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KNOWLEDGE WORTH HAVING IN 'EXCESS': THE VALUE OF TACIT AND FIRM-SPECIFIC HUMAN RESOURCE SLACK

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Whether holding resources in excess of what is needed to sustain routine operations (i.e., having slack) increases or decreases firm performance is a question of ongoing interest to management scholars. We contribute to existing theory by arguing that human resource slack generally decreases a firm's performance but that holding excess numbers of employees who possess important tacit knowledge that is specific to firms may benefit the firm. We find that the value of these excess resources increases as firms face competitive pressures and decreases when firms' operational choices facilitate the standardization of workflows. We obtain initial empirical evidence for our predictions by testing them on a novel dataset comprising six years of data for 4,070 manufacturing plants in Mexico. Copyright © 2013 John Wiley & Sons, Ltd.

INTRODUCTION

(When) does it pay for firms to hold more resources than they actually require to sustain their routine operations (hereafter, slack)? Whereas the literature on economics and finance has focused on the inefficiency and costliness of holding such excess resources (e.g., Jensen and Meckling, 1976; Leibenstein, 1966), organizational scholars have theorized about the potential benefits of slack, which allows firms to adjust to unanticipated contingencies (e.g., Bourgeois, 1981; Cyert and March, 1956, 1963; Galbraith, 1973). Numerous empirical studies examining the impact of different types of slack on performance-related outcomes, including firm profitability (Bromiley, 1991; Deephouse and Wiseman, 2000; Hambrick and D'Aveni, 1988; Lant, 1985; Love and Nohria, 2005; Miller and Leiblein, 1996; Singh, 1986; Tan and Peng, 2003; Wiseman and Bromiley, 1996), have not provided a single, universal answer to the question of whether slack increases or hampers firm performance. Instead, they have left us with another important insight: understanding the effects of slack on profitability requires a fine-grained analysis of the causal relationships (a.k.a. mechanisms) that underlie this link, and these likely depend on the specific properties of the type of resource held in excess. This paper is dedicated to uncovering the yet unexamined effects of human resource (HR) slack on firm profitability.

Two studies lay the foundation for distinguishing *HR slack* from other types of excess resources in more detail. Mishina, Pollock, and Porac (2004) draw on the resource-based view (RBV) and argue that slack in HR—as opposed to, say, financial slack—is highly idiosyncratic to context and therefore is best deployed when a firm embraces growth strategies based on its prior knowledge. Voss, Sirdeshmukh, and Voss (2008) use a similar categorization and show that firms with HR slack respond to environmental threats

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by increasing their focus on exploiting existing products rather than exploring new ones. Jointly, the two studies provide the important insight that what distinguishes HR slack from other excess resources is that workers hold *knowledge*, a resource that is not liquid and that is bound to context. However, whereas these prior works offer an entry to addressing the issue of whether HR slack increases firm performance or not, they leave the actual question for future researchers to address. We therefore build on these works to provide an understanding of whether and when it makes sense for firms to employ more workers than needed to attend to routine operations. To that end, we first refine the notion of HR slack further by parsing it into excess of different types of workers holding different types of knowledge. Leaning on the knowledge-based view (KBV; Grant, 1996a, b; Kogut and Zander, 1992) we distinguish between different types of *HR* slack using two well-established dimensions that allow us to differentiate (1) codified or tacit (Polanyi, 1966) from (2) general or firm-specific knowledge (Helfat, 1994). Classifying HR slack along these two distinct dimensions allows us to determine when these excess resources have positive or negative effects on firm performance.

More specifically, we suggest that the benefits of holding HR slack are likely to outweigh the costs only when the additional workers needed to address unforeseen events cannot be hired and trained *ad hoc*, as such contingencies emerge. Following this rationale, retaining excess workers who solely carry mostly codified knowledge should not pay off for the firm, irrespective of whether these employees have general or firm-specific knowledge. On the contrary, when the knowledge required to address an unforeseen event is tacit and difficult to transfer quickly, firms must deploy to the locus of problem solving those workers who already hold this knowledge. Inevitably, such redeployment will compromise the existing staff's involvement in routine operations, and additional workers will thus be needed, for no individual can split herself into two halves to be present at two different loci of problem solving in the firm simultaneously (indivisibility of tacit knowledge). Whether those needed workers can then be hired on demand depends on the specificity of the tacit knowledge they possess. To the extent that their tacit knowledge is mostly general and can be bought in the factor market when the need arises, we see little benefit to employing related workers in excess (tacit and general HR slack) at all times. It is only when the additional workers' tacit knowledge is primarily firm-specific and needs to be accrued over prolonged periods of employment within a particular work context (tacit and specific HR slack) that retaining such excess workers across times will increase firm performance overall. This value of tacit and specific HR slack increases (decreases) as contingencies, either external or internal to the firm, impose higher (lower) pressures to deploy these excess resources.

We test and find preliminary support for our predictions, drawing on six years of data for 4,070 manufacturing plants (1999–2004, unbalanced panel), or *maquiladoras*, that participated in Mexico's In-bond Manufacturing Program (*Industria Maquiladora de Exportacion—IME*). Elaborating on the literature on knowledge and HR (e.g., Bechky, 2003; Evans, Kunda, and Barley, 2004) and based on our own understanding of the industry gained through field visits and interviews, we exploit the granularity of the officially reported IME employment and performance data at the factory level to measure different types of HR slack per our theory: codified HR slack, tacit and general HR slack, and tacit and specific HR slack. We take advantage of events that increased the level of competition experienced by maquiladoras, namely China's entry into the World Trade Organization (WTO), to test whether greater external pressures to reorganize increase the value of holding tacit and specific HR slack. Finally, we compare the performance differences of holding this type of HR slack across maquiladoras, which embrace business models that imply tasks prone to distinct levels of standardization.

Besides expansions to the literature on slack resources, this study offers other contributions to theory and practice. First, our work is relevant for scholars interested in organizational design, as our findings suggest that holding *HR slack* could substitute/complement for well-established design variables, such as the formalization of routines and processes. Our findings also complement recent extensions of contingency arguments that explore the match between resource investments and deployment choices. Second, this study offers insights for scholars interested in HR more broadly, as our findings invite thinking about theory and empirical tests that examine the effects of holding *HR slack* in combination with other

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means to manage employees, such as the use of temporary workers and arrangements designed to embed flexibility in wages and work-hours. Third and finally, our findings are informative to policy makers and managers responsible for configuring the institutional and organizational arrangements for deploying workers. Contrary to intuition, it may pay to keep some costly slack when firms face pressures to adjust to continuous uncertainty in their workflows, and particularly when this uncertainty is exacerbated by external or internal contingencies – even if such contingencies call for cost reductions at the same time.

THEORY AND HYPOTHESES

HR slack: prior works

More than 50 years ago Cyert and March (1956) introduced the notion of slack as a pool of excess resources that helps firms adjust to unexpected fluctuations (p. 52). The vast body of research that followed has examined the association between slack and risk taking (Wiseman and Bromiley, 1996), innovation (Greve, 2003; Nohria and Gulati, 1996), firm growth (Mishina *et al.*, 2004), and performance (Bromiley, 1991; Deephouse and Wiseman, 2000; Hambrick and D'Aveni, 1988; Lant, 1985; Love and Nohria, 2005; Miller and Leiblein, 1996; Singh, 1986; Tan and Peng, 2003; Wiseman and Bromiley, 1996). Jointly, these works have taught us that understanding the effects of slack on performance requires a fine-grained analysis of the mechanisms that underlie this relationship, taking account of the specific characteristics of the excess resource. Whereas such a precise understanding has been developed for certain excess resources—notably financial slack (George, 2005)—we currently lack a similarly detailed grasp of the slack embedded in HR. This lacuna is particularly puzzling, as staff resources should, in theory, matter to most organizations in the world.

Strategy scholars have only recently begun outlining the properties that distinguish *HR slack* from other types of excess resources. In particular, two studies incorporate concepts from the RBV (Barney, 1991; Penrose, 1959) and investigate the relationship between excess employees and activities related to exploration and exploitation. In the first analysis, Mishina *et al.* (2004) find that *HR slack* facilitates expansion of existing products into new markets but inhibits growth into new product domains. In the second study, Voss *et al.* (2008) show that organizations tend to be protective of 'rare' slack and respond to external contingencies by engaging in low-risk exploitation, while avoiding more-risky exploration. Although these studies carve out important properties of *HR slack*, extant mechanisms allow us to say little about the impact on performance of this type of excess resource, for two reasons. First, the existing studies, while invoking knowledge-related arguments, do not distinguish between different types of employees in an organization and the different types of knowledge they hold. Second, understanding the effects of *HR slack* on firm performance requires considering not only the benefits but also the costs of holding excess employees. This additional aspect is important because *HR slack* implies having inputs above what is needed to sustain routine operations. Therefore, at least at some point, a portion of a firm's employees remain idle or underused and, consequently, negatively affect performance.

The specific benefits and costs of holding HR slack

HR slack benefits the firm when the availability of *excess in-house workers* helps the organization—without compromising its routine operations—adjust to contingencies: events that cannot be predicted with certainty and that may present costly threats and/or forgone opportunities to the firm unless addressed (Galbraith, 1977; Thompson, 1967). These benefits, however, must be weighed against the costs of holding additional workers on the payroll at all times. Along these lines, developing a cost-benefit rationale for holding *HR slack*, and ultimately predicting its effects on firm performance, depends largely on whether the type of knowledge required from the additional employees permits hiring them *ad hoc* or requires the redeploying of existing in-house staff as contingencies emerge. In this paper, we propose a conceptual logic for assessing the net effect of HR slack on performance that builds on premises from the KBV and that allow the classifying of workers' knowledge depending on how easily it can be acquired in the factor market and/or redeployed (Grant, 1996a, b; Kogut and Zander, 1992). Elaborating on prior works, we use the terms *codified*

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HR slack and *tacit HR slack* to distinguish between excess workers carrying knowledge that is easily separated from its source and those carrying knowledge that is bound to its repository and therefore not readily transferred (Brown and Duguid, 1991; Lave and Wenger, 1991; Nonaka, 1994; Polanyi, 1966). Moreover, we distinguish cases in which the knowledge held by excess workers is not only *tacit*, but also *general* or *specific* to a given work context (Grant, 1996a, b; Helfat, 1994). In the following sections we propose predictions that account for the 'net' effect of these distinct types of *HR slack* on firm performance.

HR slack that decreases firm performance: codified and tacit general HR slack

A firm's stock of employees carrying codified knowledge can be effectively adjusted when unexpected events emerge. The ease with which this type of knowledge can be transferred and replicated allows organizations to redeploy existing workers and/or contract additional employees and to familiarize them rapidly with the tasks to be performed. This ease is relatively independent of whether the knowledge possessed by workers is general or specific to a given organization. The fact that knowledge is prone to codification facilitates its transfer even if an employee is previously unfamiliar with the specifics of a given work context. Brief training sessions and easy-to-follow manuals are likely to be enough to acclimate the new employees to the specific demands of the situation. For example, think of employees whose primary work involves highly mechanized tasks, such as those on an assembly line (Balconi, 2002). Moreover, since little meaning is lost by these transfers, employees redeployed from different parts of the organization and/or newly contracted workers can quickly replicate the contents of codified knowledge at acceptable standards (Haas and Hansen, 2005). In view of these small costs of adjusting the pool of workers carrying codified knowledge, whether general or specific, it does not seem advantageous for a firm to hold *codified HR slack*. When unexpected contingencies arise, this type of excess worker can be hired relatively easily on demand, so the cost of holding them in stock during times of routine operation is not justified.

The benefits of *codified HR slack* are likely to remain slim even when labor markets are tight, as the short time needed for workers to acquire codified knowledge renders them highly mobile across work settings. Thus, as long as workers can freely terminate their current employment contracts, firms with *codified HR slack* will have to pay premiums to retain workers similar to those paid for contracting on the spot. Similarly, we expect few advantages from holding *codified HR slack* when the administrative costs of adjusting the size of the firm's workforce are significant (e.g., recruitment and severance pay). It is well documented that firms can bypass these costs through a wide array of temporary staffing arrangements (e.g., Houseman and Polivka, 2000). As with newly hired employees, performance differences between permanent and temporary workers holding mostly codified knowledge are likely to be short-lived, whereas employing permanent workers represents a greater burden on the firm's cost structure. We therefore predict:

> *Hypothesis 1 (H1): Holding codified HR slack, be it general or specific, has a negative effect on firm performance*.

The properties that render knowledge *tacit* complicate the adjusting of its availability when contingencies emerge. This is mainly because this knowledge is not easily transferred and, hence, can only be deployed by employees who already hold it (Ancori, Bureth, and Cohendet, 2000). Attempts to deploy tacit knowledge through intermediaries may come at the inevitable cost of losing valuable information, as those who have this knowledge may not be fully aware of how they are able to perform certain tasks at a given standard (Nelson and Winter, 1982). This trait of tacit knowledge limits the extent to which existing employees can be redeployed and its attention 'divided' to attend to both scheduled tasks and unexpected events (von Hippel, 1994). These constraints also limit the ease with which the firm's stock of employees carrying tacit knowledge can be effectively and rapidly adjusted when contingencies emerge. Any newly hired worker would have to accumulate personalized experience via repeated application before acquiring enough tacit knowledge to produce outputs at the desired standard (Grant, 1996a, b; Nonaka, 1994). Hence, a firm can only expand its pool of *tacit* knowledge rapidly if the newly hired employees already hold this knowledge, which in turn depends on whether this knowledge is *general* or *specific*.

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When the required knowledge the extra employee must possess is both tacit and general, firms can hire new coworkers as contingencies emerge. This is possible because *general* knowledge is constructed upon knowledge that is available in the 'market' and is not entirely specialized to a particular work setting (Helfat, 1994; Wang, He, and Mahoney, 2009). This type of knowledge is embodied in grammars akin to procedures, machinery, and technologies that are common across communities of practice that far exceed the boundaries of a specific organization (Barley, 1996; Barley and Bechky, 1994; Barley and Orr, 1997; Brown and Duguid, 1991). For example, think of employees who perform technical tasks and who rely heavily on knowledge that, although tacit, is also generally applicable across different settings (Bechky, 2003). To the extent that enough workers who have accumulated such tacit knowledge in other environments can be hired in the market space, the firm benefits little from holding *tacit and general HR slack*—even when labor markets are tight or the administrative costs of hiring/firing new workers are elevated (as the mobility inherent in general knowledge is likely to pressure wages upward when labor is scarce, hence eroding any benefits of retaining additional workers). Instead, the firm may be better off pursuing alternatives to access additional tacit and general knowledge on demand, such as by outsourcing the maintenance of machinery (e.g., Tsang, 2002) or IT functions (e.g., Venkatraman, 1997). Overall, in light of the availability of more cost-effective alternatives to access tacit and general knowledge when contingencies emerge, we posit:

Hypothesis (H2): Holding tacit and general HR slack has a negative effect on firm performance.

HR slack that increases firm performance: the value of tacit, firm-specific HR slack

In contrast to the aforementioned types of HR slack, a firm's stock of employees carrying *tacit* and *specific* knowledge cannot be effectively adjusted when unexpected events emerge. The defining characteristic of specific knowledge is that its usefulness is confined to the boundaries of a particular work setting (Helfat, 1994; Wang *et al.*, 2009). When firm-specific knowledge is additionally tacit and takes time to build, firms must resort to employees who already belong to the organization in order to access such knowledge, as hiring new employees poses no viable alternative: they would require time to grasp crucial pieces of the processes that are context-specific, such as nuances about the skills and knowledge held by other coworkers (Szulanski, 1996). Moreover, new employees would need time to develop strong and trusting ties and to access the social networks through which tacit knowledge is often shared (Levin and Cross, 2004). Also, new employees may take time to verify the commitment of their employers, and they might not fully engage in learning about firm-specific processes—knowledge of limited value outside a specific contractual relationship (Wang *et al.*, 2009). In light of these constraints, holding *tacit and specific HR slack* appears to be the only way for firms to meet unexpected demands of making tacit and firm-specific knowledge available in the firm. But what exactly are these unexpected events? According to Thompson (1967), 'uncertainty appears as the fundamental problem for complex organizations and coping with uncertainty, as the essence of the administrative process' (p. 159). Consequently, the benefits of holding such HR slack should almost always outweigh the costs. We expect this to remain the case even when labor markets are tight, as firms should not have to pay high wage premiums to retain workers whose knowledge would lose considerable value outside of its work context. We therefore predict:

Hypothesis (H3): All else equal, holding tacit and specific HR slack has a positive effect on firm performance.

Whereas this prediction (H3) suggests that holding *tacit and specific HR* has the potential to influence positively firm profitability at all times, the effect should be exacerbated by those contingencies that affect the deployment of that particular excess knowledge in the firm. To outline the specific conditions under which holding *tacit and specific HR* is particularly profitable and to corroborate the identification of our suggested mechanism, we further consider the moderating effect of the firm's environment. These distinctions are important given that the direct costs (wages) of a marginal unit of *tacit and specific HR* are likely to be, on average, higher than those of an additional unit of the other types of *HR slack*.

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We develop predictions in line with two stances generally embraced by organizational scholars: (1) firms react to *external contingencies*, or those that are mostly exogenous to their choices, such as the variability that characterizes competitive environments (Burton and Obel, 1984; Donaldson, 2001) and (2) firms face *internal contingencies*, or those that are mainly a product of their decisions, such as the variability inherent across distinct operational choices made by the firm (e.g., Adner and Helfat, 2003).

External contingencies and tacit and specific slack: the moderating effect of competitive pressures

Organizational scholars have long argued that firms must realign their productive arrangements in response to opportunities and threats brought about by *external*, or exogenous, contingencies (e.g., Meyer, 1982; Thompson, 1967; Zajac, Kraatz, and Bresser, 2000) and that the resources that help firms make such adjustments contribute to achieving higher performance (e.g., Brush and Artz, 1999; Miller and Shamsie, 1996). One critical factor driving these contingencies is level of competition (D'Aveni, 1994; Grant, 1996a, b; Grant, 2003). Competitive environments are 'highly changeable and even discontinuous, requiring organizations to respond flexibly and rapidly' (Hanssen-Bauer and Snow, 1996, p. 413). This logic suggests that it is critical for a firm to have enough employees to respond to competitors' moves without compromising its core operations (Galbraith, 1973; Thompson, 1967). Although such adjustments require resources of multiple types, the tasks that these imply mostly call for the exceptional deployment of workers holding tacit and specific knowledge. Only employees who know the inner workings of the organization can search for solutions and design and adjust the firm's arrangements (Bogner and Barr, 2000; Grant, 1996a, b). Moreover, since competitive disruptions usually come neither from a single source nor in neatly ordered intervals, enough employees have to be available to attend events that occur simultaneously, some even at different physical locations. These adjustments have to be implemented rapidly, as firms facing strong competition cannot afford to lag behind in their response—for example, firms that react slowly to rivals' moves are likely to lose customers to their competitors (e.g., Eisenhardt, 1989; Smith *et al.*, 1991). Thus, given the indivisibility of individual workers and their inability to attend simultaneously to two problems requiring tacit and firm-specific knowledge at two different locations and given firms' increased need to adjust to unexpected variations in times of higher competition, we suggest that the benefits of *tacit and specific HR slack* are likely to outweigh the costs even more in times of increased competition. We thus posit:

> *Hypothesis (H4a): The more that competitive pressures in the firm's external environment force the organization to adjust its operations, the higher the value of tacit and specific HR slack to that firm.*

Internal contingencies of tacit and specific HR slack: the moderating effect of firms' operational choices

Organizational design theory has also emphasized the need for a good match between the firm's resource investments and its operational choices (e.g., Adner and Helfat, 2003; Helfat *et al.*, 2007; Kor and Leblebici, 2005; Sirmon, Gove, and Hitt, 2008; Sirmon and Hitt, 2009). Even within the same industry, firms may face more or less internal contingencies depending on the nature of the workflows (Galbraith, 1977; Thompson, 1967). While some firms' operations require continuous adjustments, others rely on more steady and repeated patterns of activity to run their business. Scholars have characterized the former as more uncertain environments and suggested investing in resources that build flexibility in workflows, such as holding slack (Cyert and March, 1963; Galbraith, 1977; March and Simon, 1958). We therefore expect the value of holding *tacit and specific HR slack* to increase as firms embrace operational choices that require dealing mostly with nonstandardized workflows. This is not only because internal contingencies are more frequent in these environments but also because the variability in daily tasks renders organizational practices more reliant on the knowledge of individual workers than on explicit procedures (Bloor and Dawson, 1994; Pentland and Rueter, 1994). In contrast, keeping *tacit and specific HR slack* appears to be a costly alternative when firms' operational choices imply more stable workflows. Within these environments the universe of

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potential contingencies can be approximated with greater precision. Thus, firms can devise response plans that facilitate the effective redeployment of existing resources when (if) these events materialize (Lawson, 2001). The low variability in workflows also allows the translating of individual tacit knowledge into more explicit routines and procedures, hence facilitating the ease with which workflows can be adjusted when required (Zack, 1999). In sum, we expect the value of *tacit and specific HR slack* to decrease (increase) when firms' operational choices imply more (less) standardized workflows. Therefore, we posit:

> *Hypothesis (H4b): The more a firm's internal choices pertaining to its operations lead to a standardization of its workflows and tasks, the lower the value of tacit and specific HR slack to that firm*.

EMPIRICAL SETTING, DATA, AND MEASURES

Empirical setting

Our empirical tests draw on records of manufacturing plants operating under Mexico's In-bond Industry Program (*Industria Maquiladora de Exportacion*; IME). These plants, or *maquiladoras*, are Mexican- or foreign-owned and were granted the right to import inputs free of duties, subject to meeting predetermined export targets. The Mexican authorities required the participating plants to provide monthly data on their operations to Mexico's Institute of Statistics and Geography (INEGI). These administrative records, compiled between 1991 and 2006, include over half a million firm-month observations from more than 7,500 plants. This dataset is ideal for testing the theoretical predictions we propose, for a number of reasons. First, the labor-intensive assembly processes carried out by *maquiladoras* makes HR their prime input. Second, the granularity of the IME record provides an exceptional opportunity to approximate empirically the distinct types of *HR slack* in our theory. The breakdown of HR measures into functional groups facilitates empirical distinctions between employees carrying different types of knowledge, notably codified/tacit and specific/general. Variation at the level of the manufacturing site, rather than the firm, provides a unique opportunity to capture at a fine-grained level knowledge that is specific to a work context (King and Lenox, 2002). Also, the granularity at which plants' activities are classified allows the comparing of employment levels across entities that perform similar activities and determines what constitutes HR in 'excess'. Last, the *maquiladora* industry also provides us with unique opportunities to identify empirically the type of moderating effects suggested by our theory. On one hand, the IME's records span a stark (exogenous) shift in the competitive environment of *maquiladoras*. Namely, between 2002 and 2004 increased international competition pressured some of the entities in the sample to restructure their operations. On the other, the *maquiladoras* in our sample embrace business models that display well-defined variations in the level of standardization of the tasks they employ.

Data

The raw data we were given for our analysis consist of 451,433 monthly observations pertaining to 7,690 plants. For our analysis, we aggregate firm-month observations to a yearly level. By doing so we both suppress (undesired) seasonal fluctuations and ensure that asymptotic properties of the estimation are primarily driven by the cross-sectional characteristics of the data (Wooldridge, 2002). Depending on the type of raw data we have, we annualize variables either by averaging monthly data at the firm level (e.g., in the case of employees) or by aggregating them (e.g., in the case of monthly sales, costs, and profits). To ease the effects of abrupt variations in the exchange rate, we transform variables measured in Mexican pesos (i.e., sales and profits) into U.S. dollars using the average monthly exchange rate published by Mexico's Central Bank (*Banco de Mexico*). Since month-to-year transformations are highly sensitive to missing values—annual variables must come from averaging/summing periods with equal numbers of months—we used multiple methods to identify and impute missing values at the firm-month level. We exploit the richness of the temporal dimension of the IME records to impute missing monthly observations. To illustrate the procedure, consider an establishment for which the total number of workers for December 2004 is missing. We would first impute the missing value for December 2004 with the figure for November 2004, the adjacent monthly

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observation. If the latter was missing, too, we would seek to replace the December value with the October one, and so forth. In an extreme case, if more than 10 monthly observations in a year are missing, the remaining monthly observations would be set as a missing value and the whole firm-year would be dropped. Missing observations that still cannot be imputed because of a lack of reliable information are discarded. After running the aforementioned imputation routines as well as additional standard cleaning procedures (e.g., discarding observations that are obviously inputted incorrectly in the raw dataset), we obtain a sample of 28,339 firm-year observations pertaining to 5,451 plants. For our analysis, we finally restrict this dataset in two additional ways. First, in order to balance the number of observations within periods characterized by low- and high-competitive pressures, we sample symmetrically around the end of the year 2001, which marks a major change in the competitive environment experienced by the plants in our dataset. Second, we restrict our analysis to *maquiladoras* employing more than 10 people. The main theoretical reason for doing so is to focus on organizational entities that should be large enough ever to see a need for HR slack at all. Eventually, we are left with a sample comprising 14,035 plant-year observations pertaining to 4,070 manufacturing plants, on which we conduct our tests.

Dependent variable

The dependent variable in this study is *performance* at the plant level, computed as gross *profits*. Gross *profits* measure the residual value appropriated by a manufacturing plant after netting all expenses, except for taxes. This measure is commonly used in studies based on private firms for which no financial statements are available, as is the case with the *maquiladoras* in our sample (e.g., Durand and Vargas, 2003; George, 2005; Schulze *et al.*, 2001). In order to account for the left-skewed distribution in gross profits among the firms in our sample, we rescale the dependent variable logarithmically (natural logarithm), thereby meeting the underlying assumptions of our estimators as best as we can.[1]

Explanatory variables

We elaborate on prior studies and construct our measures for *HR slack* (Mishina *et al.*, 2004; Welbourne, Neck, and Meyer, 1999) as follows:

$$HRSlack_{it} = \frac{Plant\ Employees_{it}}{Plant\ Sales_{it}} - \frac{\sum_{j=1}^{n} \frac{Plant\ Employees_{jt}}{Plant\ Sales_{jt}}}{Plants\ Industry_{jt}} \quad (1)$$

The first term of this measure captures the ratio of workers to plant size for a focal plant i in year t, while the second term represents that same ratio for industry j in year t. By calculating the second term as the ratio for the 'average plant in an industry', we give equal weight to all plants and reduce biases potentially introduced by large plants.[2] We use plant-level export records collected by the INEGI in 2001 and classify *maquiladoras* into 123 industries or product categories. Although these data identify the outputs exported by a plant at the level of eight-digit Harmonized System Commodity Codes (HS Codes), we aggregate these at the four-digit level in order to facilitate the assigning of *maquiladoras* to a single industry category. More specifically, whenever a plant's exports fall into more than one four-digit HS category, we assign this plant to the category that accounts for the largest share of its total exports—an approach that seems unproblematic given the narrow industrial focus of the plants on one main industry. This aggregation ensures that, for each industry, there are at least two *maquiladoras* to construct the plant-year benchmarks implied by the second term of Equation 1. In order to distinguish between the three types of *HR slack* per our theory, we substitute the total number of plant employees in Equation 1 with workers in three different functional groups: line workers, plant technicians, and managers. Our mappings of the emphasis on codified/tacit and specific/generic knowledge across the tasks performed by these three types of workers are guided by multiple sources. We conducted field visits, interviewed *maquiladora*

[1] Note that gross profits might, in theory, also pick up plant-size related effects. The problem does not pertain in our analysis, however, since we control for plant size (through number of employees and firm sales) in our regressions.

[2] The results presented in this paper seem to be without significant change if measures are computed based on the industry average as in Mishina *et al.* (2004).

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managers and other experts, reviewed hundreds of task descriptions contained in multiple job banks (e.g., *Empleos Maquila*), and relied on insights provided by multiple studies on professions and work settings (Barley, 1996; Barley and Bechky, 1994; Barley and Orr, 1997; Bechky, 2003; Brown and Duguid, 1991). This qualitative evidence and our coding for each of the categories of *HR slack* are described below to the extent that it matters for this paper.

Codified HR slack

We measure *codified HR slack* by substituting the number of plant employees in Equation 1 with the number of line workers in a plant. These workers perform manual labor of different types (e.g., sewing, assembling) across work stations of highly fragmented production lines. Our interviewees reveal that, in general, instructions for replicating the tasks carried out by these employees are mostly contained in easy-to-follow manuals. Some of these documents are based on pictographic representations to bridge language barriers between workers and managers. We also learned that even the most idiosyncratic assembly processes performed by line workers are designed to be easily learned and implemented. This is because natural turnover and other eventualities require frequently replacing line workers.

Tacit and general HR slack

In addition to *codified HR slack*, we create a second variable following the computational logic of Equation 1. This time we substitute plant workers in the equation with the number of plant technicians. These employees have as their main function installing, configuring, and maintaining the machinery and tools used by line workers to carry out assembly processes. We learned from our interviewees that performing these tasks requires tacit knowledge, such as of engineering principles, the workings of certain machinery/tools, and even of computers and programming languages. These skills, although extensively refined and enhanced by experience, must be initially obtained through the type of formal training that takes months or even years to complete. However, once acquired, this knowledge can be applied to solve problems in a variety of settings. As expressed by a (former) *maquiladora* manager: 'Once a technician knew how to program or fix a plastic-injection machine, it did not matter much if this was branded by "X" or "Y" and/or operated at plant "A" or "B"'.

Tacit and specific HR slack

To proxy for *tacit and specific HR slack*, we create a further variable, this time substituting plant workers in Equation 1 for the number of plant managers. Our interviews reveal that the tasks of *maquiladora* managers require deep knowledge of every aspect of plant facilities, their adjacent value-chain (suppliers and customers), and relevant stakeholders (e.g., local authorities). *Maquiladora* managers are required to interact with other individuals across these settings, and, consequently, the knowledge they employ is extremely difficult (impossible) to codify. Although some of this knowledge is portable across settings (e.g., a manager can leverage on her connections and experience when she changes jobs), much of this is only likely to be relevant in the context of a given *maquiladora* (e.g., knowing which coworkers to rely on to address different types of issues).

The moderators of tacit and specific HR slack

External contingencies: competitive pressures

To proxy for the moderating effects of competitive pressures faced by *maquiladoras*, we take advantage of a series of institutional shifts that started in 2001, when China formally joined the WTO. It has been widely documented that this event lowered the global sourcing costs of labor-intensive products and eroded the advantages that the North American Free Trade Agreement (NAFTA) and Mexico's proximity to the United States provided to *maquiladoras* (see Carrillo and Gomis, 2003; *Financial Times*, 2012; Sargent and Matthews, 2008; Watkins, 2002). Our field interviews confirm that this new competitive environment posed important concerns for *maquiladora* managers and called for active reorganization. The affected plants needed not only to streamline their cost structures but also to differentiate their offerings from those of Chinese rivals, such as by offering more personalized attention to customers. Without exception, our sources stressed that engaging in these activities consumed much of their time and inevitably required some distancing from certain

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aspects of their more 'routine' operations. Our interviews and review of extant studies (e.g., Watkins, 2002) also suggest that the strength of these competitive pressures varied by sector and over time as trade barriers were phased out.

We therefore build on concepts from the international trade literature (Feenstra, Markusen, and Rose, 1998) to construct a time-variant variable, *competitive pressures*, that proxies for the extent to which a focal *maquiladora* was disrupted by the availability of cheaper Chinese products. The logic here is that the cost savings offered by lower-priced Chinese products could only be realized after accounting for the 'markup' imposed by the additional costs attributable (1) to the differences between the WTO tariff and the lower NAFTA duties and (2) to shipping goods farther—whereas the United States and Mexico share a land border, more than 10,500 km of ocean separate China from the United States. Since more than three fourths of *maquiladoras'* exports are directed to the United States (United States General Accounting Office, 2003), our index accounts for the markup paid by a U.S. importer in order to source the product of a focal *maquiladora* in China: $SI_{jt} = [d_{CH\,jt} - d_{MX\,jt}] + [c_{CH\,jt}/c_{MX\,jt}]$, where j refers to products at the level of four-digit HS Codes; t equals years; d_{CH} and d_{MX} are U.S. *ad valorem* duties levied on Chinese (CH) and Mexican (MX) imports; and c_{CH} and c_{MX} are the dollar cost of shipping a 40-foot container to the United States from China and Mexico. The details and multiple data sources used to compute this measure are contained in an Appendix S1. To improve interpretability we rescaled the index so that the smallest markup constitutes the highest value on the scale and the largest markup equals zero. On this scale, higher values point to potentially high threats of Chinese substitution and, consequently, high levels of competitive pressures for *maquiladoras* to reorganize (and vice versa). The products for which the index scores the highest levels are 'nails, tacks, and pins' (HS Code 7317), which are characterized by having both low volume and most-favored nation (MFN) import tariffs (0.2%); while the lowest levels are for 'yachts' (HS Code 8903), which, despite having below-average MFN tariffs (2.5%), are considerably 'bulky'. The *competitive pressures* variable takes the value of zero in the years between 1999 and 2001 to reflect the drastic change in competition that accompanied China's formal entry into the WTO. As is well documented, China's WTO membership not only implied the reduction of trade barriers but also included a series of institutional reforms that offered safeguards to importers and investors, which were the prime trigger of competition for *maquiladoras* in Mexico. We interact this index with the measure for *tacit and specific HR slack* and, per our theory, examine its effects on firm performance.

Internal contingencies: standardized operations

We take into account differences in *maquiladoras'* business models to proxy for the extent to which their operational choices rely on more or less standardized workflows. In general, *maquiladoras* are either contract plants, which provide bespoke manufacturing services to a number of customers, or focused plants, which concentrate on manufacturing their own line of products. We learned from our interviews and archival research that the standardization of certain tasks is inherently difficult in contract plants, since production must be constantly adjusted to meet customers' specifications. As new clients appear or the needs of existing ones change, the managers of these plants often must set up new production lines from scratch, as well as search for new suppliers and tooling processes. In contrast, the stability in the client/product portfolios of focused plants allows the developing of more standardized procedures. In the words of a *maquiladora* manager: 'If you are constantly shooting at the same target (producing the same type of products), it is all about making the (production) line better and better'. We relied on multiple sources to determine whether the business model embraced by a focal *maquiladora* corresponds to that of contract or focused plants, including business descriptions contained in mainstream industry directories (i.e., Solunet's *Twin Plant Directory*, *InfoMaquila*, and *Maquila Portal*), directories of trade associations, and corporate websites. With this information we code a time-invariant dummy variable, *standardized operations*, which takes a value of one if a *maquiladora* focuses on manufacturing its own products and zero if it offers customized manufacturing service. To corroborate the meaning of this measure, we use plant-level export records obtained from the INEGI and find a strong negative correlation (−0.897) between our

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dummy variable and the number of different products (defined at the level of six-digit HS Codes) produced by a *maquiladora*. We interact this variable with the measure for *tacit and specific HR slack* and examine its effects on firm performance.

Control variables

We include control variables used in prior research on slack and firm performance (George, 2005; Greve, 2003; Mishina *et al.*, 2004; Sharfman *et al.*, 1988; Tan and Peng, 2003), as well as controls specific to our setting. We deploy *year dummies* to control for the effects of unrelated macroeconomic events affecting *performance* and the level of *HR slack*, such as changes in labor market conditions and in the economic cycle. To control for local competition for inputs and customers at the industry level, we introduce proxies for *average industry profitability* and *number of industry competitors* (Scherer, 1996). We also control for firm-level effects that are likely to vary across time, such as *firm age*. *Firm age* is also likely to affect the relation between *HR slack* and *performance*. Scholars have argued that older firms are more likely not only to hold more slack resources but also to have developed superior capabilities to deploy them (Sharfman *et al.*, 1988). We measure *age* as the number of years since the firm was registered in the IME program. Although this is just a crude approximation of a plant's *age* (the entity may have been in operation long before registering in IME), it serves as a good indicator of the accumulation of knowledge about a very particular type of activity (i.e., in-bond manufacturing). We also control for the total number of worker hours of a manufacturing plant, as HR profitability is a function of the number of workers, wages, and hours worked (Lazear, 1981, 2000). However, we drop this control variable due to its high correlation (0.92) with the numbers of employees. Last, we introduce all the individual components of our *HR slack* measures to partial out their individual effects (including *plant sales, managers, plant technicians*, and *line workers*).

METHODS AND EMPIRICAL RESULTS

We run firm fixed-effects models to control for differences between entities that are likely to be constant over time, such as location, foreign ownership, and managerial style. Tests also reveal that our panel is rife with heteroskedasticity (unequal error variance in the regression errors); therefore, we use robust and clustered standard errors in our fixed-effects model. Table 1 reports the descriptive statistics and the correlations between the variables.

The variables show the expected distributions given the population of organizations in the sample. The number of line workers per manager and per plant technician is about 10 and 6, respectively, reflecting the manufacturing character of the entities in the sample. The measures for *codified HR slack, tacit and general HR slack*, and *tacit and specific HR slack* show the expected (theoretical) zero means but display significant variation across plants, which is desired. Correlations are low to moderate among most of the explanatory variables, with the exception of those measures that are systematically tied together (e.g., number of line workers, technicians, and managers) and the two interaction terms (*tacit and specific HR slack* × *competition index* and *tacit and specific HR slack* × *standardized operations*). Thus, to rule out that collinearity is affecting the magnitude of coefficient estimates and/or inference, we upward test the specification of our models by sequentially adding parameters to a baseline model of control variables (Greene, 2011; Wooldridge, 2010). As shown in Table 2, more comprehensive specifications increase in overall explanatory power and show enhanced goodness of fit. Notably, the entirety of slack-related variables (including interaction effects) is highly significant ($F(5, 4069) = 15.36$; $P > F = 0.00$). Similarly, coefficient estimates and significance levels for our central independent variables remain stable across specifications.

Model 1 starts with the most parsimonious parameterization and includes plant-, industry-, and year-specific controls. Control variables show the expected signs (e.g., sales) or are insignificant. In Models 2, 3, and 4 we include each of the core measures of slack individually and find support for H1, H2, and H3. Individually, *codified HR slack* is negatively associated with plant profitability ($p < 0.01$), *tacit and general HR slack* also shows a negative association ($p < 0.05$), and *tacit and specific HR slack* a positive relationship ($p < 0.1$). These three models also include the raw variables that constitute the *HR slack* measures

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Table 1. Descriptive statistics and correlations

Variable	Mean	Standard deviation	Minimum	Maximum	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Profits (natural log)[a]	8.187	0.347	7.791	12.673	1.000												
(2) Line workers	302.802	620.830	1.000	16,211	0.476	1.000											
(3) Plant technicians	54.772	134.681	0.000	3,194	0.474	0.579	1.000										
(4) Plant managers	33.299	75.928	1.000	1,204	0.562	0.717	0.667	1.000									
(5) Codified HR slack	0.000	0.043	−0.108	2.088	−0.169	−0.056	−0.133	−0.128	1.000								
(6) Tacit and generic HR slack	0.000	0.006	−0.020	0.321	−0.103	−0.069	0.068	−0.070	0.381	1.000							
(7) Tacit and specific HR slack	0.000	0.007	−0.014	0.769	−0.088	−0.067	−0.063	−0.024	0.537	0.553	1.000						
(8) Competitive pressures	0.582	0.66	0.000	1.592	0.092	0.003	0.016	0.021	0.001	−0.002	0.005	1.000					
(9) Standardized operations	0.781	*n.a.*	0.000	1.000	−0.021	−0.012	−0.017	0.008	−0.015	0.008	−0.006	0.010	1.000				
(10) Plant sales[b]	28,197.530	84,953.940	24.463	1,709,353	0.541	0.595	0.598	0.709	−0.139	−0.099	−0.071	0.050	0.006	1.000			
(11) Plant age (years)	11.323	1.667	9.000	14.000	0.101	0.003	0.019	0.027	0.000	−0.001	0.004	0.730	0.006	0.051	1.000		
(12) Average industry profitability[b]	1,059.90	1,089.901	1.113	18780.43	0.249	0.136	0.131	0.173	−0.002	0.000	0.003	0.158	0.021	0.173	0.165	1.000	
(13) Number of industry competitors[c]	16.514	50.572	2.000	496.000	−0.063	−0.057	−0.057	−0.087	0.010	0.003	−0.005	−0.317	−0.113	−0.096	−0.317	−0.120	1.000

[a] Arguments to construct the natural log of gross profits are expressed in 1,000 × U.S. dollars.
[b] 1,000 × U.S. Dollars.
[c] Number of firms in an industry-year.
HR = human resources.
Year dummies are not reported.

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in order to capture the effects of the slack measures, controlling for the effects of their individual parts. The predicted effects for H1, H2, and H3 remain and become more statistically significant when we include all three *HR slack* variables in a single specification (Model 5). The negative relationship between excess plant technicians and profitability is more than three times that between excess line workers and the same outcome variable, which points to the differential costs (wages) of employees across these functional groups. Per our theory, in Model 6 we introduce the

Table 2. Plant performance as a function of HR slack

	Model			
DV: Profits (natural log)	1 OLS Robust/ clustered S.E.	2 OLS Robust/ clustered S.E.	3 OLS Robust/ clustered S.E.	4 OLS Robust/ clustered S.E.
(B) Line workers (/1,000)	0.081 ∗∗ (0.028)	0.084 ∗∗ (0.028)	0.080 ∗∗ (0.028)	0.081 ∗∗ (0.028)
(C) Plant technicians (/1,000)	−0.012 (0.013)	−0.012 (0.013)	−0.011 (0.014)	−0.012 (0.013)
(D) Managers (/1,000)	0.142 (0.217)	0.139 (0.217)	0.138 (0.218)	0.147 (0.217)
(E) Codified HR slack		−0.354 ∗∗ (0.163)		
(F) Tacit and generic HR slack			−1.829∗ (0.925)	—
(G) Tacit and specific HR slack				0.622+ (0.343)
(H) Competitive pressures				
(I) Tacit and specific HR slack × competitive pressures				
(J) Tacit and specific HR slack × standardized operations				
(K) Plant sales (/10,000)	0.004 ∗∗ (0.001)	0.004∗ (0.001)	0.004∗ (0.001)	0.004∗ (0.001)
(L) Plant age (years)	0.004 ∗∗ (0.001)	0.004 ∗∗ (0.001)	0.004 ∗∗ (0.001)	0.004 ∗∗ (0.001)
(M) Average industry profitability (/1,000)	0.053 ∗∗ (0.001)	0.054 ∗∗ (0.001)	0.053 ∗∗ (0.001)	0.053 ∗∗ (0.001)
(N) Number of industry competitors (/1,000)	0.042 (0.039)	0.028 (0.004)	0.039 (0.004)	0.041 (0.004)
Constant	8.068 ∗∗ (0.021)	8.069 ∗∗ (0.021)	8.067 ∗∗ (0.021)	8.068 ∗∗ (0.021)
Firm fixed effects	YES	YES	YES	YES
Year effects	YES	YES	YES	YES
N	14,035	14,035	14,035	14,035
Number of firms	4,070	4,070	4,070	4,070
Joint *F*-test	10.61	10.32	10.13	9.98
$P > F$	0.000	0.000	0.000	0.000
R^2	0.320	0.332	0.327	0.323
R^2 between	0.337	0.349	0.345	0.341

HR = human resources.
$^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$
Standard errors are clustered by manufacturing plant.
Note that due to the full set of plant dummies, the stand-alone dummy for period standardized operations gets dropped from Model 7 and Model 8.

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Table 2. Continued

DV: Profits (natural log)	Model 5 OLS robust S.E.	6 OLS robust S.E.	7 OLS robust S.E.	8 OLS robust S.E.
(B) Line workers (/1,000)	0.085 ∗∗	0.084 ∗∗	0.081 ∗∗	0.082 ∗∗
	(0.029)	(0.029)	(0.029)	(0.029)
(C) Plant technicians (/1,000)	−0.010	−0.011	−0.011	−0.011
	(0.014)	(0.014)	(0.014)	(0.014)
(D) Managers (/1,000)	0.128	0.128	0.165	0.162
	(0.218)	(0.218)	(0.220)	(0.220)
(E) Codified HR slack	−0.493 ∗∗	−0.475 ∗∗	−0.418 ∗∗	−0.435 ∗∗
	(0.109)	(0.109)	(0.113)	(0.113)
(F) Tacit and generic HR slack	−1.7548	−1.750∗	−1.651∗	−1.634∗
	(0.720)	(0.721)	(0.729)	(0.729)
		(0.023)		(0.023)
(G) Tacit and specific HR slack	1.350∗	1.766 ∗∗	1.470 ∗∗	0.829
	(0.574)	(0.641)	(0.372)	(0.534)
(H) Competitive pressures		−0.011		−0.016
(I) Tacit and specific HR slack × competitive pressures		1.366^{+}		2.159∗
		(0.840)		(1.063)
(J) Tacit and specific HR slack × standardized operations			−5.890 ∗∗	−6.77 ∗∗
			(0.918)	(1.001)
(K) Plant sales (/10,000)	0.004∗	0.004∗	0.004∗	0.004∗
	(0.001)	(0.001)	(0.001)	(0.001)
(L) Plant age (years)	0.005 ∗∗	0.006∗	0.005∗	0.006∗
	(0.001)	(0.002)	(0.001)	(0.002)
(M) Average industry profitability (/1,000)	0.054 ∗∗	0.054 ∗∗	0.054 ∗∗	0.054 ∗∗
	(0.001)	(0.001)	(0.001)	(0.001)
(N) Number of industry competitors (/1,000)	0.025	0.021	0.016	0.015
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	8.069 ∗∗	8.057 ∗∗	8.070 ∗∗	8.053 ∗∗
	(0.022)	(0.032)	(0.021)	(0.032)
Firm fixed effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
N	14,035	14,035	14,035	14,035
Number of firms	4,070	4,070	4,070	4,070
Joint *F*-test	11.08	10.56	12.73	11.38
$P > F$	0.00	0.00	0.00	0.00
R^2	0.336	0.340	0.340	0.340
R^2 between	0.356	0.359	0.357	0.358

plant-year variant *competition index* and its interaction with *tacit and specific HR slack* (*tacit and specific HR slack* × *competition index*). This model supports H4a and suggests that this type of excess resource is almost twice as valuable for plants facing more intense competition (1.76 for parameter G vs. 3.13 for parameters G and I). We confirm the statistical significance of this effect by testing the linear combination of the direct effects of *tacit and specific HR slack* ($P > F = 0.01$). Model 7 tests the moderating effects suggested by H4b and includes the interaction term *tacit and specific HR slack* × *standardized operations*. The time-invariant baseline variable *standardized*

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operations is dropped due to collinearity with the fixed effects. The results of this model are in line with our predictions and show a strong drop in the value of *tacit and specific HR slack* when firms embrace highly standardized workflows. In fact, the linear combinations of coefficients G and J suggest that the net effects of holding this type of excess resource become negative (1.47 for parameter G, versus −4.42 for parameters G and J) for *standardized operations*—that is, $P > F = 0.00$ for joint test of parameters G and J. This result seems highly consistent with our qualitative evidence, which suggests that there is little room for slack in work settings where tasks are very well defined and governed by formal procedures. Last, in Model 8 we introduce all the variables included in the prior models and find robust support for all our conceptual predictions (i.e., H1, H2, H3, H4a, and H4b).

Robustness checks

We carried out a series of further tests to strengthen our findings. Six points strike us as worth mentioning. First, our results are robust to the way we prepare the original data for analysis. Given that our raw data suffer from missing values pertaining to some of our independent variables, we relied on different imputation routines to create our samples for analysis. Imputation of missing variables is a notoriously difficult problem in field-data research, and scholars have suggested multiple ways of dealing with it (Little and Rubin, 2002; Van Buuren, Boshuizen, and Knook, 1999). Which imputation approach appears optimal in a given situation is a function of the particular data used in a given study; however, the imputation principle remains the same: to exploit as much residual variance not used for the main analysis to predict missing values of the independent variables. For our particular setup we sought to meet this challenge by exploiting the unused longitudinal variation in our data, predicting missing values for monthly observations of our independent variables using preceding and subsequent observations before aggregating to the yearly level. Regressions we ran on different samples obtained as a result of different imputing routines for missing values in our raw data (using fewer or more neighboring monthly observations) show qualitatively convergent results. Second, our estimation results are not driven by design choices we made as part of our analysis. In particular, our findings are largely robust to the inclusion of additional plant-year observations before 1998 and after 2004, and our inference results are robust to the application of different minimum thresholds of total workers per firm for plants to be included into our sample. Third, our results are also robust to outlier control of our dependent and explanatory variables. In fact, when we drop extreme values, the results become even stronger in terms of statistical significance. Fourth, our results are robust to alternative measures of plant profitability and *HR slack*. Given that some of the inputs to compute commonly used financial ratios are not available in our dataset (e.g., returns over assets, returns over invested capital), we measure profitability in terms of total wages paid (*gross profits* over *total wages paid*) and find results that are qualitatively similar to those presented in this paper. The results presented here also remain robust if we use *HR slack variables* computed using different industry benchmarks. This is still the case if we use a coarse-grained categorization provided by the INEGI that groups plants into 12 industries. Fifth, albeit not a part of our explicit predictions, we exclude that *codified HR slack* and *tacit and general HR slack* would ever increase plant performance as competitive pressures increase or when operational choices prevent the standardization of workflows. Lastly, we test whether the results presented here are stable across distinct types of econometric models. Given the potential problem of serial autocorrelation when tracking plants' profits over time, we use models with lagged error structures—autoregressive integrated moving average (1) —and corroborate the findings of Models 1 through 8.

DISCUSSION, LIMITATIONS, AND CONCLUSIONS

This article responds to calls by recent studies to develop mechanisms that relate the specific properties of distinct types of excess resources to firm performance (e.g., George, 2005; Tan and Peng, 2003). To do this, we extend prior works that introduced a resource-based logic into the analysis of excess HR (Mishina *et al.*, 2004; Voss *et al.*, 2008) and apply well-established concepts from the KBV to punctually distinguish the properties of HR slack. We show that such

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conceptual distinctions are crucial to understanding how excess capacity embodied in this important resource affects firm performance. In more detail, we argue and show that *tacit and firm-specific HR slack*, and only this type of HR slack, can increase firm profitability, particularly in the presence of environmental shocks and for firms that rely on nonstandardized workflows.

As with every empirical study, our results are subject to a series of caveats. We do recall that our raw data require imputation as a result of missing original values, which represents a source of potential error, the size of which we cannot fully assess despite our best efforts (see Section "Robustness Checks"). And whereas the results we obtain are fully consistent with our theory, we must not exclude the possibility that we cannot observe additional ways for firms to deal with environmental uncertainty, namely ways that resort to firm capabilities that do not require the presence of HR slack. Our data—while rich in many ways—do not allow us to characterize firms in terms of more specific organizational procedures by which they deploy tacit knowledge, other than the aggregate nature of their business models (contract versus focused firms). This shortcoming may present an interesting research avenue for scholars to address in future work. Similarly, future studies may examine the value of HR slack in the context of a more varied set of fluctuations in a firm's task environment, going beyond the competitive shock elaborated here to investigate also its effects when both supply- and demand-side opportunities emerge simultaneously. We therefore encourage researchers to test our propositions in different contexts that allow them to address the aforementioned questions, as well as to think of designs that truly allow them to test the causality between slack and firm performance better than one can using field data of the type available to us. Our tests, while building on theory that establishes mechanistic links between slack and firm performance, must necessarily stop short of providing such inference. That said, given the consistency of our findings across specifications, their overall explanatory power, and their robustness to at least some of the additional tests we can deploy, we believe the results we have presented so far are not only statistically significant but also managerially meaningful. Whereas HR slack—due to the relative homogeneity of the manufacturing techniques employed by the plants in our sample—overall only accounts for a moderate amount of the variance explained by our models, its potential explanatory power is illustrated when considering that plant profitability rises by 48 percent when increasing *tacit and specific HR slack* from the minimum to the maximum value we observe in this sample (Combs, 2010). Thus, we do believe our findings are strong enough to contribute organizational scholarship and practice alike.

We believe our paper enriches the debate on slack and firm performance in four distinct ways. First, we reinforce the notion that it is not only the level but the type of excess resources that determines its contribution to performance. More specifically, the mechanisms we advocate in this paper suggest that, under certain conditions, the costs of holding *tacit and specific HR slack* are outweighed by the benefits—a situation that is likely never to occur for *codified HR slack* or *tacit and general HR slack*. Second, our findings shed light on the seemingly contradictory findings about the profitability of holding absorbed or low-discretionary slack (see Tan and Peng, 2003, for review). We suggest that these seeming contradictions might easily have resulted from the fact that prior studies did not distinguish enough between the particularities of the highly heterogeneous resources (e.g., sales, general, and administrative expenses) that make for absorbed and other slack. Third, we demonstrate that the value of holding slack resources is also highly dependent on the firm's task environment. Our findings suggest refinements of prior works according to which all forms of absorbed slack contribute negatively to firm performance during times of economic hardship (Deephouse and Wiseman, 2000). As shown here, it may pay off to hold some excess resources even when the demand for a firm's products is negatively affected by changes in its environment, as these resources may be crucial in helping the firm adapt to its new operational conditions. Presuming that the temporal pattern we observe has a systematic underpinning, our preliminary findings would complement prior studies on the impact on performance of the reduction of slack resources and downsizing (Love and Nohria, 2005). Fourth, our study further contributes to the literature on slack resources by going beyond exogenous changes in the operational environment to consider the value of excess resources in the context of endogenous operational choices. The

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results presented here suggest that what may be too much slack for one firm may be too little for another, depending on the nature of workflows implied by the firm's choices.

In addition to furthering the specific debate on slack, our study should appeal to scholars interested in HR more broadly. Our results invite further thinking about the complementarity between holding *HR slack* and other means to source employees on the spot, such as the use of temporary workers and arrangements designed to embed flexibility in wages and work-hours. Equally, we hope that organizational design researchers might see value in our findings. In our view, studying the substitutive or complementary effects of holding *HR slack* and standardizing the firms' routines and processes may be worthwhile. An important question alluded to earlier is the following: To what extent can organizational routines that facilitate the intra-firm mobility of coworkers with tacit knowledge substitute for holding the costly excess resource? To what extent does the need to hold firm-specific tacit HR slack change when two organizations have the same or different task structures?

We would also like to believe that policy makers, beyond those responsible for regulating Mexican *maquiladoras*, will be able to relate to our results. For example, the concept of creating institutional buffers to help firms retain talent in times of economic crisis has been in force in Germany since the 1950s (this initiative is known as *Kurzarbeit*), with the idea to prevent firms' irreversible brain drain during bear times by paying employees a reduced salary out of state-level insurance funds. The fundamental convictions behind both *Kurzarbeit* and the value of creating HR slack are similar in that both policy makers and managers realize that retaining corporate staff may pay off in the long term, even if short-termism would suggest laying people off. Similarly, our findings may inspire managers to reflect on an important applied question they face. Clearly, as our results indicate, there must be firm- and context-specific break-even points for holding slack. What exactly determines the optimality of this trade-off between holding excess tacit knowledge and forgoing the costs of paying salaries in their settings, however, is likely a question that firms must examine for themselves in their specific environments.

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REFERENCES

Adner R, Helfat CE. 2003. Corporate effects and dynamic managerial capabilities. *Strategic Management Journal* **24**(10): 1011–1025.

Ancori B, Bureth A, Cohendet P. 2000. The economics of knowledge: the debate about codification and tacit knowledge. *Industrial and Corporate Change* **9**(2): 255–287.

Balconi M. 2002. Tacitness, codification of technological knowledge and the organization of industry. *Research Policy* **31**(3): 357–379.

Barley SR. 1996. Technicians in the workplace: ethnographic evidence for bringing work into organizational studies. *Administrative Science Quarterly* **41**(3): 404–441.

Barley SR, Bechky BA. 1994. In the backrooms of science: the work of technicians in science labs. *Work and Occupations* **21**(1): 85–126.

Barley SR, Orr JE (eds). 1997. *Between Craft and Science: Technical Work in US Settings*. Cornell University Press: Ithaca, NY.

Barney J. 1991. Firm resources and sustained competitive advantage. *Journal of Management* **17**(1): 99–120.

Bechky B. 2003. Sharing meaning across occupational communities: the transformation of understanding on the production floor. *Organization Science* **14**(3): 312–330.

Bloor G, Dawson P. 1994. Understanding professional culture in organizational context. *Organization Studies* **15**(2): 275–295.

Bogner WC, Barr PS. 2000. Making sense in hypercompetitive environments: a cognitive explanation for the persistence of high velocity competition. *Organization Science* **11**(2): 212–226.

Bourgeois L. 1981. On the measurement of organizational slack. *Academy of Management Review* **6**(1): 29–39.

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Bromiley P. 1991. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal* **34**(1): 37–59.

Brown JS, Duguid P. 1991. Organizational learning and communities-of-practice: toward a unified view of working, learning and innovation. *Organization Science* **2**(1): 40–57.

Brush TH, Artz KW. 1999. Toward a contingent resource-based theory: the impact of information asymmetry on the value of capabilities in veterinary medicine. *Strategic Management Journal* **20**(3): 223–250.

Burton RM, Obel B. 1984. *Designing Efficient Organizations: Modelling and Experimentation*. North-Holland: Amsterdam, Netherlands.

Carrillo J, Gomis R. 2003. Los retos de las maquiladoras ante la perdida de competitividad. *Comercio Exterior* **53**(4): 318–327.

Combs JG. 2010. Big samples and small effects: let's not trade relevance and rigor for power. *Academy of Management Journal* **53**(1): 9–13.

Cyert R, March J. 1956. Organizational factors in the theory of oligopoly. *Quarterly Journal of Economics* **70**(1): 44–64.

Cyert R, March J. 1963. *A Behavioral Theory of the Firm*. Prentice-Hall: Englewood Cliffs, NJ.

D'Aveni RA. 1994. *Hypercompetition*. Free Press: New York.

Deephouse DL, Wiseman RM. 2000. Comparing alternative explanations for corporate risk-return relations. *Journal of Economic Behavior and Organization* **42**(4): 463–482.

Donaldson L. 2001. *The Contingency Theory of Organizations*. Sage: Thousand Oaks, CA.

Durand R, Vargas V. 2003. Ownership, organization, and private firms' efficient use of resources. *Strategic Management Journal* **24**(7): 667–675.

Eisenhardt KM. 1989. Making fast strategic decisions in high-velocity environments. *Academy of Management Journal* **32**(3): 543–576.

Evans JA, Kunda G, Barley SR. 2004. Beach time, bridge time, and billable hours: the temporal structure of technical contracting. *Administrative Science Quarterly* **49**(1): 1–38.

Feenstra RC, Markusen JA, Rose AK. 1998. Understanding the home market effect and the gravity equation: the role of differentiating goods. NBER Working paper 6804. National Bureau of Economic Research, Cambridge, MA.

Financial Times. 2012. Mexico: China's unlikely challenger. *Financial Times* 19 September.

Galbraith J. 1973. *Designing Complex Organizations*. Addison-Wesley: Reading, MA.

Galbraith JR. 1977. *Organization Design*. Addison-Wesley: Reading, MA.

George G. 2005. Slack resources and the performance of privately held firms. *Academy of Management Journal* **48**(4): 661–676.

Grant RM. 1996a. Prospering in dynamically-competitive environments: organizational capability as knowledge integration. *Organization Science* **7**(4): 375–387.

Grant RM. 1996b. Toward a knowledge-based theory of the firm. *Strategic Management Journal* (Winter) Special Issue **17**: 109–122.

Grant RM. 2003. Strategic planning in a turbulent environment: evidence from the oil majors. *Strategic Management Journal* **24**(6): 491–517.

Greene W. 2011. *Econometric Analysis* (7th edn). Prentice Hall: New York.

Greve H. 2003. A behavioral theory of R&D expenditures and innovations: evidence from shipbuilding. *Academy of Management Journal* **46**(6): 685–702.

Haas MR, Hansen MT. 2005. When using knowledge can hurt performance: the value of organizational capabilities in a management consulting company. *Strategic Management Journal* **26**(1): 1–24.

Hambrick D, D'Aveni R. 1988. Large corporate failures as downside spirals. *Administrative Science Quarterly* **33**: 1–23.

Hanssen-Bauer J, Snow CC. 1996. Responding to hypercompetition: the structure and processes of a regional learning network organization. *Organization Science* **7**(4): 413–427.

Helfat C. 1994. Firm-specificity in corporate applied R&D. *Organization Science* **5**(2): 173–184.

Helfat CE, Finkelstein S, Mitchell W, Peteraf MA, Singh H, Teece DJ, Winter SG. 2007. *Dynamic Capabilities*. Blackwell: Hoboken, NJ.

von Hippel E. 1994. "Sticky information" and the locus of problem solving: implications for innovation. *Management Science* **40**(4): 429–439.

Houseman SN, Polivka AE. 2000. The implications of flexible staffing arrangements for job stability. In *On the Job: Is Long-Term Employment a Thing of the Past?*, Neumark D (ed). Russell Sage Foundation: New York; 427–462.

Jensen M, Meckling W. 1976. Theory of the firm: managerial behavior agency cost and ownership structure. *Journal of Financial Economics* **3**(4): 305–360.

King A, Lenox M. 2002. Exploring the locus of profitable pollution reduction. *Management Science* **48**(2): 289–299.

Kogut B, Zander U. 1992. Knowledge of the firm, combinative capabilities and the replication of technology. *Organization Studies* **3**(3): 383–397.

Kor YY, Leblebici H. 2005. How do interdependencies among human-capital deployment, development, and diversification strategies affect firms' financial performance? *Strategic Management Journal* **26**(10): 967–985.

Lant T. 1985. Modeling organizational slack: an empirical investigation. Research paper 856, Stanford University, Stanford, CA.

Lave J, Wenger E. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press: Cambridge, UK.

Lawson MB. 2001. In praise of slack: time is of the essence. *Academy of Management Executive* **15**(3): 125–135.

Lazear E. 1981. Agency, earnings profiles, productivity, and hours restrictions. *American Economic Review* **71**(4): 606–620.

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Lazear E. 2000. The power of incentives. *American Economic Review* **90**(2): 410–414.
Leibenstein H. 1966. Allocative efficiency vs. "X-efficiency". *American Economic Review* **56**(3): 392–415.
Levin D, Cross R. 2004. The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer. *Management Science* **50**(11): 1477–1490.
Little RJ, Rubin DB. 2002. *Statistical Analysis with Missing Data*. Wiley: Hoboken, NJ.
Love EG, Nohria N. 2005. Reducing slack: the performance consequences of downsizing by large industrial firms, 1977–93. *Strategic Management Journal* **26**(12): 1087–1108.
March JG, Simon HA. 1958. *Organizations*. Wiley: New York.
Meyer AD. 1982. Adapting to environmental jolts. *Administrative Science Quarterly* **27**(4): 515–537.
Miller K, Leiblein M. 1996. Corporate risk–return relations: returns variability versus downside risk. *Academy of Management Journal* **39**(1): 305–360.
Miller D, Shamsie J. 1996. The resource-based view of the firm in two environments: the Hollywood film studios from 1936 to 1965. *Academy of Management Journal* **39**(3): 519–543.
Mishina Y, Pollock TG, Porac JF. 2004. Are more resources always better for growth? Resource stickiness in market and product expansion. *Strategic Management Journal* **25**(12): 1179–1197.
Nelson R, Winter S. 1982. *An Evolutional Theory of Economic Change*. Harvard University Press: Cambridge, MA.
Nohria N, Gulati R. 1996. Is slack good or bad for innovation? *Academy of Management Journal* **39**(5): 1245–1264.
Nonaka I. 1994. A dynamic theory of organizational knowledge creation. *Organization Science* **5**(1): 14–37.
Penrose E. 1959. *The Theory of the Growth of the Firm*. Oxford University Press: Oxford, UK.
Pentland BT, Rueter HH. 1994. Organizational routines as grammars of action. *Administrative Science Quarterly* **38**(3): 484–510.
Polanyi M. 1966. *The Tacit Dimension*. Anchor Day: New York.
Sargent J, Matthews L. 2008. Capital intensity, technology intensity, and skill development in post China/WTO maquiladoras. *World Development* **36**(4): 541–559.
Scherer FM. 1996. *Industry Structure, Strategy and Public Policy*. Harper Collins: New York.
Schulze WS, Lubatkin MH, Dino RN, Buchholtz AK. 2001. Agency relationships in family firms: theory and evidence. *Organization Science* **12**(2): 99–116.
Sharfman M, Wolf G, Chase R, Tansik D. 1988. Antecedents of organizational slack. *Academy of Management Review* **13**(4): 601–614.
Singh J. 1986. Performance slack and risk taking in organizational decision making. *Academy of Management Journal* **29**(3): 562–585.
Sirmon DG, Gove S, Hitt MA. 2008. Resource management in dyadic competitive rivalry: the effects of resource bundling and deployment. *Academy of Management Journal* **51**(5): 919–935.
Sirmon DG, Hitt MA. 2009. Contingencies within dynamic managerial capabilities: interdependent effects of resource investment and deployment on firm performance. *Strategic Management Journal* **30**(13): 1375–1394.
Smith KG, Grimm CM, Gannon MJ, Chen M. 1991. Organizational information processing, competitive responses, and performance in the U.S. domestic airline industry. *Academy of Management Journal* **34**(1): 60–85.
Szulanski G. 1996. Exploring internal stickiness: impediments to the transfer of best practice within the firm. *Strategic Management Journal* Special Issue: Knowledge and the Firm **17**: 27–43.
Tan J, Peng M. 2003. Organizational slack and firm performance during economic transitions: two studies from an emerging economy. *Strategic Management Journal* **24**(13): 1249–1263.
Thompson JD. 1967. *Organizations in Action: Social Science Bases of Administrative Theory*. Transaction: Piscataway, NJ.
Tsang AH. 2002. Strategic dimensions of maintenance management. *Journal of Quality in Maintenance Engineering* **8**(1): 7–39.
United States General Accounting Office. 2003. Report to Congressional Requesters. Mexico's maquiladora decline affects U.S.-Mexico border communities and trade: recovery depends in part on Mexico's actions. GAO report no. 03–891. General Accounting Office: Washington, DC.
Van Buuren S, Boshuizen HC, Knook DL. 1999. Multiple imputation of missing blood pressure covariates in survival analysis. *Statistics in Medicine* **18**(6): 681–694.
Venkatraman N. 1997. Beyond outsourcing: managing IT resources as a value center. *Sloan Management Review* **38**(3): 51–64.
Voss GB, Sirdeshmukh D, Voss ZG. 2008. The effects of slack resources and environmental threat on product exploration and exploitation. *Academy of Management Journal* **51**(1): 147–164.
Wang HC, He J, Mahoney JT. 2009. Firm-specific knowledge resources and competitive advantage: the roles of economic- and relationship-based employee governance mechanisms. *Strategic Management Journal* **30**(12): 1265–1285.
Watkins R. 2002. *Mexico Versus China: Factors Affecting Export and Investment Competition*. Industry and Technology Review, July 11–26. United States International Trade Commission: Washington, DC.
Welbourne TM, Neck HM, Meyer GD. 1999. Human resource slack and venture growth: an exploratory analysis of growing employees at a faster rate than sales. In *Frontiers of Entrepreneurship Research*, Reynolds PD, Bygrave WD, Manigart S, Mason CM, Meyer GD, Sapienza HJ, Shaver KG (eds). Babson College: Babson Park, MA; 480–490.

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Wiseman RM, Bromiley P. 1996. Toward a model of risk in declining organizations: an empirical examination of risk, performance and decline. *Organization Science* **7**(5): 524–543.
Wooldridge J. 2002. *Econometric Analysis of Cross-Section and Panel Data*. MIT Press: Cambridge, MA.
Wooldridge J. 2010. *Econometric Analysis of Cross-Section and Panel Data* (2nd edn). Cambridge, MA: MIT Press.
Zack MH. 1999. Managing codified knowledge. *Sloan Management Review* **40**(4): 45–58.
Zajac EJ, Kraatz MS, Bresser RK. 2000. Modeling the dynamics of strategic fit: a normative approach to strategic change. *Strategic Management Journal* **21**(4): 429–453.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix S1. Construction of the variable *competitive pressures*.

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