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THE DETERMINANTS OF HIGH PERFORMANCE WORK SYSTEMS: CROSS-SECTIONAL AND LONGITUDINAL ANALYSES

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The Determinants of High Performance Work Systems: Cross-Sectional and Longitudinal Analyses

Abstract

In this paper we examined factors hypothesized to facilitate and constrain the adoption of a *High Performance Work Systems* (HPWS). In 2,410 firms across diverse industries and three time periods we found both organizational characteristics and external environmental contingencies to be associated with the adoption of a HPWS.

The Determinants of High Performance Work Systems:
Cross-Sectional and Longitudinal Analyses

Prior conceptual work in the field of personnel and human resource (HR) management has traditionally focused on the development, implementation, and evaluation of the wide range of organizational practices associated with this function. In recent years this largely "micro" orientation has been augmented by an increasing interest in what might be called the *strategic* role of human resources. Unlike the early work in strategic human resources (Fombrun, Tichy, & DeVanna, 1984), this new literature stream is not confined to the strategic management of the HR *function*. Rather, greater emphasis is given to the strategic impact of human resources at the level of the firm; namely, the impact of the firm's HR strategy on overall firm performance (Cappelli & Singh, 1992). This trend is reflected in recent work that reframes the role of the HR function as a partner in the management of the business (Jackson & Schuler, 1995; Ulrich 1996). Within this context, firm HR strategy, whether driven by formalized HR structures or embedded within general management, is comprised of an internally consistent *system* of HR management (HRM) practices that is aligned with and helps to implement the firm's competitive strategy (Baird & Meshoulam, 1988; Jackson & Schuler, 1995).

Reflecting recent calls for the application of meso or cross-level research methodologies (Cappelli & Sherer, 1991), the recent empirical work in this field is expanding to embrace a more holistic or "macro" orientation as well. Rather than focusing on one HR function or practice, the level of analysis has become clusters or "bundles" of *High Performance Work Practices* (HPWP) (MacDuffie, 1995). For example, Pfeffer (1994) advocates the adoption of sixteen HPWP including employment security, selectivity in recruiting, work teams, incentive compensation, and employee ownership. Similarly, Huselid (1995) describes thirteen HPWP including comprehensive employee selection and development procedures, organizational work structures that encourage employee involvement, and performance management and incentive compensation systems that align the interests of employees with those of the shareholders. Conceptually, firm efforts to develop complementarities or synergies *among* HRM practices, and thereafter *between* the HRM system and firm competitive strategy, should lead to enhanced firm performance (Jackson & Schuler, 1995; Milgrom & Roberts, 1995).

Collectively, the adoption of an operationally appropriate HPWP comprises an organizational *High Performance Work System* (HPWS). In a dynamic and highly competitive marketplace, the intent of such a system is to develop a workforce with the appropriate skills and motivation and to provide an organizational structure that allows employees to influence how their roles are performed (Bailey, 1993). Indeed, prior work focusing on the firm-level impact of HPWS finds substantial economic returns associated with the adoption of such systems. Arthur (1994), Cutcher-Gershenfeld (1991), Delaney (in press), Delaney & Huselid (1996), Ichniowski, Shaw, & Prennushi (1994), Huselid (1995), Huselid & Becker (1995; 1996a; 1996b), MacDuffie (1995) and Youndt, Snell, Dean, and Lepak (1996) all found that the adoption of a HPWS to have an economically and statistically significant impact on employee turnover, productivity, or corporate financial performance. More recently, special issues devoted to this topic have appeared in the *Academy of Management Journa*l and *Industrial Relations*. The impact of this work has been to amplify earlier conclusions about the importance of HRM systems in the determinants of firm performance.

As the empirical evidence supporting the existence of a HPWS-firm performance relationship accumulates, the moderate rate of HPWS diffusion observed by a number of authors becomes a more salient subject for inquiry (Johns, 1993). Indeed, if HPWS are so successful economically, why haven't all firms adopted them? The literature in the field of strategic management presents one plausible explanation. For a firm's HRM system to generate sustainable competitive advantage, its organizational structures must not be easily imitated by competitors (Hamel and Prahalad, 1994). Moreover, to the extent that different firm competitive strategies require different role behaviors from employees, we should expect that the form and structure of the HRM system to reflect these requirements (Schuler & Jackson, 1987). In short, while firms should have an incentive to adopt HPWS, there are likely to be sufficient barriers to implementation that we

should be unsurprised by considerable variability in the diffusion of these practices across firms. Beyond these explanations, however, little is hypothesized or known about the factors influencing a firm's decision to adopt a HPWS. As the field of HR incorporates a more macro focus, this issue will become increasingly important for scholars interested in understanding the determinants of HRM systems and for practitioners attempting to implement them. Drawing on three unique national samples of publicly-held firms across a wide range of U.S. industries, this study extends a very nascent literature that has attempted to identify factors influencing the decision to adopt HPWS.

We begin with a review of the limited conceptual and empirical literature on the subject. From this literature we develop a set of hypotheses, focusing not only on the correlates of the adoption of HPWS, but also on the factors associated with *changes* in firm deployment of HPWS across time. We rely on a large national sample of firms across three data collection periods (1992, 1994, and 1996) and focus on the role of firm and environmental contingencies as predictors of HPWS adoption. We conclude with some remarks for practitioners wishing to adopt *High Performance Work Systems*, and also for scholars wishing to advance this emerging line of research.

PRIOR WORK

Because academic interest in *High Performance Work Systems* represents a very new area and one that focuses more on the effects of such systems than their determinants, there is very little conceptual work devoted to the diffusion of these practices. Existing studies draw from several literatures. For example, Jackson, Schuler and Rivero (1989) used a behavioral perspective (grounded in I/O psychology) to develop a model of HRM practices as a function of organizational characteristics. They argued that HR practices are designed to influence employee behaviors and attitudes, and the focus of their analyses is on the organizational characteristics that have such effects. Jackson et al. include both organizational characteristics involving the firm directly (competitive strategy, technology, structure, size, unionization) as well as characteristics of the firm's environment (industry). Much of the Jackson et al. paper provides support for the conventional wisdom that despite the diffusion of information about HPWP, there remains considerable interfirm and interindustry variation in the adoption of these practices. Jackson et al. do not, however, directly test a model of the determinants of a HPWS, but rather provide a series of discriminant functions showing that individual personnel practices are systematically different in firms grouped by strategy, industrial sector, etc.

Though touching on dimensions similar to Jackson et al., Osterman (1994) examines a more narrow set of work practices while developing an interdisciplinary conceptual basis for "workplace transformation" within the manufacturing sector. Rather than focusing on a broad system of High Performance Work Practices, Osterman examines specific innovative methods of work organization that include self-directed work teams, job rotation, quality circles, and Total Quality Management. Drawing on the prior conceptual work in industrial relations, sociology, and management, he considers the adoption of these practices to be a function of markets and strategy, technology, management values, and firm environment. Firm environment would include firm size, age, branch status, and time horizon for decision. Across several transformations of the dependent variable reflecting the diffusion of these practices within the firm, Osterman finds that management values favoring employee welfare, the degree of international competition, and employee skill requirements have an important influence on the adoption of innovative forms of work organization.

Similarly, Arthur (1992) found in a sample of steel "minimills" that HRM systems conformed to a strategy of either cost reduction or enhanced employee commitment. He also found that minimills adopted HRM systems consistent with their business strategies, although none of the other hypothesized determinants of the HRM systems (firm age, firm size, union coverage, location, and local labor market) was confirmed. And Snell (1992) found in a sample of 102 manufacturing plants that firms tended to link the form and structure of their administrative control systems with their competitive and manufacturing strategies.

At least two studies have adopted a systems perspective and consider the adoption of HPWP in clusters or "bundles," rather than as individual practices. Their focus on HRM systems

reflects the growing theoretical and empirical evidence that a portion of the firm-level impact of HPWS is created through complementarities and synergies *among* practices, as well as *between* systems of practices and the firm's competitive strategy. Ichniowski and Shaw (1995), drawing on an economic model of firm decisionmaking, cast the adoption of workplace innovation as an investment decision. The costs and benefits of such innovations were posited to be a function of plant technology and production methods, managerial and labor force experience, and product market characteristics. Based on panel data from 35 production lines in 21 steel companies, twenty-six individual practices (e.g., incentive pay, recruiting, teamwork, employment security, job flexibility, training, and labor management communication) were combined into one index reflecting the HR system for each line. The results supported their "adoption hypothesis" that organization change will be more difficult in older plants due to inadequate information about appropriate HR clusters and because workers in older plants will find such investments less appealing.

Pil and MacDuffie (1996) hypothesized that firms with poor performance relative to competitors, longer employee tenures, no recent lay-offs or downsizings, and firms that were undergoing significant environmental "disruptions" (e.g., deregulation) would be more likely to adopt innovative work systems. Their two-period study of the worldwide automobile industry (the MIT International Assembly Plant Study) found a general trend toward the adoption of innovative work systems from 1989 to 1993-94. They did not find the adoption of such systems to be linked to either high or low levels of prior firm performance, nor did they observe a link between employee layoffs and tenure and the adoption of innovative work systems. Their conclusion was that the external economic imperatives in this industry (i.e., intense global competition) might be the predominant factor affecting the adoption of HPWS.

Finally, in a review of the prior work in this area, Johns (1993) explained the adoption of HRM innovations through the lens of the organizational innovation-diffusion literature. He showed that the technical merit inherent in a HRM innovation accounts for relatively little variance in the extent to which is it adopted, and argued that the adoption of HRM innovations is strongly influenced by perceptions of uncertainty, politically processes, governmental regulation, and imitation processes across organizations.

In sum, the prior empirical literature draws on a largely *ad hoc* conceptual framework for guidance. Each paper cited above adopts a somewhat different theoretical perspective, which is unsurprising given the necessarily interdisciplinary nature of the subject. Indeed, as the interest in this topic follows directly from its relationship to the larger HR strategy-firm performance linkage, it is appropriate that the empirical work in this area be informed by a broader conceptual foundation rather than developing a unique theoretical framework of its own. Our work continues in that vein and develops a model of HPWS as a function of firm and environmental characteristics. It too should be considered exploratory, though it extends prior empirical work in several important ways. Most importantly, it utilizes a comprehensive, multi-dimensional measure of a firm's HR system and draws these data from three samples of firms that are broadly representative of U.S. industry.

Estimation Model and Hypotheses

As a relatively nascent empirical literature, there is little guidance with respect to the proper specification of the estimation models. However, given that the limited conceptual (Bailey, 1993) and empirical (Arthur, 1994; Huselid, 1995; MacDuffie, 1995) work that considers the effects of multiple dimensions of the HR system on firm performance, we likewise examine the *determinants* of multiple dimensions of the HR system. Therefore, while our theory is not developed enough to generate separate hypotheses for each dimension, our empirical analyses will examine each hypothesis by dimension. As such we consider the dimensional elements of the analysis largely exploratory.

As we describe in detail in the methods section, our conceptualization of the HRM system is based on a multidimensional model. Drawing on the prior empirical literature we develop a simple estimation model, such that;

$$HPWS_i = f(\text{External Environment, Organizational Characteristics}),$$

where $HPWS_i$ is one of the elements of the HR system that will serve as dependent variables. Consistent with earlier work, the independent variables are broadly categorized as external or internal to the organization. Their hypothesized effects on the adoption of HPWS are described in the following sections.

External Environmental Factors

Prior conceptual work suggests that the industry in which a firm operates exerts considerable influence over the form and structure of its HRM system. Keats and Hitt (1988), for example, suggested that at least three industry characteristics are influential. First, the degree of industry complexity should have a positive impact on the use of a HPWS. A highly competitive product market with many potential threats presents a relatively more complex environment which should benefit from the functional flexibility among employees generated by a HPWS. In more highly concentrated product markets, in contrast, the environment is less complex as there are fewer potential rivals to track and less need for a HPWS. Additionally, firms in concentrated industries (which, on average, are larger than firms in unconcentrated industries) may be more likely to be characterized by the traditional bureaucratic command and control structures that are inconsistent with a HPWS. Second, industry *munificence* (Keats & Hitt, 1988), reflected in the relative level of industry profitability, should signal the presence of resources available to invest in HPWS. Hence, all else equal, firms operating in more profitable industries should be more likely to adopt HPWS. Finally, the degree of uncertainty in the firm's cash flow or revenue stream should be *negatively* related to the propensity to adopt a HPWS. Typically operationalized as the variance in industry profitability over time (Keats & Hitt, 1988), industry *dynamism* should make investments in any type of asset more risky, and therefore less probable. To the extent that an organizational HPWS is considered an investment, a view that is consistent with the recent strategic view of HR, such added risk will diminish its appeal. Alternatively, one of the hallmarks of a HPWS is flexibility in both the skills of the labor force and the reward system. To the extent HPWS can effectively hedge some of this environmental risk, they may be relatively *more* appealing to firms confronting such uncertainty. It is not clear which of these effects will dominate.

> **Hypothesis 1:** Industry complexity and munificence will have a positive impact while industry dynamism will have either a positive or a negative impact on the use of HPWS.

Internal Organizational Factors

Consistent with the diverse results reported in prior work, we examine a variety of organizational characteristics that should influence the adoption of a HPWS. Generally, we anticipate that these variables will reflect the economic benefits and costs of the HPWS, or the organizational constraints on the adoption of such a system.

We expect that firm size will have a positive effect on the adoption of HPWS. All else equal, larger firms should be more likely to have the resources, experience, and organizational slack required to make considerable investments in a HPWS. Moreover, the relative costs of investments in human capital-enhancing HPWS should be more easily amortized across greater numbers of employees, making their costs per-employee lower.

> **Hypothesis 2:** Larger firms (i.e., those with more employees) should be more likely to invest in a HPWS.

In addition, we expect the composition of the firm’s HRM function to have an important impact on the adoption of a HPWS. Given that facilitating the adoption of many HRM innovations requires technical expertise among practitioners (Huselid, Jackson, & Schuler, in press), we expect the relative proportion of HRM employees within a firm to be positively associated with the adoption of a HPWS. We recognize the potential for an omitted variable bias in this relationship, however: investments in a HPWS and the presence of significant numbers of HRM employees may both be due to an HR strategy requiring significant investments in people. Hence, our hypothesis is simply

associational:

Hypothesis 3: The relatively number of HRM department employees will be associated with the deployment of a HPWS.

The composition of the firm's broader workforce should also affect the adoption of a HPWS, based on the expectation that the returns from investments in such systems are likely to vary across category of employee. In fact, there is considerable support in the literature for the notion that the economic returns from investments in human capital-enhancing HRM systems increase with job level and complexity. For example, Hunter, Schmidt, & Judiesch (1990) found the standard deviation of employee performance in dollars (SD_y) to be proportionally greater for higher level organizational employees than for lower level employees, while Becker & Huselid (1992) found the same result for employee salary level. This suggests that we would be likely to see more extensive investments in HPWS as the proportion of the managerial labor force (i.e., exempt employees) within the firm increases. However, this assumes that the firm is "right sized". Firms with an inappropriately large cadre of middle management may well have a higher managerial proportion in their labor force, yet not have adopted commensurate HPWS. Thus, while we expect a positive relationship, to the extent that our sample includes such firms the effect will be attenuated.

Hypothesis 4: Firms with a larger proportion of managerial employees (exempt) should be more likely to invest in HPWS.

The presence of a unionized labor force would be expected to reduce the prospects for observing a HPWS for three reasons. First, union contracts have historically sought to limit the managerial discretion and flexibility in staffing and reward management that typify a HPWS. Second, unions, by virtue of their bargaining power, threaten to appropriate a substantial portion of the returns associated with such practices (Ichniowski & Shaw, 1995), thus diminishing their appeal to the firm. While there is some support for the argument that unions can facilitate the adoption of HPWS (Eaton & Voos, 1992), empirically, Dimick & Murray (1978), Kaufman & Kaufman (1987), and Jackson, Schuler, & Rivero (1989) all found that unionized firms were substantially less likely to adopt progressive HRM practices. Third, union avoidance has also been hypothesized as a motivation for adopting progressive HRM practices. For example, Fiorito, Lowman, & Nelson (1987) and Kochan, McKersie, & Chalykoff (1986) found that the HRM practices used by firms had a substantial effect on the probability of union formation and expansion. Thus, the presence of an employee union may diminish organizational investments in HPWS, and/or more progressive HR policies may act as a deterrent to union formation. Unfortunately, there is little prior work concerning the direction of causality. However, since the bargaining units in most large firms were established long ago and the significant attention directed towards HPWS is a relatively recent phenomenon, it is more likely the unions influence the adoption of HRM practices than the reverse (Becker & Olson, 1992; Clark, 1984). Thus, we hypothesize:

Hypothesis 5: Union coverage will be negatively associated with the use of HPWS.

Previous research has considered neither the impact of labor productivity nor the relative importance of labor costs on the adoption of a HPWS. Standard economic theory predicts that labor productivity will increase as human capital is matched with more physical capital and technology. All else equal, more intensive investments in capital and equipment would mean that investments in HPWS will be highly "leveraged". Therefore, any improvement in the work system through a HPWS will be likely to have a larger financial impact in highly capital intensive firms (i.e., those with relatively greater property, plant, & equipment per employee). Additionally, highly capital intensive firms may in general be more motivated to improve labor productivity to justify their capital investments. Less clear is the effect of relative labor costs on investments in HPWS. Holding capital intensity constant, as labor costs comprise a larger share of total revenue, firms might

anticipate greater benefit from investments in HPWS, particularly when the labor force highly is skilled. Offsetting these benefits, however, is the relatively higher cost of HPWS implied by greater labor intensity. Hence, our hypothesized overall effect of relative labor costs is nondirectional.

Hypothesis 6: Capital intensivity will be positively associated with the use of HPWS.

Hypothesis 7: Relative labor costs will affect the use of HPWS.

The development and preservation of firm-specific intellectual capital has been of substantial recent interest among academics and practitioners. One tangible measure of the degree to which firms attempt to develop intellectual capital is through investment in research and development (R&D) activities. Following Hamel and Prahalad (1994), a HPWS should represent an important method through which firms that rely on R&D can support such a strategy by developing and reinforcing their core competencies in these areas. Indeed, a HPWS can play an important role in structuring an organizational environment that appropriately rewards innovation and creativity and focuses those efforts in way that serves the interests of the organization (e.g., Gerhart & Milkovich, 1992; Balkin & Gomez-Mejia, 1984). Hence, we expect that firms with greater emphasis on R&D activities will be more likely to invest in HPWS.

Hypothesis 8: R&D intensity will be positively associated with the use of HPWS.

The degree of financial risk assumed by a firm is also likely to affect the use of a HPWS. Firm-specific risk can arise from a number of factors, including the use of more debt (relative to shareholder's equity) in the firm's capital structure as well as the firm's underlying level business risk as assessed by the capital markets. We focus on that element of the overall business risk borne by shareholders (systematic risk) because top management will have an incentive to shift that risk to employees where possible (Becker & Olson, 1989). To the extent that employees are risk averse and will require a premium to bear this risk, management's ability to shift risk is not unlimited. Risk shifting in the form of reward management systems that link employee performance to firm performance is one way to improve the alignment of interests between employees and shareholders while mitigating increased risk premiums (Balkin & Gomez-Mejia, 1984; Eisenhardt, 1989; Gerhart & Milkovich, 1992). More generally, where firm systematic risk is high, firms will have more incentive to improve employee skill levels, increase functional flexibility and reduce fixed labor costs and therefore have greater incentive to use HPWS. Thus, we expect:

Hypothesis 9: Firm systematic risk (beta) will be positively associated with the adoption of HPWS.

The competitive strategy a firm pursues should also have an impact on the adoption of a HPWS. The concept of strategic HRM is based on the premise that human capital issues should be incorporated in the development of the firm's competitive strategy, and once this strategy has been developed, the HR function should design a system of internally consistent policies and practices that help to support and implement that competitive strategy. Within this context, Schuler & Jackson (1987; 1989), Jackson, Schuler, & Rivero (1989) and Jackson & Schuler (1995) describe the importance of *employee role behaviors* in the implementation of firm competitive strategy. Based on the work of Michael Porter (1985), the premise of Schuler, Jackson and their colleagues is that a predominantly *differentiation* or a *focus* strategy will require more intensive investments in a HPWS than will a *cost leadership* strategy. For example, Jackson, Schuler, & Rivero (1989) and Schuler & Jackson (1989) found in a sample of 267 firms that firms using *innovation*, *differentiation*, and *cost leadership* competitive strategies used HRM practices that were consistent with these strategies. Similarly, Arthur (1992) found that the use of a cost leadership competitive strategy was associated with diminished investments in human resources. Thus, we expect:

Hypothesis 10: Emphasis on a *cost leadership* competitive strategy in favor of either a *differentiation* or a *focus* competitive strategy will be negatively associated with the use of HPWS.

We expect the intrafirm variability of HRM strategies across business units within firms to also be related to the adoption of a HPWS. On one hand, firms with demonstrably different competitive strategies across business units could be expected to reflect this valiance in HR strategies across these units (Schuler & Jackson, 1987). On the other hand, firms that recognize the values of a HPWS may well be likely to attempt to adopt them widely throughout the firm. We expect the latter effect to predominate. Thus:

Hypothesis 11: Firms consistent in the adoption of HPWS throughout the firm will be more likely to adopt a HPWS.

We also expect that the values espoused by senior management to have an impact on the adoption of a HPWS. Senior management teams successful in the formulation and socialization of a broad organizational "vision" highlighting the role of people (as opposed to focusing on controlling costs or controlling bottom-line results) should be more likely to adopt a HPWS (Osterman, 1994).

Hypothesis 12: Managerial values will be related to the adoption of a HPWS.

Finally, the provision of employment security is one tangible way that senior management can communicate their human capital strategy to employees. Employment security has been widely hypothesized to increase the returns from investments in a HPWS, as employees cannot provide the potential benefits to firms if they are more likely to turnover. In short, job security is thought to lower the risks for both the employer and employee for investing in firm-specific human capital (Pfeffer, 1994).

Hypothesis 13: The provision of job security will be positively related to the adoption of a HPWS.

METHODS

Sample and Respondents

Our study draws on three waves of data collected in 1992, 1994, and 1996, and focuses on the HRM systems used by firms in calendar years 1991, 1993, and 1995, respectively. In each case the sample was drawn from *Compact Disclosure*, a commercial database comprised of annual corporate 10-K filings.[1] The sampling frame consisted of all publicly-held domestic firms with more than 100 employees and $5 million dollars in sales. For 1992 there were 3,452 firms in our sample; for 1994, there were 3,847 firms; and for 1996 there were 3,840 firms. After extensive pretesting and piloting of all survey materials, data on organizational HPWS were solicited from the chief human resources officer within each firm. As we describe in greater detail below, the surveys shared a number of questions in common, but also differed in many items. In 1992 968 firms representing all major domestic industries returned usable questionnaires, for an overall response rate of 28 percent. In 1994 740 questionnaires were returned, for a 20 percent response rate. In 1996 702 respondents completed questionnaires, for an overall response rate of 18 percent. 294 firms provided usable data for both 1992 and 1994; 248 firms provided data for both 1994 and 1996; 224 firms provided data for both 1992 and 1996, and 114 firms provided data for all three years.

Informants responded to each survey item separately for exempt and nonexempt employees, indicating the proportion of employees in each category who were affected by each practice. To derive a measure of the degree to which the practices were used by a particular firm, responses to each question were weighted by the proportion of employees in the exempt and nonexempt categories and summed. Survey responses were then matched with capital market and accounting data taken from *Compact Disclosure*. Substantial care was taken to ensure that all data were

matched to the same accounting periods. Missing data on some or all variables (primarily firm financial performance) reduced the sample for which complete data were available to 787 firms in 1992, 685 firms in 1994, and 673 firms in 1996. The data collection procedures employed as well as the development and validation of the HPWS scales are described in greater detail in Huselid (1995) and in Huselid and Becker (1995; 1996a).

Dependent Variables

Our *High Performance Work Systems* measures were taken from Huselid (1995) and Huselid & Becker (1995). In Huselid (1995) a two factor model of HPWS was developed based on data collected in 1992, including thirteen HPWP widely found to be effective in prior empirical work (Delaney et al.,1989; U.S. Department of Labor, 1993; see Table 1). From these items, two factors emerged, and a scale for each was constructed using the questions that loaded at .30 or greater on a single factor. The first factor, *Employee Skills and Organizational Structure*s (ESOS), focuses on the acquisition and deployment of employee skills throughout the organization. The second factor, *Employee Motivation* (EM), largely focuses on the firm's reward management system. The policies and practices that comprise these two factors are generally consistent with the "bundles" of *High Performance Work Practices* developed in other studies (Arthur, 1992; 1994; Delaney, Lewin, & Ichniowski, 1989; Ichniowski & Shaw, 1995; and MacDuffie, 1995) and have a demonstrated relationship with intermediate (turnover, productivity) and capital market measures of firm performance (Huselid, 1995; Huselid & Becker, 1995; 1996a; 1996b).

[Insert Table 1 About Here]

Using data from the 1994 survey, Huselid and Becker (1995) sought to improve on the scales developed in Huselid (1995). The same 13 questions used in the 1992 survey were also included in the 1994 survey, allowing for a cross validation of the original results.[2] However, the 1994 survey also focused more specifically on the strategic architecture of the HRM system and included measures not available in 1992. These same questions were also included in the 1996 survey. Therefore, one of the purposes of this paper is to report the results for the expanded measure available in 1994 and 1996 and to compare those results with the more limited measures available in Huselid (1995). Specifically, in our analyses of the 1994 and 1996 data we combine nine items from the 1992 survey with eight new items. These items were chosen in light of the recent conceptual work describing the importance of aligning HR and business strategies and the important role of compensation, performance management, and training systems in facilitating these goals (Jackson & Schuler, 1995). In all, seventeen items are included in our subsequent analyses. The factor structure for these items is presented in Table 2.

[Insert Table 2 About Here]

Thirteen of the seventeen items loaded unambiguously on one of three factors denoted in Table 2. The first factor, which we named *HR Strategy* (alpha = .75) reflects efforts on the part of the firm to link HR and business strategies. The second factor, *Performance Management* (alpha = .75), represents those elements of the HR system that link individual employee behaviors with firm level outcomes. The third factor is relatively more heterogeneous, but in general contains items pertaining to the selection and development of employees. Reflecting this heterogeneity, *Selection and Development* had a much lower alpha (.47).

Thus the 1992 survey has two dimensions; ESOS and EM. The 1994 and 1996 surveys have three dimensions, S&D, PM, & HR Strategy. Across the samples there is a large degree of similarity and conceptual overlap between the ESOS and S&D variables. The items contained in these scales reflect investments in training & development activities and the provision of work structures intended to take advantage of those investments. Similarly, there is significant overlap between the EM and PM variables that reflect the reward management dimension of a firm's HPWS. As described above, the HR Strategy variable was not available in the 1992 dataset.

Independent Variables

External Environmental Factors. Complexity, dynamism, and munificence are each measured at the industry level. Following Keats & Hitt (1988), complexity was defined as the four-firm industry concentration ratio, where a higher ratio indicates lower complexity. Munificence was defined as the five-year growth in industry sales, calculated by regressing the log of net sales on time. Industry dynamism, reflecting the degree of volatility in industry sales growth, is measured with the antilogarithm of the standard error of the regression coefficient in the equation described above (Keats & Hitt, 1988). Since these three variables have unique values at the 2 digit SIC industry level, we do not use industry dummy variables as an additional control. However, we have included a broad control for industry type (manufacturing) that takes the value one if the firm is located in SIC 2000 - 3999, and zero otherwise.

Internal Organizational Factors. Additional variables were constructed by combining data from several sources. Total employment and the number of employees located within the HR function were taken from the original mailed questionnaire.[3] The value of property, plant and equipment was taken from *Compact Disclosure*. Each of these variables were measured in logarithms. R&D intensity is also calculated based on data from *Compact Disclosure* and measured as annual R&D expenditures divided by net sales. Firm systematic risk (beta) was calculated for with data taken from the Center for Research on Security Prices (CRSP) database, using a 250 trading-day period. This is a conventional measure used in finance and reflects the regression coefficient from the regression of each firm's daily shareholder return on the daily market return. The percentage of the firm's employees who are unionized, the percentage of firm employees who are in management (exempt positions), and the relative emphasis on *cost leadership, differentiation*, and *focus* competitive strategies are all taken from data on the survey questionnaire.[4] From the 1994 and 1996 surveys we also included three items intended to reflect the leadership activities and underlying focus of senior executive teams. *Vision* reflects the extent to which these teams attempt to formulate and communicate basic organizational direction. *Motivation* reflects the extent to which senior executive teams attempt to challenge people with new goals, emphasize company values, and get people to become enthusiastic. Finally, *Employment Security* reflects the extent to which an explicit effort is made to provide employment security to the firm's employees. Each of these items was taken from the questionnaire, and was scaled from 1 - 6.

No direct measure of labor cost intensity is available from either the questionnaire or secondary sources for most firms. However, two income statement items together reflect total firm spending on labor. One is cost of goods sold (including production labor costs) and the other is selling, general, and administrative expenses (including administrative labor). To calculate total labor costs for each firm, the log of each of these variables was regressed on the log of total employment and control variables. The results of these analyses allowed us to estimate the percent of those costs that were attributable to labor expenses. These values were summed to calculate labor expenses, and labor cost intensity was then calculated with the ratio of labor expenses to sales.[5]

ANALYSES AND RESULTS

Descriptive statistics and intercorrelations for all variables were calculated for each survey year. For each year, separate OLS regressions were performed using each of the HPWS dimensions as dependent variables. For the majority of the regression models we present three equations, each representing our 1992, 1994, and 1996 datasets. After completing the cross-sectional (OLS) regressions, longitudinal regression models were estimated to capitalize on the panel data. While a significant advantage of our analyses is the reliance on longitudinal data, unreliability in our measures of the HRM system increases the potential for inconsistency in our findings, especially in the panel regression models (Huselid & Becker, 1996).

Descriptive statistics and intercorrelations for all variables are presented by year in Tables 3, 4, & 5. Our measures of HPWS in each case reflect an average of standard scores, hence their means are very near zero. The descriptive statistics for each of the other variables were consistent with prior empirical work on this topic. As expected, all of the HPWS scales were significantly

intercorrelated ($p < .001$), yet the magnitude of the interrelationships was sufficiently small to warrant separate exploration of each. Intercorrelations between variables were similar across each survey year.

[Insert Tables 3, 4 & 5 About Here]

Cross-Sectional (OLS) Regression Results

Table 6 presents the regression of each *High Performance Work System* dimension common to the 1992, 1994 & 1996 surveys on the independent variables, while Table 7 shows similar specifications for the three dependent variables common to the 1994 and 1996 surveys (*HR Strategy*, *PM*, and *S&D*). The models shown in Table 7 also contain three additional independent variables only available in the 1994 and 1996 surveys (*Vision*, *Motivation*, and *Employment Security*). Each equation reached significance at conventional levels.

[Insert Tables 6 and 7 About Here]

The first hypothesis posited a link between a firms' external or operating environment and the prevalence of a HPWS. As shown in Tables 6 and 7, industry complexity had a negative and significant effect (indicating the hypothesized positive relationship) in just 3 of 12 equations. The results for industry munificence were more differentiated. Munificence was significantly and positively related to the reward management dimensions in 4 of 5 comparisons. However, munificence was negatively related to staffing & development in 2 of 5 comparisons. Munificence was unrelated to the HR strategy variable in either 1994 or 1996. Our prediction for Dynamism was nondirectional. However, we found industry dynamism, reflecting volatility in industry profitability, to be significantly negatively related to the presence of HPWS in 8 of 12 comparisons across the three time periods. Thus, it would appear that volatility in industry profitability reduces the propensity for firms to invest in HPWS, perhaps because it leaves the potential returns from these investments more risky as well.

Overall these results suggest limited support for the first hypothesis. Across each of the models the variable with the largest practical and statistically significant effects is industry dynamism, while industry munificence had positive effects on reward management and negative effects on the remainder of the HRM system. While industry complexity (concentration) has been generally found to be an important determinant of firm profitability, we observed no systematic relationships between this variable and a firm's HPWS.

The results partially supported the second and third hypotheses as well. Larger firms (i.e., those with more employees) were somewhat more likely to employ each of the dimensions of HPWS. A relatively greater presence of employees within the HR function is associated with more staffing and development, but not reward management. More HR employees were negatively associated with reward management in one of two models. This may simply reflect the fact that compensation policies and programs are often influenced by those outside the function (e.g., consultants, line managers) than are other elements of a firm's HRM system. Surprisingly, relatively more employees within the HR function was only weakly related to HR Strategy. This is inconsistent with our expectation of strong links between the presence of employees within the HR function and an HR strategy - competitive strategy link.

In Hypothesis 4 we anticipated that a labor force with a relatively larger percentage of exempt (managerial) workers would benefit from greater investments in the HR system, and would therefore invest more extensively in a HPWS. We found just such an effect for 3 of 5 comparisons for the reward management dimensions. However, just the opposite effects were found for staffing & development. For 3 of 5 equations, a greater proportion of *non*exempt employees was associated with more extensive ESOS and S&D. Apparently, firms judge such systems to be more appropriate for nonexempt populations. There were no systematic relationships between HR Strategy and the workforce composition.

The fifth hypothesis stated that unions would have a negative effect on the use of a HPWS.

Consistent with this expectation, the union coverage coefficient was negative and significant for the reward management and ESOS dimensions in 8 of 10 comparisons. Interestingly, unions exhibited a positive effect on the adoption of the other staffing & development factor, S&D, perhaps reflecting the items contained in this factor (internal promotion, attitude surveys, employment testing, and pay level), which are often subject of union negotiations.

The sixth and seventh hypotheses concerned the relative impact of capital and labor intensity on the use of a HPWS. We anticipated that greater capital intensity would mean a potentially more productive work force and greater gains from investments in a HPWS. Alternatively, we anticipated that relative labor costs would affect the use of HPWS, although it was unclear in which direction. The results in the staffing and development models were consistent with this hypothesis in 4 of 5 comparisons. However, more capital intensive firms were significantly less likely to adopt reward management in 4 of 5 comparisons. Considering that our models control for firm industry, this suggests that firms in less capital intensive industries (e.g., services) are more likely to adopt the performance management and incentive compensation elements inherent in reward management. Our measure of labor cost intensity is strongly negative for both reward management and staffing & development dimensions across 7 of 10 comparisons, which is consistent with the arguments that a HPWS helps to lower overall labor costs or that these practices are more likely to be observed in low wage firms, or both. Although the presence of a HPWS is associated with significantly lower overall labor costs, perhaps unexpectedly, our HR Strategy variable was unrelated with overall labor costs.

Hypotheses eight and nine posited a positive link between R&D intensity, firm systematic risk (beta), and the presence of a HPWS. The results were positive and significant for only 3 of 10 comparisons for R&D intensity. Although firm systematic risk was unrelated to staffing & development and HR Strategy, it was positively and significantly related to reward management. Thus, although firms in more dynamic *industries* are less likely to use performance management and incentive compensation programs, more firm *specific* risk is associated with the greater use of incentives. We expect that this simply reflects efforts on the part of the shareholders to transfer risk to employees.

The tenth hypothesis stated that an emphasis on a *cost leadership* competitive strategy would likely be negatively associated with the use of a HPWS. Our results showed a statistically significant negative effect on staffing & development in 2 of 5 comparisons, indicating moderate support for this hypothesis. The impact of a cost leadership strategy on reward management was much stronger, showing statistically significant negative effects in 5 of 5 comparisons. Firms following a cost leadership strategy were also found to be significantly less likely to align business and HR strategies in 1 of 2 comparisons. Thus, it would appear that there is a linkage between firm HR and competitive strategies, but that this linkage is strongest for the reward management dimensions of a firm's HPWS.

The eleventh hypothesis suggests that firms consistent in the deployment of their HRM systems will be more likely to adopt a HPWS. The results strongly supported this hypothesis, with 10 of 12 comparisons showing significant and positive effects. We acknowledge, however, that this result is in part an artifact of the scale used to measure the dependent variable, in that firms with high scores on the HPWS variable by construction would have deployed HPWS widely.

The final two hypotheses could only be tested in the 1994 and 1996 datasets (Table 7). Hypothesis twelve predicted that the "values" espoused by senior management concerning HR would be related to a firm's HPWS. As expected, each of our measures of managerial values (*vision* and *motivation*) had a positive and significant effect on HR Strategy. The results for PM (1 of 6) and for S&D (2 of 6) were much weaker, although directionally correct, where significant.

Hypothesis thirteen suggested that the provision of employment security would have a positive effect on the adoption of HPWS. We found positive and significant results for HR Strategy in both 1994 and 1996, and positive effects for S&D in one of two comparisons. In retrospect, it is perhaps unsurprising that firms with accountabilities and incentive compensation would not need to, or want to, provide extensive job security.

Panel (Longitudinal) Regressions

The OLS regression equations shown above presume an equilibrium relationship among the variables in the models, such that the impact of the independent variables is largely reflected in the dependent variables. Such an assumption raises at least two broad concerns about conclusions drawn from our cross-sectional results. The first is the potential for simultaneity, or reverse causation, between the independent and dependent variables. For example, it could be the case that large firms are more likely to have both the resources and the inclination to adopt a HPWS, as is presumed in our models. However, it may also be the case that firms with more extensive HPWS become larger over time. While a number of econometric procedures are available to model and correct for this form of simultaneity, such alternative explanations can never be completely ruled out with cross-sectional data.

The second type of concern reflects the potential for heterogeneity, or omitted variable, bias. Variables unobserved by the researcher which are correlated with both the independent and dependent variables have the potential to bias the results. For example, the quality of a firm's management may be related to a number of the independent variables, such as firm size or relative labor costs, as well as the adoption of a HPWS. If this is so, then our estimates of the magnitude of the impact of the independent variables on the dependent variables is likely to be biased upward.

Each of these concerns can be mitigated to a large extent through the use of longitudinal, or panel, data. Moreover, such analyses can be considered a check on the OLS results, although our panel results can be expected to differ from our cross-sectional results for several reasons. The first reason is that the relationships being modeled in the OLS and panel regressions differ, in that the OLS models presented above reflect equilibrium relationships, in that the impact of the independent variables is presumed to be reflected in the dependent variables, as described above. In contrast, the panel or first-difference regression models reflect the extent to which *changes* in the independent variables are related to *changes* in the dependent variables. Another way of conceptualizing this relationship is to think of the OLS models as reflecting levels of relationships, which the panel regressions will model growth or changes in a firm's HPWS. A second source of divergence is associated with differences in sample sizes, as we have multiple responses for only a subset of the firms in our sample. A third source of expected differences in our results arises from the finding that unreliability in our measures of the HRM systems will bias the results of the fixed-effects models downward, and that this effect is exacerbated when these variables are measured multiple times (cf. Huselid & Becker, 1996).

[Insert Table 8 About Here]

Table 8 presents the panel analyses for the three categories of comparisons possible in our data: (1) 1992 and 1994 [n=278], (2) 1992 and 1996 [n=245], and (3) 1994 and 1996 [n=214]. We estimated the relationships between HPWS and the independent variables using both random- and fixed-effects regression models. While the random effects models are conceptually more appropriate when the inferences will extend to the population, fixed effects models are more appropriate when the inferences are intended to apply to the sample under study. While random effects models will generally provide more efficient estimates, random effects regression models assume that the firm-specific intercepts are uncorrelated with the regressors (Greene, 1990, p. 495). The inherent tradeoff between efficiency and consistency in the random and fixed effects models provides an empirical basis on which to choose between these competing models. The Hausman (1978) test provides a test of whether the bias inerrant in the random effects models exceeds the gain in efficiency. For our data, the Hausman tests generally reject the random effects model in favor of the more conservative estimates provided by the fixed effects models. We therefore present the more conservative pooled (with fixed effects controls) results for the ESOS variables (Equations 13 - 15), the EM variables (Equations 16-18), and the HR Strategy, PM, and S&D variables collected in 1994 and 1996 (Equations 19 - 21).

For staffing & development (ESOS), the most consistent results were related to changes in firm size, when measured as either total employment or employment within the HRM function.

Consistent with our expectations, firms becoming larger over the period under study were highly likely to adopt a more elaborate HPWS. In addition, firms becoming more consistent in the deployment of their work systems were also more likely to adopt higher levels of ESOS. There was a slight tendency (in 1 of 3 equations) for firms increasing in systematic risk and in union coverage to reduce the level of ESOS they employ.

For the reward management dimension of a firm's work system (EM), increasing volatility in a firm's external environment was linked to lower levels of EM. As the external economic environment in which a firm operates becomes more volatile, it would seem, firms shift from more contingent to more fixed compensation systems. There was a slight tendency for firms whose industries are increasing in profitability over this period to increase their use of EM, while firms increasing in size over this period were likely to reduce their level of EM. Consistent with our expectations, there was a slight tendency (in 1 of 3 equations) for firms increasing the proportion of exempt employees to expand their use of EM, while an increase in union coverage over this period was also significantly related to a decrease in the deployment of EM. Finally, a shift toward the deployment of a cost-leadership competitive strategy was also associated with decreasing use of EM.

Finally, Models 19-21 show the fixed-effects panel regressions for the HR Strategy, PM, and S&D variables (collected in 1994 and 1996). For HR Strategy, increased industry complexity (concentration) was negatively associated with a shift towards matching HR and business strategies, while increasing industry munificence was positively associated with such a shift in emphasis. An increase in firm size was positively associated with an increased emphasis on HR strategy, although controlling for firm size, more employees within the HR function was negatively associated with HR Strategy. Paradoxically, firms increasing their R&D intensity decreased their emphasis on HR Strategy over this period, while an increase in systematic risk (beta) was positively linked with the use of HR strategy. An increase in HR policy consistency was positively associated with the use of HR Strategy. Finally, firms where management is increasingly seen as "visionary" as well as those firms offering more employment security were also likely to increase their use of HR Strategy.

For the Performance Management (PM) variable, firms in increasingly munificent environments were more likely to adopt PM, while those increasing their HR staffs were less likely to do so. Firms shifting to PM paid significantly lower wages, while firms moving to a low cost competitive strategy were significantly less likely to deploy PM.

For the Selection & Development (S&D) variable, increasing complexity in the external environment was positively associated with the deployment of S&D, while a greater proportion of exempt employees in the firm was less so. Consistent with the results for HR strategy, firms increasing their R&D intensity decreased their emphasis on HR Strategy over this period, while an increase in systematic risk (beta) was positively linked with the use of HR strategy.

DISCUSSION

Recent empirical work has found the adoption of progressive or *High Performance Work Systems* to have an economically and statistically significant impact on employee turnover, productivity, and corporate financial performance. Yet, substantial variation exists in the prevalence of such systems across firms; a puzzle given such dramatic economic returns. In this paper we examined factors hypothesized to facilitate and constrain the adoption of a HPWS. In 2,410 firms across diverse industries and three time periods, we found both organizational characteristics and external environmental contingencies to be associated with HPWS. Furthermore, both of these contingencies had considerably greater effects on the reward management (EM and PM) dimensions of a HPWS than on the dimensions capturing staffing development (ESOS and S&D), or on the extent of the linkage between HRM and business strategies.

With regard to the external environment, and consistent with our expectations, the results suggest that firms in more profitable (munificent) industries are more likely to adopt incentive and performance management dimensions of a HPWS, while those firms in more volatile or dynamic industries were less likely to do so. Interestingly, it is in a volatile or dynamic environment that firms would most like to shift such risk on to employees through variable compensation systems, and

concurrently, it is in just such environments that variable compensation systems are the least attractive to employees. Apparently, the latter's preferences predominate the former's. This linkage between external environmental factors and incentive compensation systems may have important implications for practitioners wishing to implement such systems, and is deserving of further conceptual and empirical research.

In general our hypotheses regarding the impact of internal, organizational factors on HPWS were supported. In our cross-sectional results the percentage of exempt employees was positively associated with the use of performance management and incentive compensation systems (EM and PM), consistent with the expectation that such systems are more prevalent among exempt workers. The negative association between the proportion of exempt employees and the staffing development dimensions, however, may in part reflect firm efforts to invest more heavily in training and skill development for their nonexempt employees. Whether this is out of necessity, in response to low skill levels in the incoming workforce, or by choice (because the economic returns are relatively greater for these employees) is for future work to explore. However, the finding that firms may structure their HRM systems differently for exempt and nonexempt employees suggests the potential for differential returns for these practices across these categories of employees. While preliminary, this may suggest the need for more specific theoretical and empirical work that differentiates between categories.

As a whole the degree of unionization was negatively associated with the adoption of a HPWS. This finding is consistent with much of the previous work on this topic. While it has been argued that the negative union effects on employee productivity observed in the prior empirical work are exaggerated (Freeman and Medoff, 1984; Eaton & Voos, 1992) our results support the view that union bargaining objectives are in conflict with the types of organizational policies that have been shown to improve employee productivity. This finding may reflect the fact that the practices associated with HPWS are generally inconsistent with the traditional limitations on management imposed in the collective bargaining process. Indeed, union contracts traditionally place greater emphasis on member job security and control than labor performance and productivity. Our results may provide illumination to prior work unionization had a negative effect on firm performance (Becker & Olson, 1987; 1992; Hirsch, 1991), suggesting that one of the ways unions affect firm performance may be through their negative impact on the adoption of a HPWS.

The results for capital and labor intensity are more difficult to interpret. Capital intensity reflects the amount of property, plant, & equipment deployed per employee, while labor intensity indicates labor expenses as a share of total revenue. We found capital intensive firms to be more likely to adopt staffing development dimensions, but less likely to adopt the reward management dimensions, of a HPWS. The positive relationship we observed between capital intensity and ESOS/S&D may simply reflect the greater "leverage" afforded such systems in capital intensive firms, while the negative impact of capital intensity on EM/RM may suggest that individual reward systems are more appropriate in labor intensive (e.g., service) industries. It may also be that while more capital intensive firms receive greater returns from the use of a HPWS, less capital intensive firms (holding labor intensity constant) have a greater need for a HPWS because the organization is relatively more dependent on labor. Our measure of labor cost intensity is strongly negative across the reward management models. Apparently, given a fixed level of capital intensity, firms with higher labor costs invest less extensively in HPWS. While a HPWS may have greater payback potential for these firms, it appears their greater relative costs discourage investments in them.

Both R&D intensity and systematic risk represent firm characteristics that in the former the firm hopes to leverage, and in the latter it would prefer to mitigate. The results from this study suggest that the most effective approach to these objectives may be through the firm's reward management system (EM and PM). This is unsurprising given the importance of reward systems to R&D noted in previous research on strategic compensation (Balkin & Gomez-Mejia, 1984; Milkovich, Gerhart, & Hannon, 1991). Similarly, the finding with regard to firm risk is consistent with existing theoretical and empirical work in the area of agency theory (e.g., Eisenhardt, 1989; Jensen & Murphy, 1990), in that firms exhibiting greater systematic risk are more likely to attempt to align employee and shareholder interests through the use of incentive compensation and performance

management systems. It is also unsurprising because, as we argue below, it may be considerably easier to manipulate reward systems than a firm's skill base or work structure.

The results presented here are also consistent with earlier work suggesting that a *cost leadership* competitive strategy does not require that the HRM system create value in the way that a *differentiation* or *focus* strategy might. While there has been limited empirical support for a HR strategy-firm strategy contingency in the firm performance relationship (Arthur, 1994; Huselid, 1995), these results are consistent with such a contingency. This linkage between HR and business strategies has been a central tenet in the strategic HRM literature, and the specific form and structure of these relationships is an area deserving of further study. For example, while our results provide some evidence of a HRM-business strategy linkage, they provide little insight into the specific *types* of HRM policies and practices that are most effective for each strategy.

In addition to the individual hypothesis results, there is an unmistakable pattern showing that external and internal influences have a greater impact on the reward management (EM and RM) dimensions than on other HPWS dimensions. Normally we might expect that this is due to less variability in the dependent variables, but in this case EM and RM have nearly twice the variation than the ESOS/S&D dimensions, even considering that these dimensions reflect an average of standard scores. There are several possible explanations for this pattern of findings. The lower explained variance in staffing development dimension and HR Strategy suggest that firms expend more energy in "customizing" these practices to their specific circumstances, and therefore unobserved firm-specific or idiosyncratic variables not included in our analyses may account for our findings. Alternatively, it is perhaps the case that we are better able to explain the reward management dimensions of HPWS because of the prior empirical support for an incentive compensation - corporate financial performance link (Gerhart & Milkovich, 1992), which may suggest that greater attention is afforded such systems. If incorporating changes in the compensation system has a large enough impact on the firm's bottom line, investments in other HPWP may be overlooked or delayed. Moreover, parties external to the HR function (line managers, general managers, and consultants) are also more likely to be involved in its determination. Additionally, as a practical matter, employee compensation systems are likely to be applied broadly throughout the firm (i.e., affect all employees), while practices aimed at managing staffing & development (e.g. a training program) might be targeted to a single group of people. Finally, the job search and signaling literature suggests that the organization's reward system may make one of the strongest organizational statements with regard to policy and strategy (Rynes, 1991). In consideration of these possibilities, it does not seem surprising that our strongest relationships were found between independent variables and the reward management dimension of HPWS. However, it is for future work to explore our conjectures in greater detail.

Limitations and Conclusions

Ours is the first study to match firm level data on HPWS with internal and external objective data across three time periods and more than 2,400 firms. Thus, this study has a number of strengths relative to the prior empirical research on this topic. The large sample, multiple timer periods, broad industry representation, mixture of survey and objective firm-level data, and extensive control variables help to establish the plausibility of our results across a wide range of organizational experience. Moreover, the consistency of our results across a variety of alternative specifications suggests to us that our findings are likely to be robust.

The primary limitation of this study is concerned with the measurement of HRM systems. Future work should be concerned with the development and validation of better instruments to measure HRM systems, with an explicit focus on the impact of measurement error on the results (Huselid & Becker, 1996a). Given the relatively low reliabilities of our HPWS dimensions we could expect the relationships found here to be attenuated. More specifically, while our panel regression results were generally consistent with our cross-sectional findings, the considerable variability exhibited in these results suggests that this is an area requiring additional conceptual and empirical clarification.

In addition, although this study focused on the adoption of three distinct dimensions of an

organizational HPWS, the degree of "internal fit" *among* a firm's HPWS, as well as the degree of "external fit" *between* a firm's entire HRM systems and its competitive strategy are also important "dependent variables" in this line of research. Future work should focus on the development of better measures of "fit", as well as develop theoretical and empirical models of the antecedents of this construct.

These caveats notwithstanding, our results suggest that the use of an organizational HPWS is linked to a variety of firm and environmental contingencies. As we noted above, the firm-level impact of the *existence* of an organizational HPWS has been documented in a number of recent studies. In addition, recent empirical work (Huselid, Jackson, & Schuler, 1995) has also demonstrated the importance of *implementing* such systems effectively. Within the context of the need to both select an operationally appropriate HPWS and implement it effectively, this study reinforces the importance of an understanding of the factors that facilitate and constrain the *use* of HRM systems. Our point is that despite whatever attraction a HPWS may hold for practitioners, HR managers can be both constrained and facilitated in their attempts to adopt such systems by factors in their internal and external environments. Thus managers must become increasingly aware of these factors if they hope to implement HPWS effectively. Firm financial performance is determined by a myriad of factors, most of which are well beyond the control of the average manager. However, HRM systems enjoy both a large potential firm-level impact as well as a relatively low level of general competence within many firms. That is to say, the recent attention paid to HPWS suggests to us that the markets for these practices may not yet be "efficient," and that managers may enjoy a significant opportunity to enhance their firm's performance through workforce management systems. For example, in the short run there is very little that HR managers can do to change the firm's level of financial leverage (capital intensity), yet the amount of this type of risk adopted by the firm has a substantial impact on the adoption of HRM systems. Recognition of such constraints should assist academics in the development of theoretical models and empirical research that will assist HR managers to cope in such environments.

As the field of HRM matures into the role of a true "business partner," the links between HRM systems and the firm's broader strategic and environmental contingencies represents an increasingly important field of inquiry. Future work should embrace this line of research with vigor.

Endnotes

1. These documents are obtained by *Compact Disclosure* from the Securities and Exchange Commission (SEC).

2. A factor analysis of these 13 items in the 1994 sample yielded very similar results to those found in the 1992 sample (shown in Table 1).

3. Firm total employment was also collected from *Compact Disclosure*. The correlation between the questionnaire self-report measure and these objective data was .97 ($p < .001$).

4. In this study we have focused on the *cost leadership* competitive strategy for two reasons. First, as noted in the text, we assumed that the use of *differentiation* or *focus* strategies would require more intensive investments in a HPWS than would a *cost leadership* strategy. Second, because survey respondents were asked to indicate the proportion of their firm's annual sales derived from each of these strategies, their responses were constrained to equal 100 percent. Thus, the proportion of sales due to *cost leadership* equaled 1 - (*differentiation* + *focus*), and any model that includes both the *differentiation, focus* and *cost leadership* variables would be collinear. The intercorrelations between each measure of competitive strategy and all other variables used in the analyses are shown in Table 2.

5. Actual labor costs were reported for 78 of our 816 firms in the *Compustat* dataset. For these 78 firms, the correlation between the reported and imputed values was .92 ($p<.001$). In addition, we collected total firm payroll data for 738 firms in 1994. The correlation between these data and the imputed data was .85.

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Table 1[a]
Questionnaire Items and Factor Structure for HR Strategy Measures - 1992 Sample

Questionnaire Item	Factor 1	Factor 2
***Employee Skills and Organizational Structures Alpha*=.67**		
What is the proportion of the workforce who are included in a **formal information sharing program (e.g. a newsletter)?**	**.54**	.02
What is the proportion of the workforce whose job has been subjected to a formal **job analysis?**	**.53**	.18
What proportion of **non-entry** level jobs have been **filled from within** in recent years?	.52	-.36
What is the proportion of the workforce who are administered **attitude surveys** on a regular basis?	**.52**	-.07
What is the proportion of the workforce who **participate in Quality of Work Life (QWL), Quality Circles (QC), and/or labor management participation teams?**	**.50**	-.04
What is the proportion of the workforce who have access to company **incentive plans, profit-sharing plans, and/or gain-sharing plans** ?	**.39**	.17
What is the **average number of hours of training** received by a typical employee over the last **12 months**?	**.37**	-.07
What is the proportion of the workforce who have access to a **formal grievance procedure and/or complaint resolution system?**	**.36**	.13
What proportion of the workforce is **administered an employment test prior to hiring?**	**.32**	-.04
***Employee Motivation Alpha*=.66**		
What is the proportion of the workforce whose **performance appraisals** are used to **determine their compensation** ?	.17	**.83**
What proportion of the workforce receives **formal performance appraisals**?	.29	**.80**
Which of the following **promotion decision rules** do you use most often? (a) merit or performance rating alone; (b) seniority only if merit is equal; (c) seniority among employees who meet a minimum merit requirement; (d) seniority. Reverse scored.	-.07	**.56**
For the five positions that your firm hires **most frequently** , how many **qualified applicants** do you have **per position** (on average)?	-.15	.27
Eigenvalue	**2.19**	**1.76**
Proportion of variance accounted for	**16.80**	**13.60**

[a]n = 826. From Huselid (1995). Bold indicates the item loaded unambiguously at .30 or greater on a single factor.

Table 2[a]
Questionnaire Items and Factor Structure for the 1994 HR Strategy Measures

Questionnaire Item	Factor 1	Factor 2	Factor 3
HR Strategy **Alpha = .75**			
To what degree is the **HR department** involved in your firm's **strategic planning process**?	**.85**	.14	-.03
To what degree do you **align business and HR strategies**?	**.83**	.18	-.01
To what degree does your firm have a **clear strategic mission** that is **well communicated and understood at every level throughout the firm**?	**.71**	.02	.02
How many **hours of training per year** are typically received by an ***experienced*** **employee** (i.e., someone employed **more than** one year)?	.37	.14	.21
What proportion of the workforce has access to a **formal grievance procedure and/or complaint resolution system?**	.22	-.09	.17
What proportion of your **training efforts** are devoted to **skill enhancement**?	.09	-.02	.04
Performance Management **Alpha = .75**			
What proportion of the workforce has their **merit increase or other incentive pay determined by a performance appraisal**?	.09	**.78**	-.12
What proportion of the workforce receives **formal performance appraisals**?	.09	**.66**	-.01
What proportion of the workforce is **promoted based *primarily* on merit** (as opposed to seniority)?	.11	**.47**	-.09
What proportional **change in total compensation** could a ***low performer*** normally expect **as a result of a performance review**?	-.04	.25	.10
Selection & Development **Alpha = .47**			
What proportion of the workforce is ***eligible*** for ***cash*** **bonuses based on individual performance or company-wide productivity or profitability**?	.00	.45	.61
What proportion of **non-entry** level jobs have been **filled from within** in **recent** (i.e., over the past five) years?	.06	-.26	**.57**
If profits were to ***increase (decrease)*** **by 50%** below their **average level**, by what proportion would the bonus pool be ***increased (decreased)***? (items reflects the mean of the responses to these two items).	-.01	.44	.55
What proportion of the workforce is regularly administered **attitude surveys?**	.21	.02	**.51**
What proportion of the workforce is **administered an aptitude, skill, or work-sample test prior to employment?**	.05	-.31	**.39**
If the market rate for ***total*** **compensation** (Base + Bonus + Benefits) is considered to be the 50th percentile, what is your firm's **target percentile** for ***total*** **compensation**?	.07	.00	**.36**
What proportion of the workforce has **any part** of their compensation determined by a **skill-based compensation plan**?	-.06	-.07	.07
Eigenvalue	**2.63**	**1.70**	**1.41**
Proportion of variance accounted for	**15.50**	**10.0**	**8.30**

[a]n = 632. Bold type indicates that the associated question loads unambiguously on a single factor.

Table 3
Means, Standard Deviations, and Intercorrelations for 1992 Variables[a]

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. *Employee Skills & Org. Struct.*	.01	.53																	
2. *Employee Motivation*	-.04	.95	19																
3. Complexity	.39	.17	-12	-19															
4. Dynamism	1.09	.05	-11	-29	58														
5. Munificence	1.10	.06	-02	05	04	20													
6. Manufacturing/Service	.47	.50	00	-06	23	05	-38												
7. Ln of Total Employment	6.88	1.62	14	-13	16	22	11	03											
8. Ln of HR Employment	2.37	1.22	24	-05	-01	05	-01	03	71										
9. Proportion Exempt Employees	.37	.20	-01	21	-16	-13	-10	08	-17	00									
10. Union Coverage	12.28	24.96	-06	-39	01	15	-07	05	21	17	-19								
11. Ln of PP&E	10.54	2.11	16	-19	02	21	10	-06	75	65	-06	33							
12. Labor Cost Intensity	.74	.74	-09	-08	22	11	11	00	14	-08	-22	-09	-17						
13. R&D/Sales	.02	.06	-01	15	02	-10	-08	21	-13	-08	32	-14	-09	-03					
14. Systematic Risk (Beta)	1.06	.33	03	15	18	02	-04	16	06	05	07	-20	-11	08	10				
15. *Cost Leadership*	22.35	22.20	-08	-18	05	11	-02	-02	04	01	-14	15	13	-05	-10	-06			
16. *Differentiation*	37.32	23.11	04	13	02	-03	-01	13	-02	-02	18	-09	-11	14	21	08	-48		
17. *Focus*	40.33	23.04	04	04	-07	-08	03	-11	-01	01	-05	-06	-01	-09	-11	-03	-48	-54	
18. HR Policy Consistency	4.51	1.10	11	22	-13	-18	-02	-13	-11	-06	-02	-12	-11	-03	04	-03	-04	-02	06

[a] n = 815. All correlations >= .05 are significant at the .05 level, those >= .07 are significant at the .01 level, and those >= .10 are significant at the .001 level (one-tail test).

Table 4
Means, Standard Deviations, and Intercorrelations for 1994 Variables[a]

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. *Emp. Skills/Org.Struct.*	.00	.54																							
2. *Employee Motivation*	.00	.87	16																						
3. *HR Strategy*	.00	1.00	39	11																					
4. *Performance Mgmt.*	.00	.99	19	89	12																				
5. *Selection & Development*	.00	1.00	47	-07	17	-03																			
6. Complexity	.40	.17	-02	-07	-04	-06	-08																		
7. Dynamism	1.07	.04	-04	-11	-04	-11	00	74																	
8. Munificence	1.08	.06	-07	13	-01	09	-06	-02	17																
9. Manufacturing/Service	.43	.50	10	-13	01	-15	-08	07	-07	-24															
10. Ln of total employment	6.78	1.53	20	-13	18	-11	22	09	15	07	00														
11. Ln of HR employment	2.59	1.30	25	-07	18	-11	26	04	08	03	02	66													
12. % Exempt Emps.	.39	.23	-06	20	01	17	-15	-14	-13	19	-03	-24	-01												
13. Union Coverage	10.28	22.53	-02	-40	-07	-43	17	-07	03	-03	08	26	21	-20											
14. Ln of PP&E	10.50	2.11	19	-20	14	-16	27	03	10	01	-04	72	56	-16	36										
15. Labor Cost Intensity	.72	.73	-12	03	03	-01	-14	13	11	08	-07	08	-03	-13	-13	-18									
16. R&D/Sales	.03	.06	00	13	01	13	-12	-12	-13	09	18	-11	-04	38	-13	-14	01								
17. Systematic Risk (Beta)	1.08	.21	01	10	-02	10	-03	13	06	-02	14	-09	-05	09	-22	-18	04	08							
18. *Cost Leadership*	28.69	25.32	03	-24	03	-21	15	-10	-09	-04	03	19	13	-18	26	30	-09	-07	-14						
19. *Differentiation*	35.75	25.71	01	19	06	16	-13	12	08	07	08	-07	-05	23	-17	-18	11	13	14	-53					
20. *Focus*	34.83	24.36	-05	04	-10	05	-03	00	02	-06	-10	-13	-10	-05	-10	-16	-01	-05	01	-45	-47				
21. HR Policy Consistency	4.52	.68	02	05	03	05	-03	-04	-03	-01	-08	-07	-08	01	-07	-08	-01	02	-06	00	030	-03			
22. Managerial “Vision”	3.08	1.17	23	01	43	03	14	-01	-05	02	-01	10	07	-03	-05	09	-01	01	-03	01	307	-05	-01		
23. Managerial “Motivation”	3.07	1.10	22	04	50	04	09	07	02	-03	03	12	10	-02	-06	07	05	-01	-02	01	05	-08	-02	502	
24. Employment Security	4.35	1.18	09	04	20	04	03	05	08	-01	02	04	-05	-09	-10	00	01	-07	-05	-04		00	06	4	24

[a] n = 726. All correlations >= .05 are significant at the .05 level, those >= .07 are significant at the .01 level, and those >= .10 are significant at the .001 level (one-tail test).

Table 5
Means, Standard Deviations, and Intercorrelations for 1996 Variables[a]

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. *Emp. Skills/Org.Struct.*	.01	.55																							
2. *Employee Motivation*	.00	.92	11																						
3. *HR Strategy*	.00	1.00	43	13																					
4. *Performance Mgmt.*	.00	1.00	12	91	14																				
5. *Selection & Development*	.00	1.00	50	-01	28	03																			
6. Complexity	.46	.18	-14	00	-10	02	-14																		
7. Dynamism	1.07	.03	-13	-12	-09	-10	-09	63																	
8. Munificence	1.06	.03	-06	08	-06	08	-04	09	-19																
9. Manufacturing/Service	.47	.50	-02	-04	00	-08	-07	11	-11	17															
10. Ln of total employment	6.69	1.88	19	-14	21	-12	24	03	12	-02	-08														
11. Ln of HR employment	2.65	1.32	12	-12	13	-14	17	-15	-03	01	-05	47													
12. % Exempt Emps.	.42	.23	-01	22	-04	23	-08	-11	-17	12	01	-31	-08												
13. Union Coverage	11.98	24.83	06	-41	00	-45	22	-14	00	-07	02	24	17	-26											
14. Ln of PP&E	10.59	2.11	20	-20	17	-20	34	-06	05	-09	-12	59	47	-20	37										
15. Labor Cost Intensity	.67	.80	-08	-04	03	-04	-10	19	26	05	-05	19	00	-20	-08	-17									
16. R&D/Sales	.03	.09	-01	09	01	09	-08	00	-10	12	19	-19	-09	32	-10	-15	12								
17. Systematic Risk (Beta)	.79	.33	05	12	08	12	03	06	03	-01	09	13	07	13	-11	06	-01	11							
18. *Cost Leadership*	29.27	25.53	01	-19	-09	-20	07	-04	-02	03	01	13	09	-16	22	23	-06	-13	-13						
19. *Differentiation*	39.83	25.56	03	11	14	12	-05	06	-01	02	10	-05	-03	12	-17	-15	08	16	13	-63					
20. *Focus*	31.25	21.62	-05	08	-05	08	-03	-02	04	-07	-12	-10	-05	04	-07	-10	-03	-04	00	-40	-41				
21. HR Policy Consistency	4.40	1.08	13	10	17	13	05	00	-03	00	-06	-07	-07	-05	-05	-07	-06	-06	03	-03	030	-01			
22. Managerial "Vision"	4.11	1.32	21	08	53	07	11	-10	-05	-07	-03	11	09	-05	-04	09	03	-04	00	-02	611	-04	161		
23. Managerial "Motivation"	3.90	1.24	23	10	61	11	13	-02	-01	-04	00	10	07	-06	-04	05	05	-05	02	-07	08	-04	719	672	
24. Employment Security	3.65	1.40	21	05	33	09	15	-10	-09	-07	-01	-06	-08	-04	-01	-01	00	03	-03	-09		01		8	30

[a] n = 688. All correlations >= .05 are significant at the .05 level, those >= .07 are significant at the .01 level, and those >= .10 are significant at the .001 level (one-tail test).

Table 6
OLS Regression Analysis for the Common 1992, 1994, & 1996 Dependent Variables
(Standard Errors in Parentheses)

Independent Variables	Dependent Variables					
	1	2	3	4	5	6
	1992 Emp. Skills & Org. Structures	1994 Emp. Skills & Org. Structures	1996 Emp. Skills & Org. Structures	1992 Employee Motivation	1994 Employee Motivation	1996 Employee Motivation
Constant	0.437 (0.625)	1.073 (0.860)	2.198* (1.251)	2.094*** (1.006)	4.303*** (1.309)	1.886 (1.962)
External Environment						
Complexity	-0.201* (0.143)	-0.016 (0.176)	-0.148 (0.157)	-0.234 (0.230)	0.329 (0.268)	0.098 (0.246)
Dynamism	-0.633 (0.521)	-1.491* (0.889)	-1.828* (0.864)	-3.614*** (0.839)	-5.826*** (1.354)	-2.778* (1.355)
Munificence	-0.095 (0.369)	-0.183 (0.358)	-1.051* (0.638)	1.397** (0.593)	1.790*** (0.545)	0.971 (1.001)
Manufacturing/Service (1 if Manufacturing)	0.032 (0.042)	0.114*** (0.042)	0.020 (0.044)	-0.059 (0.067)	-0.175*** (0.064)	-0.125* (0.069)
Internal Environment						
ln of Total Employment	-0.019 (0.023)	0.028 (0.022)	0.053*** (0.016)	0.036 (0.040)	0.043 † (0.034)	0.030 (0.025)
ln of HR employment	0.109*** (0.025)	0.081*** (0.020)	-0.001 (0.020)	0.045 (0.040)	0.033 (0.030)	-0.023 (0.031)
Management proportion of the labor force	-0.19485* (0.099)	-0.190* (0.100)	-0.080 (0.105)	0.336* (0.159)	0.152 (0.152)	0.294* (0.165)
Unionization	-0.003* (0.001)	-0.003* (0.001)	-0.001 (0.001)	-0.011*** (0.001)	-0.012*** (0.001)	-0.013*** (0.001)
ln of PP&E	0.021 † (0.016)	0.016 (0.015)	0.025* (0.014)	-0.061** (0.025)	-0.040* (0.023)	-0.029 † (0.023)
Labor Cost Intensity	-0.038 † (0.029)	-0.094*** (0.030)	-0.031 (0.030)	-0.135*** (0.047)	-0.044 (0.046)	-0.074* (0.048)
Research and Development Intensity	-0.112 (0.317)	0.053 (0.341)	0.184 (0.261)	0.937* (0.509)	0.627 (0.518)	0.285 (0.410)
Systematic Risk (Beta)	0.041 (0.059)	0.001 (0.099)	0.025 (0.063)	0.240* (0.094)	0.087 (0.151)	0.175* (0.099)
Relative Emphasis on Cost Leadership	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.003* (0.001)	-0.005*** (0.001)	-0.003* (0.001)
HR Policy Consistency	0.049*** (0.017)	0.066*** (0.017)	0.068*** (0.019)	0.130*** (0.027)	0.023 (0.026)	0.058* (0.030)
Sample size	787	695	673	787	695	673
R^2	0.117	0.138	0.097	0.293	0.242	0.219
F	7.282***	7.795***	2.279**	22.869***	15.549***	13.143***

† $p < .10$; * $p < .05$ ** $p < .01$; *** $p < .001$. All significance levels reflect one-tail tests.

Table 7 - OLS Regression Analysis for the 1994 & 1996 Dependent Variables

Independent Variables	7 1994 HR Strategy	8 1996 HR Strategy	9 '94 Performance Management	10 '96 Performance Management	11 '94 Selection & Developmnt	12 '96 Selection & Development
Constant	-5.931* (3.353)	-0.120 (4.567)	10.822*** (3.260)	2.400 (4.837)	-2.565 (3.491)	-0.474 (4.756)
External Environment						
Complexity	-0.977 † (0.685)	-0.263 (0.572)	0.822 (0.666)	0.541 (0.606)	-1.842** (0.713)	-0.659 (0.596)
Dynamism	-0.529 (3.472)	-5.675* (3.135)	-14.064*** (3.376)	-6.477* (3.320)	3.331 (3.615)	-4.168 (3.265)
Munificence	-0.719 (1.389)	-2.514 (2.321)	3.030* (1.351)	3.187 † (2.458)	-2.619* (1.446)	0.321 (2.417)
Manufacturing/Service (1 if Manufacturing)	0.125 (0.164)	0.125 (0.159)	-0.579*** (0.159)	-0.502*** (0.169)	-0.351* (0.171)	-0.081 (0.166)
Internal Environment						
Ln of Total Emp.	0.130 † (0.087)	0.180*** (0.058)	0.208** (0.085)	0.126* (0.061)	-0.027 (0.091)	0.095 † (0.060)
Ln of HR Emp.	0.161* (0.078)	0.045 (0.072)	-0.082 (0.076)	-0.140* (0.076)	0.326*** (0.081)	0.019 (0.075)
Management % of the labor force	0.456 (0.387)	0.227 (0.382)	0.267 (0.376)	0.928* (0.404)	-1.155*** (0.403)	0.163 (0.398)
Unionization	-0.007* (0.004)	-0.001 (0.003)	-0.034*** (0.004)	-0.036*** (0.004)	0.005 † (0.004)	0.010** (0.004)
Ln of PP&E	0.042 (0.059)	0.106* (0.052)	-0.044 (0.058)	-0.075 † (0.056)	0.092 † (0.062)	0.255*** (0.055)
Labor Cost Intensity	0.051 (0.117)	0.035 (0.110)	-0.267** (0.114)	-0.250* (0.117)	-0.356** (0.122)	-0.091 (0.115)
R&D Intensity	-0.308 (1.323)	1.413 † (0.950)	2.563* (1.287)	0.728 (1.006)	-1.355 (1.378)	-0.440 (0.989)
Systematic Risk (Beta)	-0.118 (0.386)	0.231 (0.230)	0.283 (0.375)	0.422 † (0.243)	0.551 † (0.402)	0.129 (0.239)
Relative Emphasis on Cost Leadership	0.000 (0.003)	-0.008** (0.003)	-0.011*** (0.003)	-0.007* (0.003)	0.004 † (0.003)	-0.001 (0.003)
HR policy consistency	0.370*** (0.068)	0.160* (0.072)	0.103 † (0.066)	0.146* (0.076)	0.047 (0.071)	0.063 (0.075)
Managerial "vision"	0.444*** (0.075)	0.348*** (0.078)	-0.021 (0.073)	-0.008 (0.082)	0.222** (0.078)	-0.033 (0.081)
Managerial "motivation"	0.766*** (0.079)	0.854*** (0.082)	0.040 (0.077)	0.160* (0.087)	0.055 (0.082)	0.153* (0.085)
Degree of Employment Security	0.108 † (0.068)	0.251*** (0.057)	-0.003 (0.066)	0.073 (0.061)	-0.006 (0.070)	0.174** (0.060)
Sample size	685	673	685	673	685	673
R^2	0.368	0.467	0.263	0.277	0.168	0.181
F	23.142***	33.692***	14.203***	14.754***	8.013***	8.537***

† < .10; * < .05 ** < .01; *** < .001. All significance levels reflect one-tail tests.

Table 8 - Panel Survey Results for 1992, 1994, & 1996
(Standard Errors in Parentheses)

Independent Variables	Pooled Data (with fixed effects controls)			Pooled Data (with fixed effects controls)			Pooled Data (with fixed effects controls)		
	13	14	15	16	17	18	19	20	21
	'92 - '94 ESOS	'94 - '96 ESOS	'92 - '96 ESOS	'92 - '94 EM	'94 - '96 EM	'92 - '96 EM	'94 - '96 HR Strategy	'94 - '96 Perform. Mgmt.	'94 - '96 Selection & Devo.
Constant	----------	----------	----------	----------	----------	----------	----------	----------	----------
External Environment									
Complexity	-0.304 (0.352)	0.248 (0.386)	0.051 (0.337)	0.522 (0.526)	0.355 (0.546)	0.361 (0.414)	-0.999* (0.610)	0.427 (0.667)	1.618* (0.712)
Dynamism	0.547 (0.834)	0.583 (1.061)	-0.149 (1.309)	-1.664 † (1.248)	0.723 (1.500)	-2.673* (1.609)	-0.742 (1.615)	1.603 (1.764)	-0.934 (1.884)
Munificence	-0.217 (0.408)	-0.008 (0.672)	-0.455 (0.631)	0.499 (0.611)	1.946* (0.950)	0.255 (0.775)	2.107* (1.030)	1.575 † (1.125)	0.001 (1.201)
Internal Environment									
ln of Total Emp.	0.014 (0.044)	0.068* (0.029)	0.075* (0.036)	0.064 (0.066)	-0.068* (0.041)	-0.100* (0.045)	0.116** (0.045)	-0.061 (0.049)	0.038 (0.052)
ln of HR Emp.	0.048* (0.029)	0.011 (0.034)	0.004 (0.037)	-0.037 (0.044)	0.036 (0.048)	-0.071 † (0.045)	-0.089* (0.052)	-0.002* (0.057)	0.008 (0.061)
Management % of the labor force	-0.138 (0.172)	-0.015 (0.193)	0.305 (0.249)	-0.054 (0.258)	0.297 (0.297)	0.751** (0.306)	0.278 (0.293)	0.177 (0.321)	-0.727* (0.342)
Unionization	-0.002 † (0.002)	0.002 (0.002)	-0.001 (0.002)	-0.008*** (0.003)	-0.002 (0.003)	-0.005* (0.002)	-0.003 (0.004)	-0.004 (0.004)	0.003 (0.004)
ln of PP&E	0.012 (0.042)	-0.036 (0.093)	-0.031 (0.059)	0.062 (0.064)	-0.152 (0.132)	0.011 (0.072)	0.027 (0.150)	-0.207 (0.164)	-0.200 (0.175)
Labor Cost Intensity	-0.036 (0.064)	-0.069 (0.069)	0.071 (0.075)	-0.179* (0.096)	-0.118 (0.097)	0.023 (0.092)	-0.086 (0.104)	-0.191* (0.113)	0.037 (0.121)
R&D Intensity	0.763 (1.212)	-0.633 (1.469)	-0.983 (1.299)	-4.482** (1.814)	0.277 (2.077)	-0.564 (1.596)	-3.092 † (2.258)	1.956 (2.467)	-3.988 † (2.634)
Systematic Risk (Beta)	0.320 † (0.221)	0.090 (0.085)	0.106 (0.105)	0.302 (0.331)	-0.182* (0.120)	-0.154 (0.129)	0.256* (0.132)	-0.154 (0.145)	0.200 † (0.154)
Relative Emp. On Cost Leadership	0.001 (0.001)	-0.001 (0.001)	0.001 (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.001 (0.001)	0.001 (0.002)	-0.005* (0.002)	-0.001 (0.003)
HR Policy Consistency	0.041* (0.025)	0.062* (0.032)	0.008 (0.032)	0.031 (0.038)	-0.003 (0.044)	.112*** (0.039)	0.150** (0.043)	0.054 (0.052)	-0.026 (0.056)
Managerial "vision"							0.107* (0.046)	0.015 (0.051)	0.033 (0.054)
Managerial "motivation"							0.202 (0.050)	0.004 (0.054)	0.054 (0.058)
Degree of Emp. Security							0.097** (0.038)	0.018*** (0.041)	-0.035 (0.044)
Sample size	556[1]	490[1]	428[1]	556	490	428	490	490	490
R^2	0.789	0.738	0.721	0.819	0.801	0.851	0.818	0.785	0.766
F	3.32***	2.54***	2.30***	4.13***	3.628***	5.085***	3.958***	3.220***	2.886***
Lagrange Multiplier Test of Fixed Effects	71.09***	37.59***	23.20***	73.02***	48.29***	55.77***	23.18***	29.66***	30.71***

[1]As these analyses contain data pooled across the comparison years, the actual number of firms in each equation is one-half this value, or 278, 245, and 214 firms, respectively.

† $p < .10$; * $p < .05$ ** $p < .01$; *** $p < .001$. All significance levels reflect one-tail tests.