Power to the Outsiders: External hiring and decision authority allocation within organizations

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Abstract

Research Summary: This study examines the relationship between external hiring and the allocation of decision authority within organizations, and how they interact to affect organizational change and innovation. We test our hypotheses using panel data for a nationally representative sample of businesses in Canada. We find that the practice of external hiring of managers and high-skilled non-managerial employees predicts greater decision authority allocated to each respective level of the hierarchy. Reallocation of authority is positively moderated by the strategic priority of i) workplace reorganization for managerial hiring, and ii) new product development for non-managerial hiring. We also find evidence of related associations with workplace reorganization and product innovation. The findings suggest that decision authority allocation is essential to effectively utilize externally acquired human capital.

Managerial Summary: This study examines how the effectiveness of hiring managers and high-skilled non-managerial employees from outside the firm is related to how much decision authority they are granted. We show that for both types of employees, external hiring predicts greater decision authority allocated to each respective level of the organization. For managers, external hiring predicts a greater likelihood of organizational change when more decision authority is granted. Similarly, for high-skilled non-managerial employees, external hiring predicts the development of more novel innovations when more decision authority is given. Overall, the results suggest that hiring talent from outside the firm by itself is not sufficient to expect benefits to the

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organization—instead, firms must also empower outside hires with the authority needed to translate their knowledge into performance.

Keywords: external hiring, human capital, organizational change, innovation, decentralization

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INTRODUCTION

A well-established perspective in the strategic management literature is the importance of knowledge embedded in human capital as a determinant of firm performance outcomes (Castanias and Helfat, 1991; Coff, 1997). For firms lacking such knowledge, hiring talent from outside the firm provides a compelling option to acquire capabilities that cannot be easily obtained through other means (Rao and Drazin, 2002). Although difficult to estimate, available evidence suggests that there has been a substantial shift over the last several decades of firms becoming increasingly reliant on external labor markets for human capital at all levels of the organization (Bidwell and Keller, 2014; Royal and Althauser, 2003; Somaya, Williamson, and Lorinkova, 2008). While firms may benefit from acquiring human capital, prior studies have also shown that knowledge gained through external hiring may not fully translate into firm outcomes. Contextual factors such as firm size (Almeida, Dokko, and Rosenkopf, 2003) degree of path dependence (Song, Almeida, and Wu, 2003), and firm-specificity of human capital (Groysberg, Lee, and Nanda, 2008; Huckman and Pisano, 2006) have been identified as important contingencies that determine the degree to which acquired human capital may be beneficial for firms. However, the role of organizational design choices in enabling (or detracting) from the benefits of external hiring has remained largely unexplored. This is surprising, given that both the organization theory and organizational economics literatures highlight human capital as a key determinant of organizational design choices to produce firm outcomes, as organizations adopt specific structures to achieve particular goals (Aghion and Tirole, 1997; Barnard, 1938; Burns and Stalker, 1961;

Dessein, 2002; Thompson, 1967). As the nature of human capital changes within an organization, organizational design elements may also adapt to utilize relevant knowledge, ultimately affecting firm outcomes (Grant, 1996). Scholars have also increasingly recognized the role of organizational design choices in influencing the relationship between human capital and firm performance (Barney and Wright, 1998; Mawdsley and Somaya, 2016; Nyberg *et al*., 2014; Wright and McMahan, 2011), which offers one potential explanation for the considerable heterogeneity of effects found in previous studies (Newbert, 2007).[1] As firms become increasingly dependent upon external hiring for human capital, better understanding how organizational design choices are related to and affect the utilization of human capital assets is crucial to understanding the success of external hiring practices.

In this study, we examine how one important aspect of organizational design—the allocation of decision authority within the hierarchy—may be linked to external hiring and its relationship with both organizational change and product innovation. Decision authority has long been highlighted in organization theory as a key dimension of organizational design (Cyert and March, 1963; Simon, 1947; Thompson, 1967), and has also been recognized as important for firm performance in the strategic management literature (Argyres and Silverman, 2004; Damanpour, 1991; Leiponen and Helfat, 2011). Our core argument is that the practice of external hiring of high-skilled employees and the allocation of decision authority are related, and interact to

[1] Of the 33 tests considered in the meta-analysis by Newbert (2007), only one third found evidence of a positive relationship between human capital and firm performance. In a separate meta-analysis, Crook *et al.* (2011) generally find a positive relationship between human capital and firm performance, but also find substantial variance.

determine both organizational change as well as innovation outcomes. For our empirical analysis, we use comprehensive panel data containing measures of human resource practices and organizational design choices for a nationally representative sample of businesses in the Canadian economy, spanning the years 1999-2006. To test our argument, we examine how decision authority allocation and external hiring may be related for both managers and high-skilled non-managerial employees. For managers, we find that greater decision authority is allocated to the managerial level of the hierarchy when external managerial hiring is implemented, which is positively moderated by the strategic importance of workplace reorganization to the establishment. With respect to organizational change, we find that external managerial hiring combined with greater decision authority allocated to managers predicts a greater likelihood of substantive changes being made in work practices within the organization. For high-skilled non-managerial employees, we similarly find that greater decision authority is allocated to non-managerial employees when external hiring is implemented, which is positively moderated by the strategic importance of new product development.[2] In addition, we also find that both factors interact to predict more novel product innovations produced by the organization.

Our study differs from prior work in three significant ways. First, to our knowledge our study is the first to examine whether organizational design choices may be related to external hiring practices, and whether the two interact to predict organizational outcomes. Here, we argue that the allocation of decision authority is an important feature of organizational design that enables

[2] For brevity, we refer to new product and service innovations simply as new product innovations throughout the paper.

external hiring to translate into firm outcomes, and may be one explanation for the substantial heterogeneity observed in the effects of human capital (Newbert, 2007). Second, although a large body of literature in organizational theory (Burns and Stalker, 1961; March, 1991; O'Reilly and Tushman, 2008; Thompson, 1967) and organizational economics (Aghion and Tirole, 1997; Alonso, Dessein, and Matouschek, 2008; Mookherjee, 2006) has at least implicitly assumed a link between human capital and the allocation of decision rights, direct empirical evidence of their relationship has been limited (Dobrajska, Billinger, and Karim, 2015). Our study provides evidence of this relationship in the context of decision authority allocation coupled with external hiring practices, where adaptations in organizational structure are linked to changes in hiring practices within the firm. Third, we propose that, instead of a universal relationship between increasing employee skills and greater decentralization of decision authority suggested by previous studies (Bresnahan, Brynjolfsson, and Hitt, 2002; Caroli and Van Reenen, 2001), the allocation of decision authority is instead dependent on the location at which relevant knowledge is located (Grant, 1996), where organizations dynamically adjust their allocation of decision authority based upon the firm's needs to utilize different segments of their human capital assets to improve firm performance (Boumgarden, Nickerson and Zenger, 2012). In the context of our study, decision authority is reallocated to the level of the hierarchy where external hiring occurs to more effectively utilize newly acquired human capital in the organization.

THEORY AND HYPOTHESES

External hiring and the allocation of decision authority

Theoretical explanations of external hiring practices have primarily focused on the human capital implications of employee interfirm mobility, where human capital is comprised of the knowledge, talent and skills embedded within the firm's employees (Becker, 1964). From the perspective of the resource-based view, human capital can serve as an important resource for competitive advantage over a firm's rivals (Barney, 1991, Lepak and Snell, 1999). However, unlike other types of resources, human capital is contained inside individuals who operate of their own free will, and cannot be owned in the same manner as other types of assets (Coff, 1997). This allows for the possibility that employees may choose to leave their employer and join another firm, changing the aggregate human capital within both organizations. Through the practice of hiring talent from the external labor market, firms can increase the human capital within their organization and acquire new knowledge, and under the appropriate conditions utilize their human capital assets to improve firm performance (Mahoney and Pandian, 1992, Wright *et al.*, 1995). Supporting this view, a substantial literature has empirically established positive effects of external hiring on firm outcomes, including firm survival (Phillips, 2002), technical knowledge transfer (Almeida and Kogut, 1999; Rosenkopf and Almeida, 2003; Song *et al.*, 2003), and product innovation (Rao and Drazin, 2002). Following the same logic, studies have also found evidence of organizational performance losses as a result of employee departures (Broschak, 2004; Osterman, 1987; Wezel, Cattani, and Pennings, 2006).

Not all types of external hiring are motivated by the desire to acquire knowledge, however, as many positions within firms requiring lower skill levels may also be filled through external hiring

(Kacmar *et al*., 2006). Prior studies have also identified other factors unrelated to knowledge that predict external hiring. In their study of the California Savings and Loan industry, Haveman and Cohen (1994) find that organizational founding and failure predict employee mobility across firms. Bidwell and Keller (2014) find that greater variability of job performance and increased supply of available internal candidates for a position predict less external hiring. The use of internal promotions to incentivize employees may also affect external hiring practices (DeVaro, 2006), along with the presence of a unionized employee base (Pfeffer and Cohen, 1984). However, while external hiring practices are not exclusively motivated by the desire to acquire knowledge, external hiring of high-skilled human capital does have the potential to contribute to firm outcomes, given the appropriate conditions.

In addition to acquiring human capital, firms must also choose organizational design elements to provide the structure through which knowledge embedded within individuals is synthesized into the organization of work, and ultimately organizational outcomes (Kogut and Zander, 1992). While organizational design choices are not by themselves inimitable sources of competitive advantage, they are critical to the ability of firms to realize the full potential of their resources for competitive advantage (Barney and Mackey, 2005). One crucial component of organizational design necessary to utilize human capital assets for firm outcomes is the allocation of decision authority to employees who possess relevant knowledge (MacDuffie, 1995).

In the organization theory literature, the allocation of decision-making authority is considered to be a fundamental element of organizational structure (Burns and Stalker, 1961; Lawrence and

Lorsch, 1967; Thompson, 1967), with the role of human capital often at least implicitly defined within each theoretical perspective. When defining mechanistic and organic types of organizations, Burns and Stalker (1961) note that mechanistic structures have centralized decision-making authority and emphasize skills "internal" to the firm as opposed to general skills, while organic structures are decentralized and may have technical knowledge located within members anywhere inside the organization. Kogut and Zander (1992) argue that a fundamental advantage of firms over markets is the ability to translate individual expertise into organizational outcomes, where decision authority is an important "organizing principle." (p. 389) Grant (1996) arguably makes the most direct case for the link between the allocation of decision authority and human capital, proposing that decision authority should be co-located within the organization with the knowledge relevant for a given task. Similarly, in theories of delegation within organizational economics, agents are often assumed to possess greater relevant knowledge than the principal, where the allocation of decision-making authority is related to the alignment of interests between the principal and the agent (Dessein, 2002; Jensen and Meckling, 1992). These theoretical perspectives include at least an implicit argument that, when provided with greater decision authority, employees can exploit their knowledge through their decisions and actions, shaping the organization and its outcomes (Aghion and Tirole, 1997).

However, despite the prevalence of theoretical arguments linking decision authority and human capital, there has been comparatively little empirical evidence of their relationship. In the economics literature, Caroli and Van Reenen (2001) find a negative relationship between the

relative cost of skilled workers across geographic regions in Britain and France and the probability of observing decentralization within firms. Based on their findings, they argue that the trend of increasing decentralization across firms over the last several decades is explained by an increase in the supply of available skilled labor. Similarly, Bresnahan *et al.* (2002) find that firms with higher-skilled employees are more likely to be decentralized. However, both studies could not observe external hiring by firms, and were only able to propose and test for a universal relationship between increasing skills and decentralization. Within the management literature, Dobrajska *et al.* (2015) find evidence of delegation to employees with specialized knowledge in the context of a single wind turbine firm, although they were also not able to observe external hiring practices, and could not observe changes in decision authority allocation over time. While limited, the empirical evidence thus far suggests that a positive relationship exists between the allocation of decision authority and human capital within organizations.

Here, we argue that the practice of external hiring has a direct influence on organizational structure. While the acquisition of skills and knowledge from the external labor market increases human capital within the firm, capturing the benefits of external hiring requires more than the possession of human capital alone, especially if the knowledge embedded in acquired human capital is novel relative to the firm's current stock of knowledge. In addition to concerns of mitigating appropriability by human assets (Coff, 1997), an appropriate organizational structure is also needed to utilize human capital assets (Huselid, 1995; MacDuffie, 1995). If decision authority is co-located with relevant knowledge within the organization, firms that implement external hiring

will also grant employees greater decision authority in order to implement changes to the organization's processes and translate their skills and knowledge into organizational outcomes. These changes may occur dynamically within the organization as knowledge is acquired and utilized at different levels of the hierarchy (Boumgarden *et al.*, 2012). This motivates our first hypothesis, which we state for external managerial and non-managerial hiring separately:

> *Hypothesis 1a: External managerial hiring is positively associated with greater decision authority being allocated to managers.*
> *Hypothesis 1b: External hiring of high-skilled non-managerial employees is positively associated with greater decision authority being allocated to non-managerial employees.*

External managerial hiring and workplace reorganization

Within organizations, managers at both the top and middle levels of the hierarchy play a vital role in the coordination of firm activities and are argued to be instrumental in the process of organizational adaptation (Ahearne, Lam, and Kraus, 2014; Hambrick and Mason, 1984; Huy, 2002; Taylor and Helfat, 2009; Wooldridge and Floyd, 1990). Knowledge and skills possessed by managers come from a combination of endowed ability and experience and may have relevance for a wide range of firm activities, including the execution of specific work practices (Pil and Macduffie, 1996). Much of the knowledge managers possess is tacit and difficult to codify or transfer to other individuals, which includes how planning, supervision, communication, and evaluation should be carried out to achieve specific organizational goals (Argyris, 1999). As a consequence, the nature of a firm's managerial human capital is argued to be an important factor in explaining the heterogeneity of performance across firms (Castanias and Helfat, 1991; Wooldridge, Schmid, and Floyd, 2008).

For firms that seek to make substantive changes to their organization to improve performance, the firm's existing stock of knowledge may be inadequate to effectively execute organizational changes if it is largely based upon the firm's previous and current organizational routines and practices (Nelson and Winter, 1982; Newman, 2000). In this case, hiring managers from the external labor market presents a potentially attractive option to acquire the knowledge needed, especially if learning through trial and error experimentation entails incurring high costs with uncertain returns (Wiklund and Shepherd, 2011). The firm's current management may also be more committed to the status quo within the organization, as they are likely to have more personally invested in maintaining the current state of affairs and more to lose by instituting significant changes (Hambrick *et al.*, 1993). By contrast, externally hired managers have less invested in maintaining the status quo and are more likely to execute organizational changes to improve performance. Consistent with this view, prior work has found empirical evidence of external managerial hiring leading to changes in product market strategy (Boeker, 1997), strategic reorientation (Tushman, Virany, and Romanelli, 1985), and organizational structure (Guest, 1962; Helmich and Brown, 1972; Pitcher, Chreim, and Kisfalvi, 2000; Simons, 1994).

While managers have been argued to be critical for implementing organizational change, the degree of their influence may vary considerably depending upon the setting in which they operate. Managers ultimately influence the firm through their actions and decisions (Adner and Helfat, 2003), distinguishing firms from market modes of governance and making them important economic actors (Williamson, 1963). However, managers also operate subject to external

constraints, limiting their influence (Finkelstein and Peteraf, 2007). Industry structure, regulations, cultural norms, and other elements of organizational context may all directly affect the degree to which managers are able to affect organizational processes and outcomes (Hambrick and Finkelstein, 1987). Empirically, managerial discretion has been established as an important moderator in determining the influence of managers across a wide range of contexts (Finkelstein and Hambrick, 1990; Hambrick and Abramson, 1995; Wangrow, Schepker, and Barker, 2015). While managerial discretion is conceptually broader in scope than the allocation of decision authority, these arguments and findings suggest that in order to execute changes in organizational practices, managers require the authority to do so, with greater authority increasing the likelihood of observing substantive changes.[3]

Based on these arguments, we consider how external managerial hiring and the allocation of decision authority may be related to workplace reorganizations as a form of organizational change. Workplace reorganizations refer to changes in the organization of work for production, including work practices within the firm (Frost, 2000). Here, we predict that the relationship between external managerial hiring and the allocation of decision authority is moderated by the strategic importance of workplace reorganization to the business. We expect that organizations that adopt the practice of external managerial hiring will reallocate more decision authority to the managerial level of the hierarchy when workplace reorganization is a strategic priority, allowing managers to more readily implement new work practices with the knowledge they possess. Similarly, we

[3] Hambrick and Finkelstein (1987) define managerial discretion broadly as "latitude of action," with their original definition describing CEOs. We apply their arguments more broadly to both top and middle management here.

expect the relationship between external managerial hiring and workplace reorganization will be positively moderated by greater decision authority allocated to managers within the organization, as greater authority allows managers to make the necessary decisions to ensure organizational changes are effectively executed. We state these predictions formally here:

> *Hypothesis 2a: The relationship between external managerial hiring and the allocation of decision authority to managers within the organization is positively moderated by the strategic importance of workplace reorganization.*
> *Hypothesis 2b: The interaction between external managerial hiring and the allocation of decision authority to managers within the organization positively predicts workplace reorganization.*

External high-skilled non-managerial hiring and product innovation

Similar to external managerial hiring, the practice of hiring high-skilled non-managerial employees from the external labor market allows firms to acquire relevant knowledge not already contained within the organization. However, instead of obtaining knowledge for effective organizational adaptation, studies examining external non-managerial hiring have focused primarily on the acquisition of technical knowledge relevant for innovation activities (Cassiman and Veugelers, 2006; Cockburn and Henderson, 1998; Rosenkopf and Almeida, 2003). If employees hired from outside the firm possess new types of technical knowledge and skills that differ from the firm's existing human capital, not only will human capital within the firm increase, but the likelihood of creating new knowledge within the firm may also increase as newly hired employees combine and exchange their expertise with others in the organization (Smith, Collins, and Clark, 2005). Consequently, hiring high-skilled non-managerial employees from outside the firm may increase innovation output as knowledge of cheaper and more effective solutions to

technical problems is translated into improved organizational outcomes. As an example, Song, Almeida, and Wu (2001) find that one important factor in explaining the dramatic increase in innovation within the Korean and Taiwanese semiconductor industries was the practice of hiring engineers from U.S. companies. Empirical studies have also found robust evidence of effects of external hiring on firm innovation both in technology-intensive sectors (Almeida and Kogut, 1999; Song *et al.,* 2003) as well as more broadly in low- and medium-technology industries (Dooley and O'Sullivan, 2016; Santamaria, Nieto, and Barge-Gil, 2009).

While external hiring may lead to increased innovation, the effect of external hiring on firm outcomes has been found to depend substantively on the organizational context. In their study of startups in the semiconductor industry, Almeida, Dokko, and Rosenkopf (2003) find that knowledge gained from external hiring decreases with firm size, as larger firms become less motivated to utilize knowledge from acquired human capital. Similarly, Song, Almeida and Wu (2003) find that firms with greater path dependence gain less knowledge from external hiring. To the extent that human capital is firm-specific, external hiring practices may also not result in gaining the full benefit from acquired knowledge (Groysberg *et al*., 2008; Huckman and Pisano, 2006). Here, we argue that the allocation of decision authority is an important feature of organizational context that moderates the relationship between external hiring and innovation. Granting greater decision authority to non-managerial employees may increase the quality of decisions for innovation activities within the firm if they possess greater expertise than their superiors (Gambardella, Khashabi, and Panico, 2019), as well as improve their individual

productive efficiency (Sauermann and Cohen, 2010). Greater decision authority may also increase the motivation of high-skilled employees when incentive schemes are difficult to implement due to challenges in measuring the performance of workers (Gambardella, Panico, and Valentini, 2015; Zenger, 1994). More generally, delegating decision authority to lower levels in the organization is argued to facilitate the exchange of knowledge between individuals, increasing the likelihood of finding solutions to innovation problems (Sheremata, 2000; Van Wijk, Jansen, and Myles, 2008). As a consequence, organizations that allocate greater decision authority to the non-managerial level with corresponding external hiring practices may experience improved innovation outcomes, as they are able to improve their utilization of acquired human capital. Firms that prioritize innovation may also decentralize to a greater extent when externally hiring skilled non-managerial employees, due to the additional benefits of decentralization for the innovation process. Consistent with this view, Nickerson and Zenger (2002) note that Hewlett-Packard's historical shifts towards decentralization were driven by the need to empower skilled employees at lower levels of the organization to engage in innovation activities.

Given these arguments, we predict that the relationship between external hiring of high-skilled non-managerial employees and the allocation of decision authority is positively moderated by the strategic importance of new product development to the organization. Similarly, we expect the relationship between external managerial hiring and product innovations will be positively moderated by greater decision authority allocated to non-managerial employees within the

organization, as greater authority allows employees to make the necessary decisions to improve the likelihood of developing new products and services. This motivates the following hypothesis:

> *Hypothesis 3a: The relationship between external hiring of high-skilled non-managerial employees and the allocation of decision authority to non-managerial employees within the organization is positively moderated by the strategic importance of new product development.*
> *Hypothesis 3b: The interaction between external hiring of high-skilled non-managerial employees and the allocation of decision authority to non-managerial employees within the organization positively predicts new product innovations.*

DATA AND MEASURES

Data

The data for our study comes from the Workplace and Employee Survey (WES), developed and administered by the Business and Labour Market Analysis Division and Labour Statistics Division at Statistics Canada, which contains comprehensive information on human resource practices, organizational structure, workplace reorganization, and innovation output for the years 1999-2006. The survey is a random stratified sample representative of the population of businesses in the Canadian economy in each year. There are two main advantages of the data compared to other existing microdata on human resource practices and firm internal organization. First, the WES data allows for direct measurement of the allocation of decision authority across different levels of the organizational hierarchy, including between managers and non-managerial employees. Second, an important strength of the WES is that responding to the survey was mandatory under Canadian law, which resulted in regular response rates of approximately 90 percent, mitigating concerns of non-response bias in our analysis. Measures of task allocation for managers as a distinct category are recorded for the years 2003 and 2005. Task allocation for non-

managerial employees, organization strategic priorities and workplace reorganization were recorded every other year beginning from the first year of the survey (1999, 2001, 2003, 2005). External hiring and innovation measures were recorded every year from 1999-2006.

We make several adjustments to both our managerial and non-managerial hiring samples. We begin by excluding organizations in regulated industries including utilities, transportation and warehousing, finance and insurance, and real estate rental and leasing to due to industry constraints that may prevent firms from executing organizational changes or developing new product innovations.[4] In our managerial hiring sample, we also exclude organizations with no managerial positions, and similarly remove organizations with no high-skilled non-managerial positions in our non-managerial hiring sample.[5] To mitigate concerns that organizations may have too few employees to internally hire for managerial or high-skilled non-managerial positions, we calculated the median total employee count for all businesses in the Canadian economy that responded as typically filling these vacant positions internally, to estimate a conservative sample cutoff point. We then restricted the sample to only include businesses with greater than ten employees, exceeding the median total employee count for businesses that typically hired internally for both positions.[6] In our final data used to examine external hiring and decision

[4] These industries are based on the list of "federally regulated sectors" provided by Employment and Social Development Canada, a ministry of the Canadian government. Includes NAICS codes 22, 48, 49, 52, and 53.
[5] High skilled non-managerial positions are formally defined as "professionals" in the WES survey (see discussion in Measures section).
[6] The median number of employees in organizations that typically hired managers from within the firm was 8; the median number for hiring professionals from within the firm was 10.

authority, our managerial hiring sample includes 3,547 businesses, while our non-managerial hiring sample includes 2,742 businesses in total.[7]

Measures

Allocation of decision-making authority

In order to measure the allocation of decision-making authority within organizations, a direct measure of actual decision control within the hierarchy is required. Formal arrangements such as organizational charts, while informative, do not necessarily indicate where actual authority lies within the hierarchy. For example, while senior managers may in principle have the authority to make decisions over a wide range of tasks, in practice the actual decisions may be made at lower levels in the organization, and simply receive "rubberstamp" approval from superiors (Aghion and Tirole, 1997). In contrast to measures based on organizational charts, the WES data contains detailed information regarding actual decision-making authority on 12 tasks across different layers in the organizational hierarchy. The survey data we use asks "who normally makes decisions with respect to the following activities?" The 12 operating tasks in the survey range from "daily planning of individual work" to "product and service development."[8] We consider the following five possible responses to the question of who makes decisions: 1) non-managerial employees, 2)

[7] A total of 3,210 organizations were excluded from the available data in 2003 and 2005 for the managerial hiring sample (1,593 in regulated industries, 136 having no managerial positions, 2,120 with 10 employees or less). A total of 4,773 organizations were excluded from the available data in 1999, 2001, 2003, and 2005 for the non-managerial hiring sample (2,109 in regulated industries, 910 having no professional positions, 2,927 with 10 employees or less).

[8] Tasks include: 1) Daily work planning; 2) Weekly work planning; 3) Follow-up of results; 4) Customer relations; 5) Quality control; 6) Purchase of necessary supplies; 7) Maintenance of machinery and equipment; 8) Setting staffing levels; 9) Filling vacancies; 10) Training; 11) Choice of production technology; and 12) Product/service development.

work supervisors, 3) senior managers, 4) individuals or groups outside the workplace, and 5) business owners. To measure the allocation of decision authority to managers, we calculate the fraction of tasks allocated to either work supervisors or senior managers within the organization. Similarly, we measure the allocation of authority to non-managerial employees by calculating their fraction of allocated tasks. For the remainder of the paper, we refer to both variables respectively as *ManagerControl* and *NonmanagerControl*.

External managerial and high-skilled non-managerial hiring

To measure the work practice of external hiring to fill managerial and non-managerial roles, the WES asks how vacant positions are usually filled, with separate responses for each employee type.[9] Managers are defined in the survey to include "the most senior manager in the workplace and other senior managers whose responsibilities would normally span more than one internal department," or who "generally report to senior management and are responsible for a single domain or department."[10] High-skilled non-managerial employees are defined in the survey as "professionals," whose "duties would normally require at least an undergraduate university degree or the equivalent." To measure the practice of external managerial hiring, we create a dummy variable equal to one if managerial positions are reported as usually being filled "from outside the

[9] The survey question states "How are vacant positions usually filled? Check only the most frequently used method."

[10] The survey provides a variety of examples of what is included in the definition of managers: "Examples: president of single location company; retail store manager; plant manager; senior partners in business services firms; production superintendent; as well as vice-presidents, assistant directors, junior partners and assistant administrators whose responsibilities cover more than one specific domain, department heads or managers (engineering, accounting, R&D, personnel, computing, marketing, sales, etc.); heads or managers of specific product lines; junior partners or assistant administrators with responsibilities for a specific domain; and assistant directors in small locations (without an internal department structure)."

company" as opposed to within the firm, with the added condition that at least one manager is hired in the same year if the practice changed from the prior year. To measure external hiring of high-skilled non-managerial employees, we follow the same procedure to create the corresponding variable for external hiring of professionals.

Strategic importance of workplace reorganization and new product development

To measure the strategic importance of workplace reorganization and new product development to the organization, we exploit a section of the WES survey which asks respondents to "please rate the following factors with respect to their relative importance in your workplace general business strategy." Respondents are asked to choose the importance of each factor on a Likert scale with possible responses being (1) Not applicable, (2) Not important, (3) Slightly important, (4) Important, (5) Very important, and (6) Crucial. Here, we consider the factors of "reorganizing the work process" and "developing new products/services," using each one as a separate variable for analysis. For our measure of strategic priority of each factor, we redefine values of (2) on the Likert scale to be equal to (1) and reset the scale to be ascending from 1 to 5, as an increase from the original (1) to (2) and vice versa does not clearly capture the changes in strategic priority that we aim to measure.[11]

Workplace reorganization

In a separate section of the WES, respondents are asked whether their workplace experienced any organizational changes during the year, where organizational change is defined as "a change

[11] This modification does not change the sign or significance level of our results from using each original variable and adding a separate dummy control for values equal to 1.

in the way in which work is organized within your workplace." Here, we seek to measure a wide range of types of workplace reorganization that have been highlighted as substantive changes in work practices, and consider the responses of 1) greater integration among different functional areas (Grant, 1996); (2) downsizing[12] (Freeman and Cameron, 1993; Cameron, 1994); 3) re-engineering[13] (Hammer and Champy, 2009); 4) greater reliance on job rotation, multi-skilling (Campion *et al.*, 1994; Ortega, 2001); 5) and implementation of total quality management (Powell, 1995).[14] For our measure of workplace reorganization, we create a dummy variable equal to one if the organization reports any of these changes occurring during the year of the survey.

Product innovations

To measure innovation output, the WES asks respondents whether new products or services were developed during the year of the survey. New products or services are defined as differing "significantly in character or intended use from previously produced goods or services." To measure the novelty of innovations, the survey subsequently asks whether the innovation is the first in its local market, in Canada, or in the world. However, industries may vary substantially in the length of their product development cycles, making it challenging to systematically attribute innovation output to external hiring. To mitigate this concern, in the creation of our innovation measures we consider only those industries identified as having product development cycles of

[12] The survey defines downsizing as "part of a reorganization in the workplace and not simply a response to a drop in demand."
[13] The survey defines re-engineering as "redesigning processes to improve performance and cost."
[14] Text is taken verbatim from the survey. Quotes omitted for ease of reading.

four years or less by Bushman *et al.* (1996)[15][16], and create two distinct measures: 1) the total number of novel innovations developed during the four years after external hiring of professionals has occurred, which we define as being first in the local market, in Canada, or in the world; and 2) the total number of non-novel innovations during the four years after external hiring of professionals has occurred.

Control variables

We include a number of control variables in our analysis. In our specifications with decision authority as the dependent variable, we include organization fixed effects to address concerns of unobserved heterogeneity and year fixed effects to control for aggregate shocks and trends. In our nonlinear models with workplace reorganization and innovation as dependent variables, we include fixed effects for industry (measured by 4-digit NAICS code), province, and year. In all of our specifications, we control for organization size, measured by logged total number of employees, and include a dummy variable control for organizations that are part of a multi-establishment firm. We also control for the average annual earnings of employees within the organization and include a dummy variable equal to one if the business has an organized union. To address changes in workforce composition that may affect the allocation of decision authority independently of external hiring practices, we include controls for the percentage of employees in

[15] Bushman et al. (1996) use product development times provided by the National Academy of Engineering (1992) to create their classification. Four years or less is their definition of a "short" (vs. long) product development cycle. Short cycle industries include autos, computers, dental, food manufacturing, hotels, metal manufacturing, mining, photography, publishing, software, tobacco, and wholesale/retail.

[16] A total of 5,679 organizations were excluded from the available data in 1999 and 2001 (1,632 in regulated industries, 745 having no professional positions, 2,289 with 10 employees or less, 4,692 not in short product cycle industries).

the organization that are managers and the percentage of employees that are defined as professionals in the survey.

Models

To estimate the relationship between the practice of external hiring and the allocation of decision authority for managers and high-skilled non-managerial employees ("professionals" in the WES), we estimate panel OLS fixed effects regressions.[17] In our specifications examining how external managerial hiring and the allocation of decision authority interact to predict workplace reorganization, we estimate logit regressions since our dependent variable is binary. To mitigate concerns of simultaneity, we lag all independent variables by two years.[18] For our specifications that investigate how external hiring of high-skilled non-managerial employees interacts with decision authority allocation to predict innovations, we estimate negative binomial models since our dependent variables are a count with over-dispersion (number of novel innovations: mean=0.48, S.D.=0.67; number of non-novel innovations: mean=1.71, S.D.=1.29).[19]

RESULTS

External hiring and decision authority allocation

Table 2 presents the results of our regressions examining the relationship between external managerial hiring and the allocation of decision authority to managers within the organization

[17] We also estimate OLS fixed effects regressions on log-odds transformed versions of *ManagerControl* and *NonmanagerControl*, as well as fractional probit regressions, with results shown in Appendix Table A13. Ultimately, we find similar results.

[18] The lag is for two years since task allocation data is not collected in 2004.

[19] As an additional robustness check, we also estimated Poisson regressions and found similar results for both novel and non-novel innovations.

(*ManagerControl*). We note that because our specifications include organization fixed effects, we are estimating the relationship between external managerial hiring and the allocation of decision authority using within-organization variation over time. As shown in Columns 1 through 4, we find consistent evidence of an increase in decision authority allocated to managers when external managerial hiring is implemented (p-values ranging from 0.001 to 0.003). In terms of magnitude, external managerial hiring predicts an increase of 10 percentage points in the fraction of tasks allocated to managers (Column 4). These findings are consistent with Hypothesis 1a stating that the implementation of external managerial hiring is positively associated with greater decision authority being allocated to managers.

----Insert Table 2 about here----

Table 3 presents the results of our regressions examining the relationship between external high-skilled non-managerial hiring (hiring of professionals in the WES) and the allocation of decision authority to non-managerial employees (*NonmanagerControl*). Similar to our results in Table 2, we find consistent evidence of increasing decision authority being allocated to non-managerial employees when external hiring of professionals is implemented (p-values ranging from 0.001 to 0.006). These findings are consistent with Hypothesis 1b, which states that the implementation of external hiring of high-skilled non-managerial employees is positively associated with greater decision authority being allocated to non-managerial employees. However, we note that the magnitude we find for external hiring of professionals is considerably

lower than that for external managerial hiring, predicting only a roughly 2.7 percentage point increase in the fraction of tasks allocated to non-managerial employees (Column 4).[20]

----Insert Table 3 about here----

External managerial hiring and workplace reorganization

In Column 1 of Table 4, we examine whether the relationship between external managerial hiring and the allocation of decision authority to managers is moderated by the strategic importance of workplace reorganization. We find evidence of a moderating relationship, with higher levels of strategic importance of workplace reorganization predicting greater decision authority being allocated to managers with external managerial hiring (p=0.048). This supports Hypothesis 2a, which states that the strategic importance of workplace reorganization positively moderates the relationship between external managerial hiring and the allocation of decision authority to managers within the organization. With respect to magnitude, a one unit increase in the Likert scale of strategic importance predicts a 2.7 percentage point increase in the fraction of tasks allocated to managers within the hierarchy when external managerial hiring is implemented.

----Insert Table 4 about here----

[20] As an additional robustness check for our *ManagerControl* and *NonmanagerControl* results, we also include controls for external professional and managerial hiring, with results shown in Appendix Table A12. We find similar results with these additional controls.

Table 5 presents our regression results examining how the interaction between external managerial hiring and decision authority allocated to managers (*ManagerControl*) predicts workplace reorganizations. As Column 2 of Table 5 shows, we find evidence of a positive interaction (p=0.017). However, since we use a nonlinear model (logit) for estimation, the coefficient is difficult to directly interpret. To aid interpretation, in Figure 1 we plot the marginal effect on the probability of workplace reorganization across a range of values for the fraction of tasks allocated to managers and include a 95% confidence interval. Consistent with our results in Table 5, the marginal effect increases with the fraction of tasks allocated to managers and shows evidence of a positive effect at higher allocations, beginning at approximately 0.55 and continuing to 1. With respect to magnitudes, the association ranges from a 5.7% increase in the probability of workplace reorganization at 0.55 to 16.5% at 1. Taken together, the results provide evidence for Hypothesis 2b, which states that the interaction between external managerial hiring and the allocation of decision authority to managers within the organization positively predicts workplace reorganization.

----Insert Table 5 and Figure 1 about here----

External high-skilled non-managerial hiring and innovation

In Column 2 of Table 4, we examine whether the relationship between external high-skilled non-managerial hiring (hiring of professionals in the WES) and the allocation of decision authority to non-managerial employees is moderated by the strategic importance of new product development. We find evidence of a moderating relationship, with higher levels of strategic

importance of product development predicting greater decision authority being allocated to non-managerial employees with external professional hiring (p=0.029). This supports Hypothesis 3a, which states that the strategic importance of new product development positively moderates the relationship between external high-skilled non-managerial hiring and the allocation of decision authority to non-managerial employees within the organization. In terms of magnitude, a one unit increase in the Likert scale of strategic importance predicts a 0.8 percentage point increase in the fraction of tasks allocated to non-managerial employees within the hierarchy when external hiring of professionals is implemented.

Table 6 presents our regression results examining how the interaction between external hiring of professionals and decision authority allocated to non-managerial employees (*NonmanagerControl*) predicts the number of innovations produced by the organization. In Column 1 of Table 6, we find evidence of a positive interaction for novel innovations (p=0.000), but no evidence of an interaction effect for non-novel innovations (Column 2, p=0.308). Since our negative binomial model is a nonlinear estimation, in Figure 2 we plot the marginal effect on the predicted number of novel innovations produced across a range of values for the fraction of tasks allocated to non-managerial employees.[21] Similar to our results in Table 6, the marginal effect of external professional hiring generally increases with the fraction of tasks allocated to non-managerial employees. Also, while we find evidence of a positive interaction on the number of novel innovations starting at relatively low fractions of tasks allocated to non-managerial

[21] Appendix Figures A14a (without 95% confidence intervals) and A14b (with 95% confidence intervals) show the same plot with the full range of possible task values.

employees, the marginal effect is relatively small at lower fractions but increases substantially at higher fractions. For example, the marginal effect on the number of novel innovations is only 0.14 at 0.11, but increases to 1.39 at 0.5, and to 3.57 at 0.8.[22] Overall, the results provide nuanced evidence for Hypothesis 3b, which states that the interaction between external hiring of high-skilled non-managerial employees and the allocation of decision authority to non-managerial employees within the organization positively predicts new product innovations.

----Insert Table 6 and Figure 2 about here----

Robustness checks

To test the robustness of our findings, we conduct a series of additional checks (see Appendix). In Table A1, we examine whether external hiring of lower-skilled employees also predicts reallocation of decision authority, and find no compelling evidence of a relationship. We also control for human capital investments by the organization (e.g., training) in our decision authority regressions (Table A2); repeat all of our main analyses on matched samples using Coarsened Exact Matching (Tables A3-A4); implement a Heckman-style correction for the endogeneity of external hiring (Table A5); examine the robustness of our results across industries (Tables A6-A9); and estimate a bivariate probit for workplace reorganization (Table A10), and ultimately find similar results. Also, although measurement error in our external hiring measures is likely to bias against finding any evidence of relationships, in Table A11 we

[22] While the point estimates for the marginal effect continue to increase after 0.8 (see Appendix Figure A14a), the confidence intervals grow considerably larger due to relatively few observations at these very high levels.

again estimate our decision authority regressions using a more stringent version of our measure of external hiring, which does not meaningfully change our results.

DISCUSSION AND CONCLUSION

Over the last several decades, the dependence of firms upon external labor markets for human capital has increased dramatically, increasing the strategic importance of effective management of external hiring. This study examined how the practice of external hiring may be related to the allocation of decision authority within organizations, and how both factors interact to predict organizational change and product innovation. Our main argument proposed that external hiring of high-skilled employees and the allocation of decision authority are related, and interact to determine both workplace reorganization as well as the development of product innovations. In our empirical analysis, we test this argument for both external managerial hiring and external hiring of high-skilled non-managerial employees (referred to as "professionals" in our survey data). For managers, we find decision authority is reallocated to the managerial level of the hierarchy when external managerial hiring is implemented. This relationship is positively moderated by the strategic importance of workplace reorganization, and we also find that external managerial hiring combined with greater decision authority predicts a greater likelihood of substantive changes in the organization of work. For professionals, we similarly find that greater decision authority is allocated to non-managerial employees when external hiring is implemented. This relationship is positively moderated by the strategic importance of new product development, and we also find that external hiring of professionals combined with greater decision authority

allocated to non-managerial employees predicts more novel product innovations produced by the organization. Our findings suggest the appropriate allocation of decision authority within organizations is closely linked to the success of external hiring.

While we find evidence of decision authority reallocation for both managers and professionals, as noted earlier the magnitude of the effect we find is considerably larger for managers (10 vs. 2.7 percentage points). While differences in measurement error between the two external hiring variables offer one possible explanation for the contrasting results, the findings are also consistent with the notion that managerial knowledge relevant for organizational change requires greater breadth of decision authority for effective implementation. Alternatively, shifting decision authority to managers within the firm may simply be easier to execute than to non-managerial employees if the activities of managers are more easily monitored by superiors in the hierarchy (Mookherjee, 2006). Testing these different possible mechanisms using more detailed data is a promising avenue for future work.

In testing our hypothesis that the interaction between external professional hiring and decision authority allocated to non-managerial employees positively predicts product innovations, we did find supporting evidence, but our results suggest the relationship is more nuanced, as we only find evidence for novel product innovations. Our results offer one possible explanation for inconsistent findings in prior related work. In examining the relationship between external hiring and innovation outcomes, Diaz-Diaz, Aguiar-Diaz, and De Saa-Perez (2008) find that external hiring practices lead to the development of new product innovations, but no evidence of an increase in

the total count of product innovations. However, their data did not allow them to distinguish between novel and non-novel innovations. The contrast in our results suggests that considering each type of product innovation separately may be important for identifying effects of external hiring.

We consider several possible explanations for the contrast in our findings for novel and non-novel product innovations. First, to the extent hiring of professionals contributes to innovation, knowledge acquired through external hiring may typically be relatively distant to knowledge within the firm and enable novel forms of exchange and experimentation, resulting in the development of more novel product innovations as opposed to products already in the marketplace (Zhou and Li, 2012). Second, firms using knowledge acquired from external hiring may primarily focus on the development of novel innovations if they mainly compete based upon differentiation versus lower costs, even if the knowledge acquired can be used to produce products already in the marketplace (White, 1986). Finally, reallocating decision authority to non-managerial employees may also be less critical in imitating products already available in the market, if imitation of products requires less knowledge utilization or exchange (Sheremata, 2000). Future work could consider how external hiring practices result in different types of innovative activities and output, and the mechanisms through which they occur.

We recognize several limitations of our study, which may provide the basis for additional future work. First, while our results generalize to the population of businesses in the Canadian context, future work should replicate our results in other countries to consider whether other

country-specific factors such as institutional differences also affect the relationship between external managerial hiring and decision authority allocation. Second, we note that while we are able to examine when organizations primarily rely upon external or internal managerial hiring at the organizational level, our measure of external hiring is subject to measurement error, since our data does not precisely capture the degree to which external hiring is used beyond being the most frequently used method to fill positions. Also, we are not able to observe hiring at the level of individual positions, which introduces potential measurement error in estimation. Ideally, one would test for a relationship between external hiring and decision authority between comparable positions within the same organization, and observe effects on firm outcomes. Position-level data linked to relevant organizational structure variables such as decision authority allocation would provide a more detailed understanding of how external hiring for specific positions can affect the structure of organizations, helping to more precisely inform our understanding of how human capital and organizational structure are linked.

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Table 1a. Summary statistics and correlation table, manager control sample

Variable	Mean	σ	1	2	3	4	5	6	7	8	9
1. Manager control	0.37	0.35	1.00								
2. External mgr. hiring	0.63	0.48	0.06	1.00							
3. Workplace reorg. strategic priority	2.36	1.16	0.03	-0.001	1.00						
4. ln(Total employees)	3.24	0.79	0.23	-0.15	0.13	1.00					
5. Multi-unit enterprise	0.08	0.28	0.08	-0.16	0.02	0.34	1.00				
6. Average employee earnings	33.41	22.28	0.09	-0.04	0.03	0.10	0.06	1.00			
7. Manager pct. of employees	0.16	0.13	-0.002	0.05	-0.15	-0.27	-0.12	0.15	1.00		
8. Professionals pct. of employees	0.05	0.15	-0.05	-0.001	-0.12	0.01	0.002	0.09	-0.03	1.00	
9. Unionized	0.17	0.38	0.06	0.001	0.09	0.25	0.21	0.05	-0.10	-0.08	1.00
N = 5,999											

Table 1b. Summary statistics and correlation table, nonmanager control sample

Variable	Mean	σ	1	2	3	4	5	6	7	8	9
1. Nonmanager control	0.08	0.13	1.00								
2. External prof. hiring	0.64	0.48	0.13	1.00							
3. New prod/svc dev. strategic priority	2.48	1.34	0.02	-0.03	1.00						
4. ln(Total employees)	3.42	0.93	-0.11	-0.07	0.23	1.00					
5. Multi-unit enterprise	0.14	0.34	-0.08	-0.14	0.04	0.40	1.00				
6. Average employee earnings	36.69	22.76	0.13	0.05	0.10	0.12	0.07	1.00			
7. Manager pct. of employees	0.13	0.12	-0.009	0.07	-0.02	-0.18	-0.10	0.08	1.00		
8. Professionals pct. of employees	0.19	0.22	0.16	0.15	-0.03	-0.21	-0.12	-0.005	0.02	1.00	
9. Unionized	0.20	0.40	-0.10	-0.003	0.07	0.34	0.26	0.05	-0.15	-0.21	1.00
N = 5,713											

Table 1c. Summary statistics and correlation table, workplace reorganization regression sample

Variable	Mean	σ	1	2	3	4	5	6	7	8	9
1. Workplace reorganization	0.36	0.48	1.00								
2. External mgr. hiring	0.62	0.49	-0.10	1.00							
3. Manager control	0.38	0.35	0.01	0.02	1.00						
4. ln(Total employees)	3.30	0.82	0.18	-0.16	0.21	1.00					
5. Multi-unit enterprise	0.10	0.30	0.13	-0.17	0.12	0.34	1.00				
6. Average employee earnings	33.73	21.86	0.09	-0.06	0.04	0.07	0.05	1.00			
7. Manager pct. of employees	0.16	0.12	-0.04	0.04	0.02	-0.33	-0.15	0.16	1.00		
8. Professionals pct. of employees	0.05	0.13	0.07	-0.10	-0.09	0.003	0.02	0.07	0.01	1.00	
9. Unionized	0.20	0.40	-0.01	0.02	0.12	0.24	0.21	0.01	-0.08	-0.09	1.00
N = 2,389											

Table 1d. Summary statistics and correlation table, innovation regression sample

Variable	Mean	σ	1	2	3	4	5	6	7	8	9	10
1. Number of novel innovations	0.48	0.67	1.00									
2. Number of non-novel innovations	1.71	1.29	-0.24	1.00								
3. External prof. hiring	0.50	0.50	0.06	-0.21	1.00							
4. Nonmanager control	0.08	0.12	0.20	-0.15	0.29	1.00						
5. ln(Total employees)	3.67	0.91	0.12	0.15	-0.16	-0.33	1.00					
6. Multi-unit enterprise	0.19	0.39	0.13	-0.07	-0.17	-0.21	0.54	1.00				
7. Average employee earnings	24.78	19.56	0.09	-0.05	0.06	0.07	0.19	-0.01	1.00			
8. Manager pct. of employees	0.14	0.15	-0.04	-0.26	0.35	-0.02	-0.32	-0.20	-0.06	1.00		
9. Professionals pct. of employees	0.09	0.11	0.10	-0.05	0.09	0.42	-0.24	-0.10	0.08	0.04	1.00	
10. Unionized	0.23	0.42	-0.14	0.17	-0.12	-0.14	0.30	0.15	0.14	-0.17	-0.06	1.00
N = 678												

Table 2. Manager control regressions

	(1)	(2)	(3)	(4)
	FE	FE	FE	FE
Dependent variable:	Manager Control	Manager Control	Manager Control	Manager Control
ln(Total employees)	0.056	0.091	0.107	0.110
	(0.078)	(0.007)	(0.024)	(0.020)
Multi-unit enterprise	0.047	0.044	0.045	0.046
	(0.067)	(0.076)	(0.073)	(0.073)
Average employee earnings	0.002	0.002	0.002	0.002
	(0.059)	(0.141)	(0.099)	(0.103)
Manager pct. of employees		0.365	0.370	0.375
		(0.092)	(0.110)	(0.100)
Professionals pct. of employees			-0.272	-0.293
			(0.019)	(0.011)
Unionized				-0.089
				(0.157)
External mgr. hiring	0.099	0.095	0.099	0.100
	(0.001)	(0.003)	(0.002)	(0.002)
Year fixed effects	Y	Y	Y	Y
Organization fixed effects	Y	Y	Y	Y
Observations	5,999	5,999	5,999	5,999
Adj R-squared	0.45	0.45	0.46	0.46

Standard errors clustered by province-year. p-values in parentheses. All regressions use sampling weights.

Table 3. Nonmanager control regressions

	(1)	(2)	(3)	(4)
	FE	FE	FE	FE
Dependent variable:	Nonmanager Control	Nonmanager Control	Nonmanager Control	Nonmanager Control
ln(Total employees)	0.015	0.018	0.023	0.023
	(0.235)	(0.158)	(0.078)	(0.069)
Multi-unit enterprise	0.011	0.012	0.013	0.012
	(0.445)	(0.378)	(0.339)	(0.427)
Average employee earnings	0.001	0.001	0.001	0.001
	(0.046)	(0.059)	(0.061)	(0.063)
Manager pct. of employees		0.143	0.146	0.144
		(0.008)	(0.007)	(0.009)
Professionals pct. of employees			0.118	0.117
			(0.000)	(0.000)
Unionized				-0.010
				(0.530)
External prof. hiring	0.035	0.034	0.027	0.027
	(0.002)	(0.001)	(0.006)	(0.006)
Year fixed effects	Y	Y	Y	Y
Organization fixed effects	Y	Y	Y	Y
Observations	5,713	5,713	5,713	5,713
Adj R-squared	0.43	0.43	0.44	0.44

Standard errors clustered by province-year. p-values in parentheses. All regressions use sampling weights.

Table 4. Strategic priority regressions

	(1) FE	(2) FE
Dependent variable:	Manager Control	Nonmanager Control
ln(Total employees)	0.106	0.022
	(0.018)	(0.165)
Multi-unit enterprise	0.050	0.012
	(0.057)	(0.377)
Average employee earnings	0.002	0.001
	(0.086)	(0.028)
Manager pct. of employees	0.392	0.143
	(0.095)	(0.026)
Professionals pct. of employees	-0.280	0.111
	(0.012)	(0.004)
Unionized	-0.089	-0.010
	(0.165)	(0.547)
External mgr. hiring	0.031	
	(0.447)	
Workplace reorg. strategic priority	-0.015	
	(0.274)	
External mgr. hiring X Workplace reorg. strategic priority	0.027	
	(0.048)	
External prof. hiring		0.038
		(0.030)
New prod/svc dev. strategic priority		0.004
		(0.429)
External prof. hiring X New prod/svc dev. strategic priority		0.008
		(0.029)
Year fixed effects	Y	Y
Organization fixed effects	Y	Y
Observations	5,999	5,713
Adj R-squared	0.46	0.45

Standard errors clustered by province-year. p-values in parentheses. All regressions use sampling weights.

Table 5. Workplace reorganization regressions

	(1)	(2)
	Logit	Logit
Dependent variable:	Workplace Reorganization	Workplace Reorganization
ln(Total employees)	0.735	0.738
	(0.000)	(0.000)
Multi-unit enterprise	0.292	0.393
	(0.450)	(0.195)
Average employee earnings	0.005	0.004
	(0.366)	(0.359)
Manager pct. of employees	1.338	1.032
	(0.346)	(0.550)
Professionals pct. of employees	0.955	0.614
	(0.293)	(0.500)
Unionized	-0.484	-0.572
	(0.011)	(0.013)
External mgr. hiring	0.147	-0.550
	(0.546)	(0.289)
Manager Control	-0.287	-1.520
	(0.519)	(0.027)
External mgr. hiring X Manager Control		1.806
		(0.017)
Industry fixed effects	Y	Y
Province fixed effects	Y	Y
Year fixed effects	Y	Y
Observations	2,389	2,389
pseudo-R-squared	0.30	0.31
log likelihood	-52,305	-51,778

Standard errors clustered by province-year. p-values in parentheses. All regressions use sampling weights.

Table 6. Innovation regressions

	(1)	(2)
	Neg. Binomial	Neg. Binomial
Dependent variable:	Number of novel innovations	Number of non-novel innovations
ln(Total employees)	0.308	0.122
	(0.043)	(0.008)
Multi-unit enterprise	0.215	-0.530
	(0.554)	(0.013)
Average employee earnings	0.004	-0.006
	(0.360)	(0.354)
Manager pct. of employees	-0.633	-1.206
	(0.674)	(0.017)
Professionals pct. of employees	-0.574	-0.287
	(0.317)	(0.615)
Unionized	-0.536	0.180
	(0.043)	(0.000)
External prof. hiring	-0.586	-0.014
	(0.011)	(0.922)
Nonmanager Control	-5.925	0.100
	(0.009)	(0.930)
External prof. hiring X Nonmanager Control	9.005	-1.383
	(0.000)	(0.308)
Industry fixed effects	Y	Y
Province fixed effects	Y	Y
Year fixed effects	Y	Y
Observations	678	678
log likelihood	-18,090	-36,081

Standard errors clustered by province-year. p-values in parentheses. All regressions use sampling weights.

Figure 1. Marginal effect of external managerial hiring vs. fraction of tasks allocated to managers

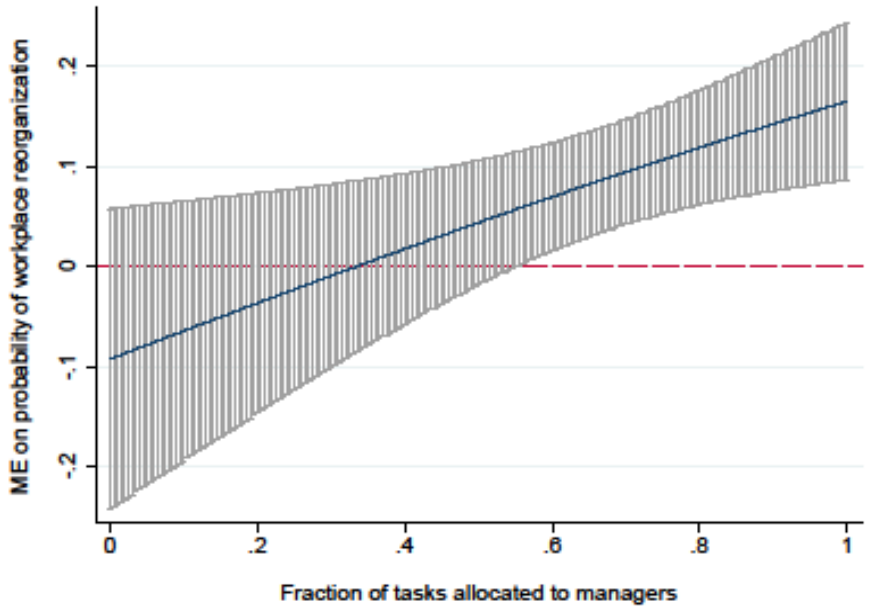

Figure 2. Marginal effect of external professional hiring vs. fraction of tasks allocated to non-managerial employees