	14,163,436.00	−45,320,000.00*	14,788,901.00	−29,450,000.00	15,175,617.00	−60,210,000.00	15,776,842.00
Prior Profit (99) × TIME	−3,825,149.00	3,641,238.00	−705,189.00	3,614,891.00	−7,425,415.00	3,677,571.00	−3,985,901.00	3,687,525.00
Change predictor								
TIME (prerecession)	12,415,964.00*	3,667,926.00	11,097,286.00*	3,668,836.00	13,021,709.00*	3,793,656.00	11,734,026.00*	3,817,520.00
Predictors								
Staffing (04)			3,718,853.00*	11,468,904.00			2,622,309.00	12,246,726.00
Staffing (04) × TIME			7,833,589.00*	3,772,907.00			6,083,661.00	3,961,319.00
Training (04)					26,167,463.00*	18,244,824.00	36,825,521.00*	18,467,493.00
Training (04) × TIME					25,752,244.00*	5,841,174.00	23,003,182.00*	5,818,068.00
Mediator								
Firm productivity (04–07)								
Firm Productivity (04–07) × TIME								
Moderator								
Staffing (04) × Training (04)								
Staffing (04) × Training (04) × TIME								
Variance components								
Intercept	$2.51 \times 10^{16*}$	2.83×10^{15}	$2.68 \times 10^{16*}$	2.91×10^{15}	$2.60 \times 10^{16*}$	3.07×10^{15}	$2.77 \times 10^{16*}$	3.14×10^{15}
TIME	$3.60 \times 10^{15*}$	3.36×10^{14}	$3.50 \times 10^{15*}$	3.29×10^{14}	$3.50 \times 10^{15*}$	3.45×10^{14}	$3.47 \times 10^{15*}$	3.42×10^{14}
−2 log likelihood	100,561.90		96,032.20		92,850.10		89,006.00	
Akaike's information criterion	100,567.90		96,038.20		92,856.10		89,012.00	

Note. The dependent variable (prerecession profit) is change in firm profit for the years 2000 to 2007 (00–07). H = hypothesis; 99 = 1999; TIME = prerecession; 04 = 2004.
* $p < .05$.

one standard deviation increase in firm prerecession productivity, there is a 29,925,673.00 ($p < .05$) increase in postrecession financial performance. Thus, Hypotheses 7 and 8 are supported.

Hypotheses 9a and 9b predicted that the effects of prerecession selective staffing and internal training on postrecession profit growth are fully mediated by firm prerecession productivity. Models 20 and 21 in Table 8 show the postrecession mediated model. The effect sizes for selective staffing and internal training are reduced and not significant when firm prerecession productivity is entered into the models, and suggests firm prerecession productivity fully mediates the relationship between selective staffing or internal training and postrecession profit growth. Using the partial estimates and the standard errors from Models 2 and 20 (for staffing) and 3 and 21 (for training), the bootstrap results (see Table 7) show that there is a positive and significant indirect relationship between selective staffing (indirect effect = 2.07×10^{11}, $p < .05$, 95% bootstrap CI [1.21×10^{10}, 4.61×10^{11}]) and internal training (indirect effect = 2.29×10^{11}, $p < .05$, 95% bootstrap CI [1.41×10^{10}, 4.99×10^{11}]) with postrecession profit growth via firm prerecession productivity. There are no significant effects on the intercepts. Overall, Hypotheses 9a and 9b are supported.

The overall findings are graphically illustrated and summarized in Figures 3 and 4. These were depicted by estimating predicted firm pre- and postrecession profit with high- (1 *SD* above the sample mean) and low- (1 *SD* below the sample mean) selective staffing and internal training, contrasted with predicted firm performance at the sample mean. As shown in Figure 3, firms with more selective staffing (see Figure 3a) and internal training (see Figure 3b) outperform their rivals over time before the recession. Figure 3c shows the nature of the interaction between staffing and training, finding that it is only when staffing and training are both high that firms see consistent profit growth. Figure 4 shows that firms with more selective staffing have greater performance growth postrecession than firms with less selective staffing.

Supplemental Analyses for Research Questions

To provide further nuance and context for the hypothesis tests, we summarize three sets of analyses informing the three research questions relating to (a) changes in staffing and training over time (see Appendix A), (b) collective turnover (see Appendix B), and (c) an alternative operationalization of financial outcomes (see Appendix C).

Question 1: Do selective staffing and internal training change over time? Selective staffing and internal training were assessed in 2005, 2007, 2009, and 2011, using the same items and procedures described in the Method section. In each measurement occasion, the focus of the items was on the prior year (e.g., selection ratio or internal training in 2004, 2006, 2008, and 2010). It was thus possible to see whether selection ratio (our operationalization of selective staffing) and the amount of internal training differed as a result of the recession. Using an RCGM (see Appendix A, Table A1), we found that selective staffing increased very slightly over time ($\beta = .02$, $p < .05$). However, the model was unable to provide an estimate for between-firm variance in the slope, which usually means there is a lack of variability, and hence the model is too complex (Singer & Willett, 2003). The slope for internal training was not significant, although there was significant variability across firms in this slope (variance component = .87, $p < .05$). Thus, selective staffing increased slightly for all firms, whereas the use of internal training was much more variable. However, the overall changes in staffing and training are rather modest, suggesting that it is not the change in these variables that is driving the changes in profit, but rather prerecession investments

Table 6 (*continued*)

Model 10 (H3)		Model 11 (H4a)		Model 12 (H4b)		Model 13		Model 14 (H6)	
β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
2,157,819.00	25,504,191.00	−954,797.00	26,530,280.00	3,392,806.00	27,739,251.00	1,268,611.00	28,631,611.00	−11,130,000.00	27,707,557.00
−12,050,000.00	28,029,879.00	−11,630,000.00	29,133,486.00	−13,400,000.00	30,327,184.00	−13,830,000.00	31,337,770.00	−3,928,632.00	30,313,952.00
13,981,476.00	47,423,629.00	34,143,393.00	48,736,012.00	−3,478,452.00	50,263,214.00	12,953,224.00	51,520,632.00	29,742,295.00	50,047,635.00
79,086,149.00*	10,984,020.00	76,113,991.00*	11,196,228.00	75,021,945.00*	11,485,721.00	71,153,615.00*	11,686,040.00	69,787,369.00*	11,648,639.00
−16,230,000.00	14,752,637.00	−47,930,000.00	15,337,204.00	−28,190,000.00	15,686,370.00	−62,290,000.00	16,268,675.00	−65,710,000.00	15,935,036.00
−5,762,757.00	3,360,459.00	−2,881,399.00	3,403,869.00	−8,024,873.00	3,467,972.00	−4,990,425.00	3,524,639.00	−5,419,808.00	3,658,473.00
12,327,529.00*	3,386,062.00	11,188,462.00*	3,449,819.00	12,986,702.00*	3,586,894.00	11,867,344.00*	3,655,680.00	10,052,004.00*	3,798,981.00
		3,067,605.00	11,575,591.00			2,198,027.00	12,394,205.00	8,660,050.00	12,630,597.00
		4,520,048.00	3,594,435.00			3,750,959.00	3,830,140.00	9,290,549.00	4,038,254.00
				26,613,668.00*	18,395,714.00	35,208,819.00*	18,610,894.00	28,094,457.00*	19,027,218.00
				17,850,482.00*	5,653,737.00	16,499,377.00*	5,683,813.00	17,099,415.00*	6,043,394.00
83,694.00*	11,101,141.00	9,839,821.00*	11,315,410.00	−803,284.00*	11,844,143.00	8,871,741.00*	12,024,717.00		
25,020,182.00*	3,279,498.00	21,936,369.00*	3,344,291.00	21,843,735.00*	3,540,838.00	19,315,653.00*	3,594,581.00		
								44,748,805.00*	26,355,669.00
								25,433,703.00*	8,382,129.00
2.46×10^{16}*	2.82×10^{15}	2.65×10^{16}*	2.90×10^{15}	2.58×10^{16}*	3.09×10^{15}	2.76×10^{16}*	3.16×10^{15}	2.71×10^{16}*	3.09×10^{15}
2.95×10^{15}*	2.87×10^{14}	3.01×10^{15}*	2.91×10^{14}	3.03×10^{15}*	3.08×10^{14}	3.11×10^{15}*	3.14×10^{14}	3.34×10^{15}*	3.32×10^{14}
99,997.90		95,480.00		92,303.70		88,466.90		88,922.40	
100,003.90		95,486.00		92,309.70		88,472.90		88,928.40	

Table 7
Bootstrapping Tests for Mediation

Mediation path	Bootstrapping	
	Indirect effect	95% CI
Indirect paths		
Hypotheses 4a & 4b		
Staffing (04) → Labor productivity (04–07) → Intercept in prerecession profit (00–07)	6.94×10^{10}	$[-8.85 \times 10^{10}, 2.88 \times 10^{11}]$
Staffing (04) → Labor productivity (04–07) → Change in prerecession profit (00–07)	$1.55 \times 10^{11*}$	$[1.23 \times 10^{10}, 3.14 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Intercept in prerecession profit (00–07)	-5.50×10^{9}	$[-1.97 \times 10^{11}, 1.79 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Change in prerecession profit (00–07)	$1.51 \times 10^{11*}$	$[9.93 \times 10^{9}, 3.09 \times 10^{11}]$
Hypotheses 9a & 9b		
Staffing (04) → Labor productivity (04–07) → Intercept in postrecession profit (08–11)	6.53×10^{10}	$[-1.47 \times 10^{11}, 3.34 \times 10^{11}]$
Staffing (04) → Labor productivity (04–07) → Change in postrecession profit (08–11)	$2.07 \times 10^{11*}$	$[1.21 \times 10^{10}, 4.61 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Intercept in postrecession profit (08–11)	3.13×10^{10}	$[-2.03 \times 10^{11}, 2.85 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Change in postrecession profit (08–11)	$2.29 \times 10^{11*}$	$[1.41 \times 10^{10}, 4.99 \times 10^{11}]$

Note. Bootstrapping is conducted on the basis of the Monte Carlo method with 20,000 repetitions. Estimates used in these tests come from different models: Hypothesis 4a (Models 2 and 11), Hypothesis 4b (Models 3 and 12), Hypothesis 9a (Models 2 and 20), Hypothesis 9b (Models 3 and 21). CI = confidence interval; 00 = 2000; 04 = 2004; 07 = 2007; 08 = 2008; 11 = 2011.
* $p < .05$.

in staffing and training that develop slack resources to contribute to firm profit growth during postrecession periods.

Question 2: How does collective turnover influence the effects of selective staffing and internal training? It has long been recognized that collective turnover is usually negatively related to firm performance (Hausknecht & Trevor, 2011). More recent theory and research are focusing on understanding how collective turnover interrelates with human capital resources (Nyberg & Ployhart, 2013; Shaw et al., 2013; Sturman, Trevor, Boudreau, & Gerhart, 2003). As collective turnover represents the erosion of human capital resources, research suggests that collective turnover should significantly moderate the effects of human capital resources on firm financial performance outcomes (Nyberg & Ployhart, 2013). However, little of this empirical research has been conducted at the firm level and over time. Therefore, we included collective turnover (of all firm employees, as reported in the 2005 HCCP survey) as a substantive variable in all models involving the hypotheses tests (see Appendix B, Tables B1–B3). As expected, collective turnover is negatively related to productivity (Model B1-1) and prerecession profit growth (Model B2-1), but is unexpectedly *not* related to postrecession profit growth (Model B3-1). For productivity, collective turnover moderates the

Table 8
Longitudinal Random Coefficient Growth Models (Postrecession)

Variable	Model 15		Model 16 (H7)		Model 17		Model 18	
	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	38,578,227.00	25,108,138.00	40,245,804.00	25,552,662.00	37,684,654.00	26,036,302.00	39,358,946.00	26,947,293.00
Firm-level controls								
Industry Dummy 1	8,758,676.00*	26,134,335.00	3,725,924.00	26,528,030.00	12,260,554.00	26,909,362.00	10,695,972.00	27,873,252.00
Industry Dummy 2	−17,380,000.00*	41,154,339.00	−15,020,000.00*	41,232,274.00	−21,670,000.00*	41,261,263.00	−22,970,000.00*	42,369,554.00
Prior profit (07)	349,020,000.00*	16,899,414.00	364,030,000.00*	17,826,901.00	338,780,000.00*	17,559,187.00	351,820,000.00*	18,983,573.00
Firm size (08–11)	−106,500,000.00*	15,219,636.00	−117,300,000.00*	15,378,892.00	−108,600,000.00*	15,207,363.00	−112,000,000.00*	15,668,832.00
Prior Profit (07) × TIME	6,766,547.00	6,291,593.00	−413,296.00	6,851,893.00	5,567,413.00	6,743,908.00	−2,392,639.00	7,322,567.00
Change predictor								
TIME (prerecession)	17,618,133.00*	6,664,122.00	17,207,231.00*	6,865,363.00	15,684,125.00*	7,105,122.00	15,008,985.00*	7,282,398.00
Predictors								
Staffing (04)			−8,286,925.00	13,326,524.00			−10,290,000.00	14,197,982.00
Staffing (04) × TIME			13,742,680.00*	6,845,025.00			13,950,147.00*	7,282,437.00
Training (04)					58,064,642.00*	20,639,513.00	55,541,204.00*	21,011,606.00
Training (04) × TIME					−13,130,000.00	9,062,095.00	−12,170,000.00	9,186,478.00
Mediator								
Firm productivity (04–07)								
Firm Productivity (04–07) × TIME								
Moderator								
Staffing (04) × Training (04)								
Staffing (04) × Training (04) × TIME								
Variance components								
Intercept	$1.19 \times 10^{16*}$	2.54×10^{15}	$1.09 \times 10^{16*}$	2.56×10^{15}	$9.79 \times 10^{15*}$	2.59×10^{15}	$1.05 \times 10^{16*}$	2.72×10^{15}
TIME	$1.53 \times 10^{15*}$	7.11×10^{14}	$1.64 \times 10^{15*}$	7.37×10^{14}	$1.39 \times 10^{15*}$	7.39×10^{14}	$1.39 \times 10^{15*}$	7.73×10^{14}
−2 log likelihood	49,788.80		47,725.40		45,918.40		44,158.50	
Akaike's information criterion	49,794.80		47,731.40		45,924.40		44,164.50	

Note. The dependent variable (postrecession profit) is change in firm profit for the years 2008 to 2011 (08–11). H = hypothesis; 07 = 2007; TIME = prerecession; 04 = 2004.
* $p < .05$.

effects of selective staffing and internal training (Models B1–2 and B1–3 in Appendix B, Table B1). For prerecession profit growth, collective turnover only moderated the effects of internal training (Model B2–3 in Appendix B, Table B2). There are three major conclusions. First, the effects of collective turnover are affected by broader economic conditions, in this case, the Great Recession. Second, collective turnover can moderate the effects of selective staffing and internal training, but primarily when the economy is strong and growing (e.g., prerecession). As shown in Figures B1a–B1c, high turnover attenuates the otherwise positive effects of selective staffing and internal training. Finally, the relationships between collective turnover, selective staffing, and internal training are complex and need considerably more theoretical and empirical attention.

Question 3: Do the conclusions hold with an alternative measure of external firm financial performance? To reduce concerns that these results were based on the choice of profit measure, we also tested the hypothesized models using ordinary profit as an alternative firm external performance measure. The results showed similar signs and magnitudes of effect sizes compared with the tables reported for the hypothesis tests (see Appendix C, Tables C1–C3). Thus, the hypothesis tests and conclusions are identical with an alternative measure of profit.

Discussion

Understanding the factors that contribute to firm heterogeneity, performance, and competitive advantage is a question that unites multiple disciplinary perspectives. We propose that staffing and training are two such strategically valuable factors because they shape the nature of human capital resources. Therefore, our objective in this research was to examine why selective staffing and internal training contribute to firm profit growth via firm labor productivity, and how these relationships may differ as a function of the Great Recession. For prerecession profit, the findings suggest (a) more selective staffing and internal training contribute indirectly (through productivity) to profit growth, (b) the indirect effects are fully mediated for selective staffing and partially mediated for internal training, and (c) selective staffing and internal training also interact to directly influence profit growth. For postrecession profit, (d) selective staffing and internal training (assessed prerecession) contribute indirectly (through prerecession productivity) to profit growth, and (e) the indirect effects are fully mediated. Finally, (f) internal training is more beneficial for generating prerecession resources and profit growth, whereas (g) staffing is more beneficial for postrecession profit growth (presumably because staffing builds generic human capital resources that enable firm flexibility and adaptation). These findings and those offered in the Supplemental Analyses section suggest that investing in staffing and training prerecession generates slack resources that help firms buffer and more quickly recover from the Great Recession, although collective turnover can, to a degree, attenuate these effects.

Theoretical Implications

Demonstrating that environmental variability influences the strength and direction of staffing and training on productivity and firm pre- and postrecession profit has many important theoretical implications. First, this study emphasizes the contextualized nature of firm-level relationships. This is noteworthy because the role of context is perhaps one of the greatest disconnects between micro and macro research (Ployhart & Hale, in press). Examining staffing and training within the broader economic context shows that environmental change presents an important boundary condition on their relationships with profit growth. Others have suggested environmental variability is an important influence on HR management (Barney, 2001; Helfat & Peteraf, 2003; Schneider et al., 2012; Sirmon, Hitt, & Ireland, 2007), but empirical research has been lacking, particularly

Table 8 (*continued*)

Model 19 (H8)		Model 20 (H9a)		Model 21 (H9b)		Model 22		Model 23	
β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
50,285,672.00*	24,514,314.00	50,686,217.00*	25,028,910.00	48,799,757.00*	25,438,721.00	49,966,276.00*	26,321,032.00	28,735,362.00	26,833,671.00
−3,535,163.00*	25,285,121.00	−6,683,348.00	25,758,085.00	1,469,910.00	26,025,703.00	758,496.00	26,942,705.00	18,478,065.00	27,549,552.00
−41,270,000.00*	39,945,713.00	−37,830,000.00*	40,215,948.00	−45,000,000.00*	40,050,398.00	−47,050,000.00*	41,135,859.00	−18,490,000.00*	41,726,408.00
335,000,000.00*	17,414,207.00	349,860,000.00*	18,404,064.00	326,870,000.00*	17,916,256.00	338,080,000.00*	19,335,900.00	342,150,000.00*	19,130,020.00
−91,550,000.00*	14,586,308.00	−101,300,000.00*	14,834,463.00	−93,180,000.00*	14,567,087.00	−95,170,000.00*	15,017,591.00	−109,500,000.00*	15,434,044.00
−3,382,021.00	6,632,441.00	−10,040,000.00	7,147,663.00	−4,774,695.00	6,978,845.00	−12,300,000.00	7,509,778.00	−2,158,171.00	7,487,370.00
14,373,491.00*	6,494,549.00	13,991,571.00*	6,699,566.00	12,664,537.00*	6,904,761.00	11,922,513.00*	7,077,603.00	15,183,567.00*	7,328,114.00
		−9,911,869.00	13,409,583.00			−11,540,000.00	14,275,901.00	−763,808.00	14,620,978.00
		10,833,944.00	6,698,605.00			10,995,597.00	7,096,740.00	13,512,264.00*	7,530,473.00
				60,074,765.00*	20,887,122.00	57,896,381.00*	21,252,585.00	40,968,765.00*	21,806,118.00
				−15,490,000.00	9,000,242.00	−14,440,000.00	9,120,225.00	−11,260,000.00	9,658,076.00
12,079,661.00*	14,377,074.00	9,254,650.00*	14,508,795.00	4,532,367.00*	15,132,311.00	5,115,238.00*	15,433,143.00		
29,925,673.00*	7,414,948.00	29,291,379.00*	7,580,964.00	33,232,652.00*	7,852,675.00	32,659,541.00*	7,969,262.00		
								76,635,066.00*	31,174,890.00
								−3,137,461.00	15,866,365.00
1.11×10^{16}*	2.38×10^{15}	1.04×10^{16}*	2.42×10^{15}	9.30×10^{15}*	2.42×10^{15}	1.00×10^{16}*	2.55×10^{15}	9.65×10^{15}*	2.65×10^{15}
5.95×10^{14}*	6.46×10^{14}	7.27×10^{14}*	6.75×10^{14}	3.96×10^{14}*	6.68×10^{14}	3.59×10^{14}*	7.00×10^{14}	1.33×10^{15}*	7.59×10^{14}
49,686.30		47,627.40		45,816.50		44,058.70		44,077.50	
49,692.30		47,633.40		45,822.50		44,064.70		44,083.50	

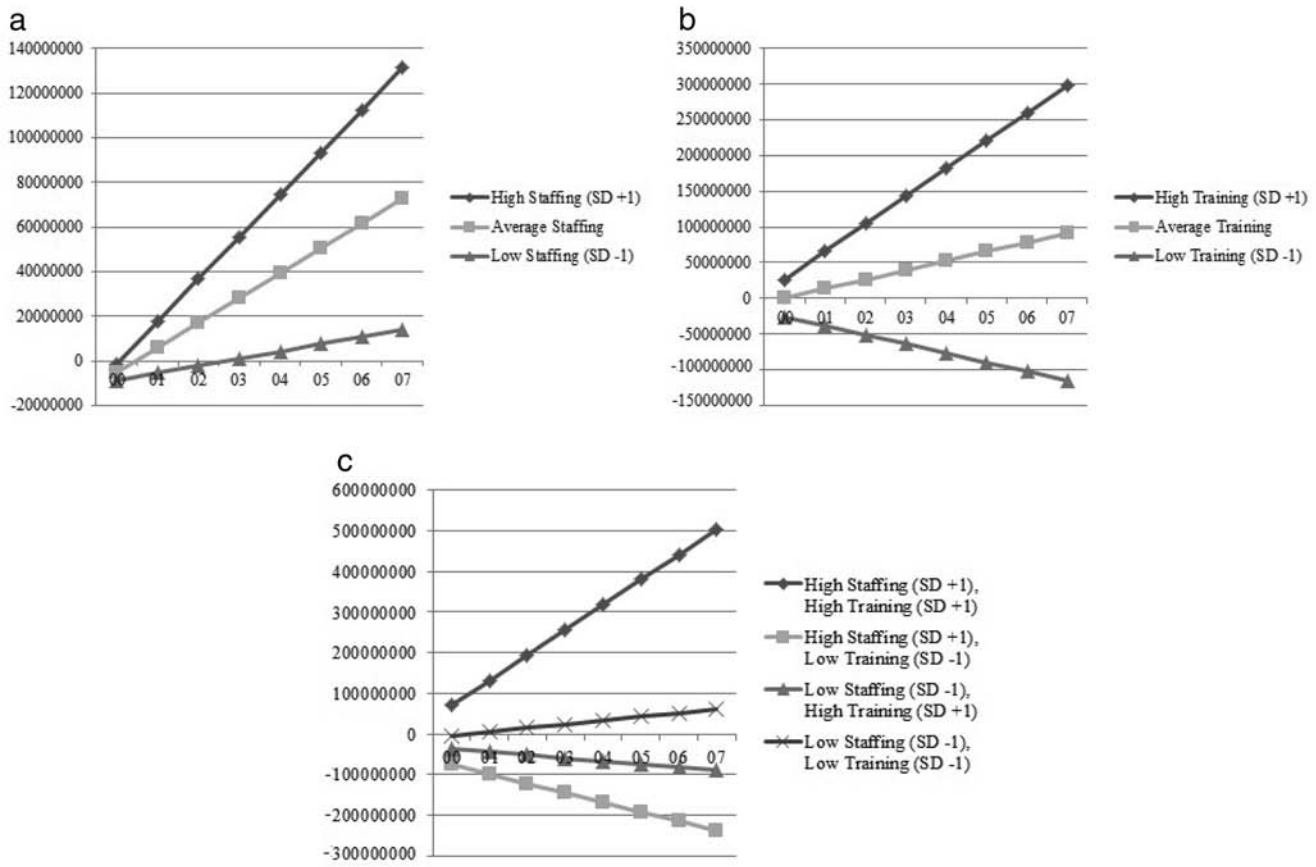

Figure 3. Predicted prerecession firm profit trends for the years 2000 to 2007 (00–07) with staffing and training. a: Staffing on firm profit 00–07 predicted trends. b: Training on firm profit 00–07 predicted trends. c: Predicted prerecession firm profit trends (00–07) with interaction between staffing and training.

with respect to staffing and training. Indeed, the general finding is that selective staffing (acquiring generic human capital) and internal training (developing specific human capital) have positive effects on firm performance (Combs et al., 2006; Crook et al., 2011; Schmidt & Hunter, 1998). This study places boundaries on such "universalistic" expectations because more selective staffing and internal training do not always contribute to greater firm profit growth, and even when they do, the magnitude of the effects may differ over time. Simply put,

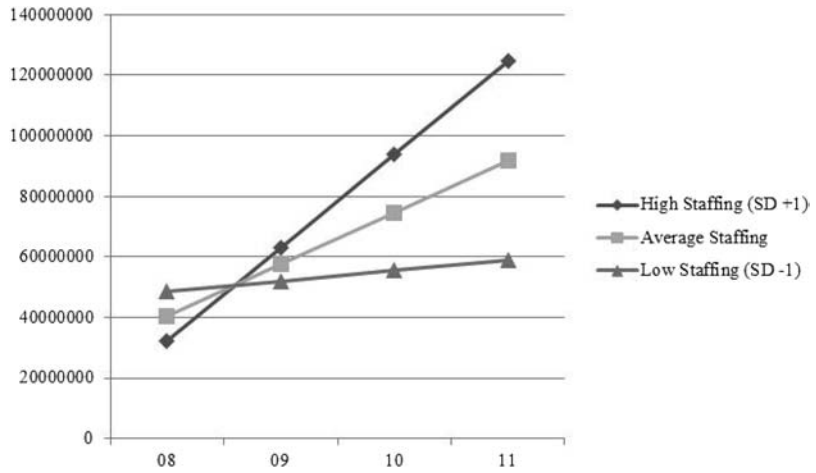

Figure 4. Predicted postrecession firm profit trends for the years 2008 to 2011 (08–11) with staffing.

the value of staffing or training, and human capital resources and resource complementarities, depends on economic conditions. This more contextualized view expands prior contingency approaches of HR practices (Delery & Doty, 1996; Jackson & Schuler, 1995; Youndt et al., 1996) and more recent contextualized views of human capital (see Campbell et al., 2012; Ployhart & Moliterno, 2011). Future research should continue to explore other environmental boundary conditions.

Second, the effects for training on profit growth were generally stronger than the effects of staffing before the recession, but the effects for staffing were greater than the effects of training for recovery from the recession. This finding is interesting because it contradicts most prior strategy research on the superiority of specific human capital resources for generating firm performance. However, this research has not considered the broader economic context. Because selective staffing leads to acquiring higher quality generic human capital resources that are more adaptive and flexible in turbulent environments (Ployhart & Moliterno, 2011; Way et al., 2012; Wright & Snell, 1998), staffing is an effective means to invest in human capital to buffer the severe recession effects. Future research needs to examine more specifically why this occurs. The explanation offered in this study is one of generating slack resources. The pattern of mediation results and supplemental analyses suggests that staffing and training may generate slack resources when the economy is strong, and these slack resources help firms weather and recover from economic downturns. Training that develops specific human capital resources appears to be vital for establishing slack resources during a strong economy, whereas staffing that develops generic human capital resources appears to be vital for reacting to and recovering from a changing economic context caused by the Great Recession. Future research should also search for different training strategies that more quickly reconfigure specific human capital when recessions begin. Overall, research needs to identify the ways in which staffing and training contribute to competitive advantage under different environmental conditions.

Third, this study has implications for the "black box" concern of HR practices (B. E. Becker & Huselid, 2006; Lepak et al., 2006) and resource complementarities (Ployhart et al., in press). SHRM scholars argue that HR practices sequentially contribute to HR, operational, and financial performance (e.g., Jiang et al., 2012; Ployhart & Hale, in press). We show that selective staffing and internal training influence firm profit growth through firm prerecession productivity. Our study sheds light on the SHRM literature by empirically testing why staffing and training are related to pre- and postrecession performance via productivity. Future research needs to more closely examine other mediating processes relevant for different types of firm-level outcomes. For example, our results emphasize the importance of staffing and training to develop slack resources, but the linkage between HR systems and the generation of slack resources has to date been relatively ignored. At the same time, our study extends research on HR systems by studying interactions between staffing and training from the lens of resource complementarities. It is interesting to observe that research on HR systems tends to emphasize the importance of the system, yet operationalize the system via additive measures of individual practices. In contrast, the strategy literature emphasizes the importance of resources complementarities (e.g., Adegbesan, 2009; Ennen & Richter, 2010). Given that HR practices should influence human capital resources, future research should more carefully consider the manner in which HR practices contribute to the creation of resource complementarities, or alternatively, the manner in which HR practices may complement each other to acquire or develop human capital resources (Ployhart et al., in press).

Fourth, our study reinforces the importance of future research examining staffing, training, human capital resources, and collective turnover in combination. The supplemental analyses that included turnover were both similar to and different from past research, and the relationships with staffing and training were complex, suggesting the presence of additional moderators (see Nyberg & Ployhart, 2013, for several theoretical explanations). One such moderator could be the timing of collective turnover. As expected, turnover rates followed an inverted U-shaped pattern over time, such that they increased prior to the recession and decreased during and after the recession ($\beta_{linear} = .04$, $\beta_{quadratic} = -.02$; $ps < .05$). The variance components could not be estimated for these terms, suggesting that the recession affected turnover rates similarly. Finally, using turnover rates in 2006, 2008, or 2010, we found effects with staffing, training, and profit growth identical to those reported with turnover rates in 2004. Thus, it appears that collective turnover has a stronger effect when economic conditions are more favorable, perhaps because employee mobility is less constrained. Future research should take a more careful examination of time, economic conditions, and collective turnover flows similar to the research that has been conducted at the individual level.

Fifth, this study furthers calls for careful consideration of the role of time within organizational scholarship (Mitchell & James, 2001; Wright & Haggerty, 2005). Modeling the profit trajectory over time revealed predictive relationships that were positive before and after the recession, but were negative when the recession hit. This "discontinuous" effect can only be observed by modeling data over time, and these "sign reversals" would have been obscured by looking at the data cross-sectionally (indeed, bivariate relationships are uniformly positive). Thus, research should consider how long or under what conditions the relationships between staffing, training, and performance last. For example, researchers need to not only identify the conditions that change the value of human capital resources (Helfat & Peteraf, 2003) but also how to manage the resources when the environment changes (Sirmon et al., 2007). Greater precision in the specification of when relationships will exist, and for how long, adds to greater refinements of theory, more precise hypothesis tests, and more actionable practical recommendations.

Finally, this study contributes to the growing integration between micro and macro scholarship. As research in economics and strategy increasingly explores psychological microfoundations of firm heterogeneity (e.g., Coff & Kryscynski, 2011; Felin et al., 2009), there is much that organizational psychology can do to contribute to the broader macro literature (Ployhart & Hale, in press). Such research is important for many reasons, not the least of which is demonstrating the strategic value and importance of psychological constructs and phenomena (Ployhart, 2012; Schneider et al., 2012). But the broader scientific benefits are to gain a more complete understanding of organizations and the people within them. For example, if the benefits of staffing and training are, to a degree, dependent on broader economic conditions, then how does this change the way in which validity generalization evidence is used to argue for the merits of one selection or training practice over another? If staffing, which contributes to the generation of generic human capital resources, is more important in times of economic crisis, then does this require a change to the past 50 years of economic research on specific human capital?

These findings challenge the dominant logic that exists within each independent literature, and they require new thinking and theory to address them.

Practical Implications

This study's most important practical implication is that firms that use more selective staffing and internal training outproduce and outperform competitors before the Great Recession, and they also recover more quickly. Stated simply, the bigger they are, the harder they fall, but the faster they get back up. Yet, this simple story obscures some important nuances that may enable managers to *more effectively* leverage their HR practices and human capital resources under different economic conditions. This is important because when budgets are constrained, where can HR managers make investments that generate the greatest return? First, when the economy is strong, managers must be careful to invest in both staffing and training, but when the economy changes drastically, investing in training appears less critical. This suggestion is based on the findings that training is more important for generating profit growth during the prerecession period, whereas staffing is more important for generating profit growth through and recovering from the recession. Second, the effects of staffing and training on profit growth occur due to their effects on productivity, suggesting that using HR to generate slack resources is necessary to weather economic transformations. Of course, staffing and training are only two HR practices from an entire system, and other practices in that system (e.g., compensation) are also necessary to enhance productivity and profit growth (e.g., Huselid, 1995; Jiang et al., 2012). Overall, these findings are timely given that economic turbulence is likely to be the norm in the foreseeable future (Brown, Haltiwanger, & Lane, 2006), and HR managers often struggle to justify their human capital expenditures during times of uncertainty (Ghemawat, 2009; Robbins & Pearce, 1992). Better acquiring and developing talent offers greater flexibility and opportunities for profit growth across pre- and postrecession periods, but not with equal effectiveness in each period.

Limitations and Directions for Future Research

Collecting firm-level performance data from over a decade and linking it with measures of staffing and training presents many challenges. We tried to provide the most stringent tests of the hypotheses possible, but there remain several factors beyond our control that should be considered when interpreting these findings and addressed with future research. First, the staffing and training measures were based on reports by HR managers, albeit two managers within each firm. This not only eliminates common-source bias but also makes it impossible to estimate the reliability of these measures (Gerhart, Wright, McMahan, & Snell, 2000; Wright et al., 2001) because one manager responded to the staffing questions, whereas another responded to the training questions. However, other research suggests that when the focus of the items is on more objective characteristics, reliability of single-item scores is often acceptable (Wanous, Reichers, & Hudy, 1997). Further, when managers are within the same firm, prior research suggests it is possible for them to agree and produce ratings with acceptable levels of reliability (Takeuchi et al., 2009). In this study, managers only reported the selection ratio and proportion of employees internally trained. These are very objective questions and hence may be more reliable, but the fact remains that we cannot estimate reliability. However, even if reliability is low, the results presented here would be conservative because unreliability attenuates correlations and regression weights.

Second, future research should examine more direct measures of staffing and training or other proxy measures to ensure convergence of results (see Van Iddekinge et al., 2009). Use of selection ratio and proportion of employees who were internally trained should provide a reasonable approximation of the quality of selective staffing and internal training. For example, the quality of selective staffing may be operationalized by selection ratio because selecting applicants from larger pools using valid procedures allows firms to identify higher quality talent (Cabrera & Raju, 2001; Cascio, 2000; Cronbach & Gleser, 1965). Likewise, several studies have operationalized internal training on the basis of indices of employee participation in training (Delaney & Huselid, 1996; Hatch & Dyer, 2004; Ployhart et al., 2011; Russell et al., 1985). The analyses presented in the Method section offer some empirical support for these inferences of construct validity. Nevertheless, it is not possible to directly assess quality with these measures, and thus future research should examine these more direct measures. For example, researchers should examine whether firms that use structured (vs. unstructured) interviews, or training programs based on job analyses and needs analysis (vs. those that do not), result in higher productivity and profitability. Such research would fill an important void that remains in the literature.

Third, the results of this study are in part limited by the time frames for which we had data. The timing of the staffing and training measures were collected in the 2005 survey administration but referenced the 2004 calendar year. This allows us to model the longest period of performance growth, but it would be preferable to model staffing and training farther back to the year 2000. Expanding the time periods is important because as the results of this study show, broader economic conditions can affect the specific effect sizes and the statistical significance of different predictors. Therefore, we caution readers from generalizing our results too broadly across time or economic periods, and strongly suggest the need for replication under similar and different economic periods. In particular, future research needs to examine how long the effects found in this research are likely to last. Recessions have occurred regularly over the last century, and hence one must consider when a "postrecession" period becomes a "prerecession" period. Further, the severity of the recession is likely to affect these time frames, as severe recessions tend to transform the economic landscape, whereas lesser recessions tend to contract it.

Fourth, this study operationalized firm profit using EBIT because it is based on generally accepted accounting principles and a widely used accounting metric (Richard et al., 2009). However, other firm performance metrics may have different relationships with selective staffing and internal training. Future research needs to examine which firm outcomes are most strongly related to selective staffing and internal training, and when.

Finally, although we tried to control for exogenous influences that may affect the staffing, training, and performance scores (particularly prior performance and size), there may be other "third variables" that we cannot model. Allowing intercepts to vary across firms may at least help account for such variability, but future research should model other potential sources of variance,

such as the firm's other HR practices, policies, or the firm's strategy. One particularly important influence is the possibility that prior firm profitability influences which HR practices are adopted and how they are implemented. Although we tried to control for such reverse causality via modeling prior profit, future research needs to consider issues of reverse causality more carefully. Another potential influence is cultural differences in the adoption of HR practices. Even though South Korea has largely adopted Western HR practices since the late 1990s (Bae, 2012; Tung, Paik, & Bae, 2013), there may still be cultural differences that exist that cannot be captured in our data, and hence these findings need to be replicated in different countries. A third potential influence involves broader economic conditions that we could not model in these data. In particular, unemployment rates increased during the Great Recession, but they varied widely across industries and regions. Different unemployment rates will certainly influence the return to be found by selective staffing (and possibly internal training as well), and we encourage researchers to link such economic indices to HR practices and psychological characteristics (e.g., quality of applicant pools).

Conclusion

Our study demonstrates that environmental change, such as the Great Recession, can affect the strength and direction of staffing, training, and productivity on firm profit growth. Different relationships are found in different recession phases (pre- and postrecession). The results provide important nuanced insights that more selective staffing and internal training enhance productivity that in turn contributes to pre- and postrecession profit growth and that selective staffing helps buffer the deleterious effects of a recession. Overall, we hope the present study stimulates more theoretical and empirical attention to identify the potential boundary conditions that may influence the strategic value of HR systems for firm growth and competitive advantage.

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Appendix A

Table A1
Longitudinal Trends for Selective Staffing and Internal Training

Variable	Model A1–1 Selective staffing β	Model A1–1 Selective staffing *SE*	Model A1–2 Internal training β	Model A1–2 Internal training *SE*
Intercept	.77*	.01	1.43*	.16
Change predictors				
TIME	.02*	.01	.03	.09
Variance components				
Intercept	.02*	.00	4.06*	.71
TIME	Did not converge	Did not converge	.87*	.16
−2 log likelihood	−280.00		4,992.80	
Akaike's information criterion	−276.00		4,998.80	

Note. TIME = prerecession.
* $p < .05$.

Appendix B

Table B1
Results of Staffing, Training, and Turnover on Labor Productivity

Variable	Model B1–1 β	Model B1–1 *SE*	Model B1–2 β	Model B1–2 *SE*	Model B1–3 β	Model B1–3 *SE*
Intercept	26,440.00	9,507.35	23,640.00	8,323.42	25,790.00	10,316.00
Firm-level control						
Firm size (04–07)	13,389.00*	3,251.35	11,869.00*	3,355.88	8,987.65*	3,280.68
Predictors						
Turnover (04)	−10,037.00*	3,302.01	−13,583.00*	4,301.85	−14,196.00*	3,747.30
Staffing (04)			4,867.23	3,496.91		
Training (04)					15,362.00*	3,814.39
Interactions						
Staffing (04) × Turnover (04)			−5,202.50*	2,585.65		
Training (04) × Turnover (04)					−23,723.00*	5,862.51
Variance component						
Intercept	2.13×10^8	3.22×10^8	1.46×10^8	2.67×10^8	2.59×10^8	3.66×10^8
−2 log likelihood	8,565.60		8,210.30		7,910.90	
Akaike's information criterion	8,569.60		8,214.30		7,914.90	

Note. The dependent variable is average firm productivity for the years 2004 to 2007 (04–07).
* $p < .05$.

(*Appendices continue*)

Table B2
Results of Staffing, Training, and Turnover on Prerecession Profit

Variable	Model B2–1		Model B2–2		Model B2–3	
	β	*SE*	β	*SE*	β	*SE*
Intercept	174,150.00	25,622,241.00	−6,515,907.00	26,679,126.00	−1,674,002.00	27,146,283.00
Firm-level controls						
Industry Dummy 1	−10,440,000.00	28,263,385.00	−8,475,419.00	29,265,173.00	−8,242,365.00	29,768,900.00
Industry Dummy 2	21,910,924.00	49,909,094.00	47,473,591.00	51,262,513.00	9,120,486.00	51,334,516.00
Prior profit (99)	79,822,823.00*	11,175,187.00	78,326,100.00*	11,358,593.00	71,103,172.00*	11,614,549.00
Firm size (00–07)	−17,340,000.00	14,570,240.00	−47,560,000.00*	15,250,303.00	−38,100,000.00	15,549,433.00
Prior Profit (99) × TIME	−3,610,212.00	3,663,047.00	−453,834.00	3,649,656.00	−10,180,000.00	3,664,559.00
Change predictor						
TIME (prerecession)	12,473,649.00*	3,728,663.00	9,953,087.00*	3,820,380.00	13,566,412.00*	3,751,699.00
Predictors						
Turnover (04)	−5,566,202.00*	10,669,918.00	−16,540,000.00	14,195,526.00	−8,962,897.00	12,557,584.00
Turnover (04) × TIME	−7,022,758.00*	3,643,284.00	−8,167,459.00	4,704,035.00	−8,614,015.00*	4,130,261.00
Staffing (04)			1,548,660.00	12,209,773.00		
Staffing (04) × TIME			6,335,363.00	4,012,442.00		
Training (04)					39,453,306.00*	20,538,313.00
Training (04) × TIME					31,449,647.00*	6,565,907.00
Moderator						
Staffing (04) × Turnover (04)			−7,999,920.00*	8,334,006.00		
Staffing (04) × Turnover (04) × TIME			−4,099,675.00	2,787,310.00		
Training (04) Turnover (04)					−42,780,000.00*	22,028,750.00
Training (04) Turnover (04) × TIME					−27,050,000.00*	7,092,833.00
Variance components						
Intercept	$2.57 \times 10^{16*}$	2.93×10^{15}	$2.75 \times 10^{16*}$	3.02×10^{15}	$2.50 \times 10^{16*}$	3.05×10^{15}
TIME	$3.63 \times 10^{15*}$	3.44×10^{14}	$3.56 \times 10^{15*}$	3.39×10^{14}	$3.28 \times 10^{15*}$	3.32×10^{14}
−2 log likelihood	98,268.80		93,676.30		90,783.40	
Akaike's information criterion	98,274.80		93,682.30		90,789.40	

Note. The dependent variable is change in firm profit for the years 2000 to 2007 (00−07). 99 = 1999; TIME = prerecession; 04 = 2004.
* $p < .05$.

(*Appendices continue*)

Table B3
Results of Staffing, Training, and Turnover on Postrecession Profit

Variable	Model B3–1		Model B3–2		Model B3–3	
	β	*SE*	β	*SE*	β	*SE*
Intercept	39,632,454.00	25,569,931.00	41,091,906.00	26,282,177.00	37,272,724.00	26,214,432.00
Firm-level controls						
Industry Dummy 1	7,754,850.00*	26,517,220.00	2,630,855.00	26,976,891.00	12,707,221.00	26,888,605.00
Industry Dummy 2	−35,990,000.00*	42,654,131.00	−35,510,000.00*	42,908,190.00	−21,790,000.00*	42,204,600.00
Prior profit (07)	350,000,000.00*	16,999,221.00	364,260,000.00*	17,972,327.00	320,780,000.00*	18,229,933.00
Firm size (08–11)	−107,000,000.00*	15,201,391.00	−117,200,000.00*	15,381,297.00	−102,100,000.00*	14,997,454.00
Prior Profit (07) × TIME	5,587,091.00	6,373,168.00	−1,733,359.00	6,960,169.00	5,714,086.00	7,111,943.00
Change predictor						
TIME (prerecession)	17,073,557.00*	6,764,800.00	15,157,514.00*	7,215,858.00	14,435,153.00*	7,208,948.00
Predictors						
Turnover (04)	−823,741.00	13,912,554.00	−2,923,211.00	18,452,855.00	−4,885,696.00	16,767,486.00
Turnover (04) × TIME	−9,158,014.00	7,247,616.00	−10,840,000.00	9,820,405.00	−11,090,000.00	9,102,370.00
Staffing (04)			−9,281,563.00	14,148,382.00		
Staffing (04) × TIME			12,131,092.00	7,258,140.00		
Training (04)					72,857,289.00*	23,712,279.00
Training (04) × TIME					−14,030,000.00	10,568,681.00
Moderator						
Staffing (04) × Turnover (04)			−1,516,619.00	10,361,263.00		
Staffing (04) × Turnover (04) × TIME			−4,862,698.00	5,318,219.00		
Training (04) Turnover (04)					−93,820,000.00*	27,065,015.00
Training (04) Turnover (04) × TIME					13,730,748.00	13,421,547.00
Variance components						
Intercept	$1.17 \times 10^{16*}$	2.57×10^{15}	$1.07 \times 10^{16*}$	2.60×10^{15}	$8.74 \times 10^{15*}$	2.52×10^{15}
TIME	$1.42 \times 10^{15*}$	7.18×10^{14}	$1.54 \times 10^{15*}$	7.47×10^{14}	$1.19 \times 10^{15*}$	7.23×10^{14}
−2 log likelihood	48,856.70		46,726.60		45,063.20	
Akaike's information criterion	48,862.70		46,732.60		45,069.20	

Note. The dependent variable is change in firm profit for the years 2008 to 2011 (08–11). 07 = 2007; TIME = prerecession; 04 = 2004.
* $p < .05$.

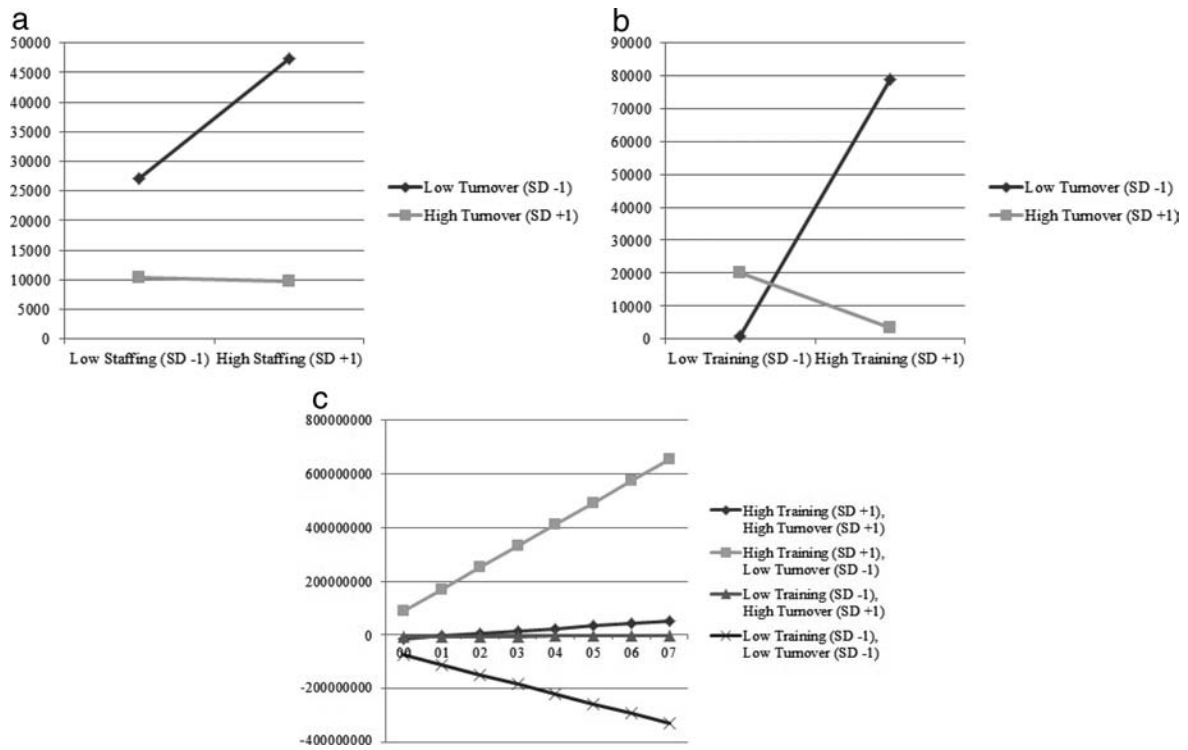

Figure B1. Predicted interactions between staffing and turnover, and training and turnover. a: Staffing × Turnover on Firm Productivity for the years 2004 to 2007 (04–07). b: Training × Turnover on Firm Productivity (04–07). c: Predicted firm prerecession firm profit trend for the years 2000 to 2007, with interaction between training and turnover.

(*Appendices continue*)

Appendix C

Table C1
Longitudinal Random Coefficient Growth Models (Prerecession)

Variable	Model C1–1		Model C1–2		Model C1–3		Model C1–4	
	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	−11,950,000.00	27,970,468.00	−15,400,000.00	29,062,753.00	−10,230,000.00	30,072,736.00	−12,760,000.00	31,055,777.00
Firm-level controls								
Industry Dummy 1	−9,002,412.00	30,902,855.00	−8,596,828.00	32,082,149.00	−11,430,000.00	33,064,717.00	−11,760,000.00	34,186,316.00
Industry Dummy 2	28,110,243.00	52,407,166.00	48,445,971.00	53,927,317.00	4,871,220.00	55,187,387.00	20,343,345.00	56,707,159.00
Prior profit (99)	87,639,184.00*	12,332,486.00	84,724,623.00*	12,575,310.00	82,903,325.00*	12,857,373.00	78,689,165.00*	13,098,409.00
Firm size (00–07)	−50,810,000.00*	15,938,572.00	−78,880,000.00*	16,732,258.00	−64,450,000.00	17,122,893.00	−95,130,000.00*	17,895,866.00
Prior Profit (99) × TIME	−11,410,000.00*	4,085,557.00	−8,193,990.00*	4,119,292.00	−15,320,000.00*	4,105,871.00	−11,830,000.00*	4,185,382.00
Change predictor								
TIME (prerecession)	14,018,757.00*	4,117,328.00	12,757,996.00*	4,175,088.00	14,789,460.00*	4,248,678.00	13,564,899.00*	4,338,284.00
Predictors								
Staffing (04)			2,179,918.00	12,958,736.00			994,933.00	13,803,880.00
Staffing (04) × TIME			8,907,849.00*	4,294,673.00			6,887,658.00	4,503,635.00
Training (04)					23,291,536.00*	20,494,979.00	34,467,059.00*	20,808,975.00
Training (04) × TIME					30,173,179.00*	6,519,055.00	27,432,624.00*	6,588,818.00
Mediator								
Firm productivity (04–07)								
Firm Productivity (04–07) × TIME								
Moderator								
Staffing (04) × Training (04)								
Staffing (04) × Training (04) × TIME								
Variance components								
Intercept	$3.07 \times 10^{16*}$	3.60×10^{15}	$3.26 \times 10^{16*}$	3.71×10^{15}	$3.13 \times 10^{16*}$	3.89×10^{15}	$3.33 \times 10^{16*}$	4.00×10^{15}
TIME	$4.46 \times 10^{15*}$	4.25×10^{14}	$4.45 \times 10^{15*}$	4.26×10^{14}	$4.29 \times 10^{15*}$	4.33×10^{14}	$4.38 \times 10^{15*}$	4.43×10^{14}
−2 log likelihood	101,290.10		96,818.30		93,536.40		89,743.80	
Akaike's information criterion	101,296.10		96,824.30		93,542.40		89,749.80	

Note. The dependent variable is change in firm ordinary profit for the years 2000 to 2007 (00−07). 99 = 1999; TIME = prerecession; 04 = 2004.
* $p < .05$.

Table C2
Bootstrapping Tests for Mediation

Mediation path	Bootstrapping	
	Indirect effect	95% CI
Indirect paths		
Hypotheses 4a & 4b		
Staffing (04) → Labor productivity (04–07) → Intercept in prerecession ordinary profit (00–07)	6.43×10^{10}	$[-1.20 \times 10^{11}, 3.01 \times 10^{11}]$
Staffing (04) → Labor productivity (04–07) → Change in prerecession ordinary profit (00–07)	$1.71 \times 10^{11*}$	$[1.24 \times 10^{10}, 3.48 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Intercept in prerecession ordinary profit (00–07)	-8.40×10^{9}	$[-2.25 \times 10^{11}, 2.07 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Change in prerecession ordinary profit (00–07)	$1.62 \times 10^{11*}$	$[1.16 \times 10^{10}, 3.39 \times 10^{11}]$
Hypotheses 9a & 9b		
Staffing (04) → Labor productivity (04–07) → Intercept in postrecession ordinary profit (08–11)	6.52×10^{10}	$[-1.52 \times 10^{11}, 3.32 \times 10^{11}]$
Staffing (04) → Labor productivity (04–07) → Change in postrecession ordinary profit (08–11)	$2.07 \times 10^{11*}$	$[1.34 \times 10^{10}, 4.60 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Intercept in postrecession ordinary profit (08–11)	3.11×10^{10}	$[-2.03 \times 10^{11}, 2.90 \times 10^{11}]$
Training (04) → Labor productivity (04–07) → Change in postrecession ordinary profit (08–11)	$2.29 \times 10^{11*}$	$[1.31 \times 10^{10}, 4.98 \times 10^{11}]$

Note. Bootstrapping is conducted on the basis of the Monte Carlo method with 20,000 repetitions. CI = confidence interval; 04−07 = 2004 to 2007; 00−07 = 2000 to 2007; 08–11 = 2008 to 2011.
* $p < .05$.

(*Appendices continue*)

Table C1 (*continued*)

Model C1–5		Model C1–6		Model C1–7		Model C1–8		Model C1–9	
β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
−7,870,041.00	28,569,787.00	−10,920,000.00	29,815,527.00	−6,815,770.00	30,996,576.00	−8,912,789.00	32,099,105.00	−21,020,000.00	31,153,296.00
−12,560,000.00	31,370,746.00	−12,600,000.00	32,707,887.00	−14,250,000.00	33,855,787.00	−15,000,000.00	35,095,888.00	−5,044,938.00	34,040,804.00
14,647,709.00	53,056,396.00	30,385,959.00	54,677,804.00	−5,997,222.00	56,100,716.00	5,411,298.00	57,675,622.00	23,156,135.00	56,207,581.00
86,961,370.00*	12,279,840.00	83,270,169.00*	12,551,456.00	82,302,657.00*	12,832,615.00	77,626,569.00*	13,092,232.00	76,475,509.00*	13,097,738.00
−50,040,000.00	16,611,811.00	−81,670,000.00	17,376,947.00	−63,440,000.00	17,698,050.00	−97,240,000.00	18,465,057.00	−100,400,000.00*	18,119,735.00
−12,720,000.00*	3,781,242.00	−9,878,855.00*	3,882,927.00	−15,310,000.00*	3,890,231.00	−12,330,000.00*	4,006,408.00	−13,410,000.00*	4,136,264.00
13,911,293.00*	3,818,069.00	12,839,055.00*	3,938,894.00	14,737,718.00*	4,037,128.00	13,690,084.00*	4,164,308.00	11,524,078.00*	4,306,388.00
		1,714,059.00	13,047,323.00			709,670.00	13,942,961.00	6,206,532.00	14,249,343.00
		5,247,100.00	4,104,259.00			4,350,029.00	4,363,665.00	10,760,054.00	4,578,695.00
				24,040,636.00*	20,624,422.00	33,083,984.00*	20,936,249.00	27,133,262.00*	21,445,107.00
				21,467,876.00*	6,350,587.00	20,126,209.00*	6,461,950.00	20,220,032.00*	6,835,553.00
−448,629.00*	12,455,160.00	9,108,429.00*	12,734,468.00	−1,223,803.00*	13,263,443.00	8,154,812.00*	13,505,782.00		
27,233,826.00*	3,690,157.00	24,200,540.00*	3,807,906.00	23,526,587.00*	3,982,281.00	21,121,084.00*	4,088,827.00		
								38,174,119.00*	29,706,219.00
								30,771,141.00*	9,483,802.00
$2.98 \times 10^{16*}$	3.57×10^{15}	$3.19 \times 10^{16*}$	3.70×10^{15}	$3.09 \times 10^{16*}$	3.90×10^{15}	$3.30 \times 10^{16*}$	4.01×10^{15}	$3.25 \times 10^{16*}$	3.94×10^{15}
$3.68 \times 10^{15*}$	3.66×10^{14}	$3.84 \times 10^{15*}$	3.80×10^{14}	$3.76 \times 10^{15*}$	3.92×10^{14}	$3.94 \times 10^{15*}$	4.08×10^{14}	$4.19 \times 10^{15*}$	4.28×10^{14}
100,725.60		96,264.90		92,989.10		89,203.00		89,659.70	
100,731.60		96,270.90		92,995.10		89,209.00		89,665.70	

Table C3
Longitudinal Random Coefficient Growth Models (Postrecession)

Variable	Model C3–1		Model C3–2		Model C3–3		Model C3–4	
	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	38,573,448.00	25,108,176.00	40,240,797.00	25,552,731.00	37,679,272.00	26,036,284.00	39,353,282.00	26,947,278.00
Firm-level controls								
Industry Dummy 1	8,759,021.00*	26,134,338.00	3,726,634.00	26,528,060.00	12,261,129.00	26,909,290.00	10,696,934.00	27,873,176.00
Industry Dummy 2	−17,420,000.00*	41,154,387.00	−15,060,000.00*	41,232,359.00	−21,710,000.00*	41,261,183.00	−23,010,000.00*	42,369,462.00
Prior profit (07)	349,020,000.00*	16,899,466.00	364,030,000.00*	17,826,980.00	338,780,000.00*	17,559,208.00	351,820,000.00*	18,983,599.00
Firm size (08–11)	−106,500,000.00*	15,219,590.00	−117,300,000.00*	15,378,847.00	−108,600,000.00*	15,207,267.00	−111,900,000.00*	15,668,718.00
Prior Profit (07) × TIME	6,765,916.00	6,291,536.00	−414,401.00	6,851,810.00	5,566,851.00	6,743,849.00	−2,393,615.00	7,322,483.00
Change predictor								
TIME (prerecession)	17,622,114.00*	6,664,061.00	17,211,285.00*	6,865,278.00	15,688,398.00*	7,105,056.00	15,013,324.00*	7,282,309.00
Predictors								
Staffing (04)			−8,295,332.00	13,326,629.00			−10,300,000.00	14,198,064.00
Staffing (04) × TIME			13,746,718.00*	6,844,942.00			13,954,548.00*	7,282,351.00
Training (04)					58,066,529.00*	20,639,604.00	55,543,927.00*	21,011,709.00
Training (04) × TIME					−13,130,000.00	9,062,066.00	−12,170,000.00	9,186,436.00
Mediator								
Firm productivity (04–07)								
Firm Productivity (04–07) × TIME								
Moderator								
Staffing (04) × Training (04)								
Staffing (04) × Training (04) × TIME								
Variance components								
Intercept	$1.19 \times 10^{16*}$	2.54×10^{15}	$1.09 \times 10^{16*}$	2.56×10^{15}	$9.79 \times 10^{15*}$	2.59×10^{15}	$1.05 \times 10^{16*}$	2.72×10^{15}
TIME	$1.52 \times 10^{15*}$	7.11×10^{14}	$1.64 \times 10^{15*}$	7.37×10^{14}	$1.39 \times 10^{15*}$	7.39×10^{14}	$1.39 \times 10^{15*}$	7.73×10^{14}
−2 log likelihood	49,788.80		47,725.40		45,918.40		44,158.40	
Akaike's information criterion	49,794.80		47,731.40		45,924.40		44,164.40	

Note. The dependent variable is change in firm ordinary profit 2008–2011 (08–11). 07 = 2007; TIME = prerecession; 04–07 = 2004 to 2007.
* $p < .05$.

Table C3 (*continued*)

Model C3–5		Model C3–6		Model C3–7		Model C3–8		Model C3–9	
β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
50,280,424.00*	24,514,502.00	50,680,825.00*	25,029,115.00	48,793,706.00*	25,438,860.00	49,960,013.00*	26,321,162.00	28,729,276.00	26,833,622.00
−3,534,056.00*	25,285,291.00	−6,682,001.00	25,758,267.00	1,471,370.00	26,025,811.00	760,182.00	26,942,793.00	18,479,302.00	27,549,432.00
−41,300,000.00*	39,946,025.00	−37,860,000.00*	40,216,269.00	−45,030,000.00*	40,050,590.00	−47,080,000.00*	41,136,010.00	−18,520,000.00*	41,726,249.00
335,010,000.00*	17,414,355.00	349,870,000.00*	18,404,229.00	326,870,000.00*	17,916,366.00	338,080,000.00*	19,336,009.00	342,150,000.00*	19,130,028.00
−91,550,000.00*	14,586,330.00	−101,300,000.00*	14,834,478.00	−93,180,000.00*	14,567,061.00	−95,160,000.00*	15,017,536.00	−109,500,000.00*	15,433,905.00
−3,385,920.00	6,632,310.00	−10,050,000.00	7,147,504.00	−4,778,382.00	6,978,705.00	−12,310,000.00	7,509,609.00	−2,159,149.00	7,487,285.00
14,376,897.00*	6,494,425.00	13,995,066.00*	6,699,421.00	12,668,292.00*	6,904,625.00	11,926,346.00*	7,077,445.00	15,187,898.00*	7,328,025.00
		−9,918,488.00	13,409,757.00			−11,540,000.00	14,276,051.00	−772,637.00	14,621,054.00
		10,837,072.00	6,698,462.00			10,999,110.00	7,096,584.00	13,516,670.00*	7,530,385.00
				60,080,467.00*	20,887,292.00	57,902,594.00*	21,252,759.00	40,971,075.00*	21,806,214.00
				−15,490,000.00	9,000,176.00	−14,440,000.00	9,120,146.00	−11,260,000.00	9,658,024.00
12,060,283.00*	14,377,224.00	9,236,036.00*	14,508,961.00	4,510,955.00*	15,132,444.00	5,094,610.00*	15,433,284.00		
29,935,069.00*	7,414,797.00	29,300,496.00*	7,580,789.00	33,242,851.00*	7,852,511.00	32,669,446.00*	7,969,074.00		
								76,637,811.00*	31,175,049.00
								−3,137,351.00	15,866,177.00
$1.11 \times 10^{16*}$	2.38×10^{15}	$1.04 \times 10^{16*}$	2.42×10^{15}	$9.30 \times 10^{15*}$	2.42×10^{15}	$1.00 \times 10^{16*}$	2.55×10^{15}	$9.65 \times 10^{15*}$	2.65×10^{15}
$5.95 \times 10^{14*}$	6.46×10^{14}	$7.26 \times 10^{14*}$	6.75×10^{14}	$3.96 \times 10^{14*}$	6.68×10^{14}	$3.59 \times 10^{14*}$	7.00×10^{14}	$1.33 \times 10^{15*}$	7.59×10^{14}
49,686.20		47,627.40		45,816.50		44,058.70		44,077.50	
49,692.20		47,633.40		45,822.50		44,064.70		44,083.50	

Received January 19, 2013
Revision received November 18, 2013
Accepted November 18, 2013 ■