THE IMPACT OF HUMAN RESOURCE MANAGEMENT PRACTICES ON TURNOVER, PRODUCTIVITY, AND CORPORATE FINANCIAL PERFORMANCE

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This study comprehensively evaluated the links between systems of High Performance Work Practices and firm performance. Results based on a national sample of nearly one thousand firms indicate that these practices have an economically and statistically significant impact on both intermediate employee outcomes (turnover and productivity) and short- and long-term measures of corporate financial performance. Support for predictions that the impact of High Performance Work Practices on firm performance is in part contingent on their interrelationships and links with competitive strategy was limited.

The impact of human resource management (HRM) policies and practices on firm performance is an important topic in the fields of human resource management, industrial relations, and industrial and organizational psychology (Boudreau, 1991; Jones & Wright, 1992; Kleiner, 1990). An increasing body of work contains the argument that the use of *High Performance Work Practices,* including comprehensive employee recruitment and selection procedures, incentive compensation and performance management systems, and extensive employee involvement and training, can improve the knowledge, skills, and abilities of a firm's current and potential employees, increase their motivation, reduce shirking, and enhance retention of quality employees while encouraging nonperformers to leave the firm (Jones & Wright, 1992; U.S. Department of Labor, 1993).

Arguments made in related research are that a firm's current and potential human resources are important considerations in the development and execution of its strategic business plan. This literature, although largely conceptual, concludes that human resource management practices can help to create a source of sustained competitive advantage, especially when they are aligned with a firm's competitive strategy (Begin, 1991; Butler, Ferris, & Napier, 1991; Cappelli & Singh, 1992; Jackson & Schuler, 1995; Porter, 1985; Schuler, 1992; Wright & McMahan, 1992).

In both this largely theoretical literature and the emerging conventional wisdom among human resource professionals there is a growing consensus that organizational human resource policies can, if properly configured, provide a direct and economically significant contribution to firm performance. The presumption is that more effective *systems* of HRM practices, which simultaneously exploit the potential for complementarities or synergies among such practices and help to implement a firm's competitive strategy, are sources of sustained competitive advantage. Unfortunately, very little empirical evidence supports such a belief. What empirical work does exist has largely focused on individual HRM practices to the exclusion of overall HRM systems.

This study departs from the previous human resources literature in three ways. First, the level of analysis used to estimate the firm-level impact of HRM practices is the system, and the perspective is strategic rather than functional. This approach is supported by the development and validation of an instrument that reflects the system of High Performance Work Practices adopted by each firm studied. Second, the analytical focus is comprehensive. The dependent variables include both intermediate employment outcomes and firm-level measures of financial performance, and the results are based on a national sample of firms drawn from a wide range of industries. Moreover, the analyses explicitly address two methodological problems confronting survey-based research on this topic: the potential for simultaneity, or reverse causality, between High Performance Work Practices and firm performance and survey response bias. Third, this study also provides one of the first tests of the prediction that the impact of High Performance Work Practices on firm performance is contingent on both the degree of complementarity, or internal fit, among these practices and the degree of alignment, or external fit, between a firm's system of such practices and its competitive strategy.

THEORETICAL BACKGROUND

The belief that individual employee performance has implications for firm-level outcomes has been prevalent among academics and practitioners for many years. Interest in this area has recently intensified, however, as scholars have begun to argue that, collectively, a firm's employees can also provide a unique source of competitive advantage that is difficult for its competitors to replicate. For example, Wright and McMahan (1992),

drawing on Barney's (1991) resource-based theory of the firm, contended that human resources can provide a source of sustained competitive advantage when four basic requirements are met. First, they must add value to the firm's production processes: levels of individual performance must matter. Second, the skills the firm seeks must be rare. Since human performance is normally distributed, Wright and McMahan noted, all human resources meet both of these criteria. The third criterion is that the combined human capital investments a firm's employees represent cannot be easily imitated. Although human resources are not subject to the same degree of imitability as equipment or facilities, investments in firm-specific human capital can further decrease the probability of such imitation by qualitatively differentiating a firm's employees from those of its competitors. Finally, a firm's human resources must not be subject to replacement by technological advances or other substitutes if they are to provide a source of sustainable competitive advantage. Although labor-saving technologies may limit the returns for some forms of investment in human capital, the continuing shift toward a service economy and the already high levels of automation in many industries make such forms of substitution increasingly less probable.

Wright and McMahan's work points to the importance of human resources in the creation of firm-specific competitive advantage. At issue, then, is whether, or how, firms can capitalize on this potential source of profitability. Bailey (1993) contended that human resources are frequently "underutilized" because employees often perform below their maximum potential and that organizational efforts to elicit discretionary effort from employees are likely to provide returns in excess of any relevant costs. Bailey argued that HRM practices can affect such discretionary effort through their influence over employee skills and motivation and through organizational structures that provide employees with the ability to control how their roles are performed.

HRM practices influence employee skills through the acquisition and development of a firm's human capital. Recruiting procedures that provide a large pool of qualified applicants, paired with a reliable and valid selection regimen, will have a substantial influence over the quality and type of skills new employees possess. Providing formal and informal training experiences, such as basic skills training, on-the-job experience, coaching, mentoring, and management development, can further influence employees' development.

The effectiveness of even highly skilled employees will be limited if they are not motivated to perform, however, and HRM practices can affect employee motivation by encouraging them to work both harder and smarter. Examples of firm efforts to direct and motivate employee behavior include the use performance appraisals that assess individual or work group performance, linking these appraisals tightly with incentive compensation systems, the use of internal promotion systems that focus on employee merit, and other forms of incentives intended to align the interests

of employees with those of shareholders (e.g., ESOPs and profit- and gain-sharing plans).

Finally, Bailey (1993) noted that the contribution of even a highly skilled and motivated workforce will be limited if jobs are structured, or programmed, in such a way that employees, who presumably know their work better than anyone else, do not have the opportunity to use their skills and abilities to design new and better ways of performing their roles. Thus, HRM practices can also influence firm performance through provision of organizational structures that encourage participation among employees and allow them to improve how their jobs are performed. Cross-functional teams, job rotation, and quality circles are all examples of such structures.

Thus, the theoretical literature clearly suggests that the behavior of employees within firms has important implications for organizational performance and that human resource management practices can affect individual employee performance through their influence over employees' skills and motivation and through organizational structures that allow employees to improve how their jobs are performed. If this is so, a firm's HRM practices should be related to at least two dimensions of its performance. First, if superior HRM practices increase employees' discretionary effort, I would expect their use to directly affect intermediate outcomes, such as turnover and productivity, over which employees have direct control. Second, if the returns from investments in superior HRM practices exceed their true costs, then lower employee turnover and greater productivity should in turn enhance corporate financial performance. Therefore, in anticipation of an estimation model that focuses on these dependent variables, my review of the empirical literature concentrates on prior work examining the influence of HRM practices on employee turnover, productivity, and corporate financial performance.

PRIOR EMPIRICAL WORK

Individual HRM Practices and Firm Performance

Turnover. Prior work has examined the determinants of both individual employees' departures and aggregate organizational turnover, although most of the prior work has focused on the former. For example, Arnold and Feldman (1982), Baysinger and Mobley (1983), and Cotton and Tuttle (1986) concluded that perceptions of job security, the presence of a union, compensation level, job satisfaction, organizational tenure, demographic variables such as age, gender, education, and number of dependents, organizational commitment, whether a job meets an individual's expectations, and the expressed intention to search for another job were all predictive of employees' leaving, and Sheridan (1992) found that perceptions of organizational culture influenced turnover. Thus, the theoretical rationale for examining the effects of HRM practices on turnover lies

in their effects on these individual-level factors. Among the few empirical papers on the effects of specific HRM practices on aggregate turnover, the work of McEvoy and Cascio (1985), who showed that job enrichment interventions and realistic job previews were moderately effective in reducing turnover, is notable.

Productivity. Research on the impact of HRM practices on organizational productivity is more extensive. Cutcher-Gershenfeld (1991) found that firms adopting "transformational" labor relations—those emphasizing cooperation and dispute resolution—had lower costs, less scrap, higher productivity, and a greater return to direct labor hours than did firms using "traditional" adversarial labor relations practices. Katz, Kochan, and Weber (1985) demonstrated that highly effective industrial relations systems, defined as those with fewer grievances and disciplinary actions and lower absenteeism, increased product quality and direct labor efficiency, and Katz, Kochan, and Keefe (1987) showed that a number of innovative work practices improved productivity. Katz, Kochan, and Gobeille (1983) and Schuster (1983) found that quality of work life (QWL), quality circles, and labor-management teams increased productivity. Bartel (1994) established a link between the adoption of training programs and productivity growth, and Holzer (1987) showed that extensive recruiting efforts increased productivity. Guzzo, Jette, and Katzell's (1985) meta-analysis demonstrated that training, goal setting, and sociotechnical systems design had significant and positive effects on productivity. Links between incentive compensation systems and productivity have consistently been found as well (Gerhart & Milkovich, 1992; Weitzman & Kruse, 1990). Finally, employee turnover also has an important influence on organizational productivity (Brown & Medoff, 1978).

Corporate financial performance. A number of authors have explored the links between individual HRM practices and corporate financial performance. For example, Cascio (1991) and Flamholtz (1985) argued that the financial returns associated with investments in progressive HRM practices are generally substantial. Similarly, work in the field of utility analysis (Boudreau, 1991; Schmidt, Hunter, MacKenzie, & Muldrow 1979) has concluded that the value of a one-standard-deviation increase in employee performance measured in dollars (SD_y) is equivalent to 40 percent of salary (per employee) and that the organizational implications of human resource management practices that can produce such an increase are considerable. Although most of the empirical work on this topic has been conducted in laboratories, Becker and Huselid (1992) presented field data suggesting that SD_y may in fact be well in excess of 40 percent of salary. Similarly, Terpstra and Rozell (1993) found a significant and positive link between the extensiveness of recruiting, selection test validation, and the use of formal selection procedures and firm profits, and Russell, Terborg, and Powers (1985) demonstrated a link between the adoption of employee training programs and financial performance. The use of performance appraisals (Borman, 1991) and linking such appraisals and compensation

have also been consistently connected with increased firm profitability (Gerhart & Milkovich, 1992).

Limitations of the Prior Empirical Work

In summary, prior empirical work has consistently found that use of effective human resource management practices enhances firm performance. Specifically, extensive recruitment, selection, and training procedures; formal information sharing, attitude assessment, job design, grievance procedures, and labor-management participation programs; and performance appraisal, promotion, and incentive compensation systems that recognize and reward employee merit have all been widely linked with valued firm-level outcomes. These policies and procedures have been labeled High Performance Work Practices (U.S. Department of Labor, 1993), a designation I adopt here.

However, if this line of research is to be advanced, several serious limitations in the prior empirical work have to be addressed. Two are methodological, and one involves both conceptual and measurement issues. The first issue concerns the potential simultaneity between High Performance Work Practices and corporate financial performance, a problem exacerbated by the prevalence of cross-sectional data in this line of research. For example, if higher-performing firms are systematically more likely to adopt High Performance Work Practices, then contemporaneous estimates of the impact of these practices on firm performance will be overstated. Alternatively, it may be that otherwise lower-performing firms turn to High Performance Work Practices as a remedy. If so, then such cross-sectional estimates will understate the true effects of HRM practices on firm performance. This form of simultaneous relationship is less probable in the case of turnover and productivity, because these variables would be unlikely to widely influence the selection of High Performance Work Practices. However, given the direct link between firm profits and the availability of slack resources for investment in such practices, it is easy to imagine a firm's financial performance having such an influence.

A second methodological problem is related to the widespread collection of data via questionnaire. Because survey respondents generally self-select into samples, selectivity or response bias may also affect results. The most common form of selectivity bias occurs when the probability of responding to a questionnaire is related both to a firm's financial performance and the presence of High Performance Work Practices. Without knowing the direction of these relationships a priori, however, a researcher cannot determine the effect on the impact of such practices on firm performance. Despite a well-developed literature devoted to the statistical correction of selection bias (Heckman, 1979), such correction has rarely been attempted in prior work.

Systems of HRM practices and the concept of fit. The third significant limitation of prior work is its widespread conceptual focus on single High Performance Work Practices, and the measurement problems inher-

ent in broadening the focus to a system of such practices. A focus on individual practices presents both theoretical and methodological dilemmas, as both recent research (Arthur, 1992; MacDuffie, 1995; Osterman, 1987a, 1994) and conventional wisdom would predict that firms adopting High Performance Work Practices in one area are more likely to use them in other areas as well. Therefore, to the extent that any single example reflects a firm's wider propensity to invest in High Performance Work Practices, any estimates of the firm-level impact of the particular practice will be upwardly biased. This likely bias presents a significant limitation for a line of research that attempts to estimate the firm-level impact of a firm's entire human resources function, as the sum of these individual estimates may dramatically overstate their contribution to firm performance.

The potential for bias associated with a focus on individual policies has not been lost on several scholars, who have recently linked data on systems of High Performance Work Practices with valued firm-level outcomes. For example, Delaney (in press) found the widespread use of progressive human resource management practices to have a strong and negative effect on organizational turnover in the manufacturing sector. Ichniowski, Shaw, and Prennushi (1993), using longitudinal data from 30 steel plants, found the impact of "cooperative and innovative" HRM practices to have a positive and significant effect on organizational productivity. Similarly, Arthur (1994) found in 30 steel "minimills" that those with "commitment" human resource systems, emphasizing the development of employee commitment, had lower turnover and scrap rates and higher productivity than firms with "control" systems, emphasizing efficiency and the reduction of labor costs. Finally, MacDuffie (1995) found that "bundles" of internally consistent HRM practices were associated with higher productivity and quality in 62 automotive assembly plants.

Each of these studies has focused on the impact of systems of High Performance Work Practices on employee turnover or productivity. Research on the links between systems of work practices and corporate financial performance is much more limited. Kravetz (1988) and Schuster (1986) each matched data on global human resource management "progressiveness" with accounting indexes of firm profits. Although both authors concluded that more progressive HRM practices were associated with enhanced performance, the analyses in each study were restricted to simple bivariate correlations and thus did not control for variables such as firm size or industry. Ichniowski (1990) concluded that the use of progressive HRM practices was associated with both high productivity and high financial performance in 65 business units, but owing to data limitations, he too was unable to resolve the issue of simultaneity between HRM practices and firm performance or provide results beyond a single sector, manufacturing.

In short, although a growing empirical literature focuses generally on the impact of High Performance Work Practices, prior work has been limited in terms of the range of practices evaluated, the dependent variables,

and the industry context. For example, a finding that systems of work practices affect turnover or productivity does not necessarily mean that these practices have any effect on firm profits, and the discovery that systems of High Performance Work Practices affect profitability begs the important issue of the processes through which they influence firm financial performance. Therefore, unlike prior work this study included the full range of organizational human resource practices, examined those practices in terms of their impact on both immediate employment outcomes and corporate financial performance, and did so within the context of a broad range of industries and firm sizes. My initial summary hypotheses can be stated as follows:

> *Hypothesis 1a: Systems of High Performance Work Practices will diminish employee turnover and increase productivity and corporate financial performance.*

> *Hypothesis 1b: Employee turnover and productivity will mediate the relationship between systems of High Performance Work Practices and corporate financial performance.*

The second hypothesis will allow for one of the first empirical tests of a diverse theoretical literature positing the importance to firm performance of synergies and fit among human resource practices as well as between those practices and competitive strategy (Milgrom & Roberts, 1993). Baird and Meshoulam (1988) described the first of these complementarities as internal fit. Their primary proposition was that firm performance will be enhanced to the degree that firms adopt human resource management practices that complement and support each other. Similarly, Osterman (1987a) argued that there should be an underlying logic to a firm's system of HRM practices and that certain policies and practices fit together. Osterman (1994) found that firms valuing employee commitment, for instance, are less likely to use temporary employees and more likely to invest in innovative work practices such as skills training and incentive compensation. A tangible focus on employee commitment can be expected to help produce a stable core of employees, thus increasing the probability that a firm will reap the benefits associated with investments in training. And a preference for committed employees and the use of incentive compensation may also help attract high-performing employees, because, all else being equal, employees in such firms will receive higher wages to match their greater productivity. Similarly, the returns from the use of valid selection procedures are likely to be greater when a firm's performance appraisal and incentive compensation systems can recognize and reward good employee performance, and incentive compensation systems should perform best when linked with high-quality performance appraisals. An internal promotion system provides a strong incentive for employees to remain with a firm and, when combined with the appropriate incentive compensation and performance appraisal systems, can magnify the returns

from investments in employee development activities. Finally, the effectiveness of employee participation systems will be enhanced if employees know their efforts will be rewarded and will increase the probability of their advancement. Thus,

> *Hypothesis 2: Complementarities or synergies among High Performance Work Practices will diminish employee turnover and increase productivity and corporate financial performance.*

A second form of complementarity, Baird and Meshoulam's (1988) external fit, occurs at the intersection of a firm's system of HRM practices and its competitive strategy. The notion that firm performance will be enhanced by alignment of HRM practices with competitive strategy has gained considerable currency in recent years and in fact underlies much of the recent scholarship in the field (Begin, 1991; Butler et al., 1991; Cappelli & Singh, 1993; Jackson & Schuler, 1995; Schuler, 1992; Wright & McMahan, 1992). Moreover, a developing literature suggests that firms do indeed attempt to match HRM practices with competitive strategies. For example, Jackson, Schuler, and Rivero (1989) found that firms pursuing a strategy of innovation used HRM practices that were broadly consistent with that approach, and Arthur (1992) found that steel minimills adopting a strategy of differentiation emphasized employee commitment. Similarly, Snell and Dean (1992, 1994) that found human resource management practices varied systematically with type of manufacturing system, individual job characteristics, and firm environment. Although no empirical work has suggested that firms with better external fit exhibit higher performance, the expectation that they should provides my final hypothesis:

> *Hypothesis 3: Alignment of a firm's system of High Performance Work Practices with its competitive strategy will diminish employee turnover and increase productivity and corporate financial performance.*

Fit Versus "Best Practices"

The internal fit perspective suggests that the adoption of an internally consistent system of High Performance Work Practices will be reflected in better firm performance, ceteris paribus: It should be possible to identify the best HRM practices, those whose adoption generally leads to valued firm-level outcomes. The external fit perspective raises the conceptual issue of whether any particular human resources policy can be described as a best practice, or whether, instead, the efficacy of any practices can only be determined in the context of a particular firm's strategic and environmental contingencies. Although prior work has yet to provide a direct test of these competing hypotheses, recent research finding strong main effects for the adoption of High Performance Work Practices lends credence to the best practices viewpoint.

The argument that firm performance will be enhanced to the degree a firm's HRM practices are matched with its competitive strategy is, however, compelling. In fact, the internal and external fit hypotheses may not be altogether inconsistent: All else being equal, the use of High Performance Work Practices and good internal fit should lead to positive outcomes for all types of firms. However, at the margin, firms that tailor their work practices to their particular strategic and environmental contingencies should be able to realize additional performance gains. For example, most firms should benefit from the use of formal selection tests, although the results of such tests could be used to select very different types of people, with those differences perhaps depending on competitive strategy. Likewise, the use of formal performance appraisal and incentive compensation systems has been widely found to enhance firm performance. However, each of these practices can be used to elicit very different types of behaviors from employees. In short, the process of linking environmental contingencies with HRM practices may vary across firms, but the tools firms use to effectively manage such links are likely to be consistent. The issue of whether internal, external, or both types of fit affect firm performance is central, and later in this article I provide an explicit test of these hypotheses.

METHODS

Sample and Data Collection

A study of this type presents a number of data collection challenges. It requires as broad a sample as possible and at the same time requires that each data point provide comprehensive information on both organizational human resource practices and strategies and firm-level performance. Thus, my sample was drawn from Compact Disclosure, a database containing comprehensive financial information from 10-K reports[1] on nearly 12,000 publicly held U.S. firms. Firms were included in the sample if they had more than a hundred employees and excluded if they were foreign-owned, holding companies, or publicly held divisions or business units of larger firms. These criteria yielded 3,452 firms representing all major industries.

Firm-level data on High Performance Work Practices were collected with a questionnaire mailed to the senior human resources professional in each firm. I pretested the survey items with a number of colleagues and human resource professionals and conducted a pilot study using all survey materials. In the main study, representatives of 968 firms submitted usable responses, for an overall response rate of 28 percent.

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[1] 10-k reprints are informational documents filed with the Securities and Exchange Commission.

Questions concerning each High Performance Work Practice (described below) were asked separately for exempt and nonexempt employees, and respondents indicated the proportion of employees in each category who were affected by each practice. I then weighted the response to each item by the proportion of employees in each category: the value for each question was the sum across categories. Prior work has frequently employed a dummy variable to indicate the presence or absence of each practice; the specification used here is more sensitive to the breadth of implementation of each practice throughout a firm.

Measurement of High Performance Work Practices

Scale development. Prior work on the measurement of High Performance Work Practices is extremely limited. The only relevant study was conducted by Delaney, Lewin, and Ichniowski (1989), who in 1986 sent 7,765 business units for which data were available on the COMPUSTAT tapes a 29-page questionnaire concerning a wide variety of HRM practices. From the responses of 495 firms (a 6.4 percent response rate), Delaney and colleagues concluded that ten practices in the areas of personnel selection, performance appraisal, incentive compensation, job design, grievance procedures, information sharing, attitude assessment, and labor-management participation represented "sophistication" in human resource management. In this study, I adopted those ten items because they are consistent with the prior empirical work. However, to provide a more exhaustive list of contemporary High Performance Work Practices, I added items assessing three practices widely found to affect a firm's performance: the intensity of its recruiting efforts (selection ratio), the average number of hours of training per employee per year, and its promotion criteria (seniority versus merit).

These 13 items broadly represent the domain of High Performance Work Practices identified in prior work (U.S. Department of Labor, 1993). These items also represent important choice variables on which many firms differ significantly (Delaney et al., 1989). However, the substantial conceptual and empirical overlap among these items and my desire to adopt a systems perspective make determination of the independent contribution of each practice to firm performance impractical. Therefore, to uncover the underlying factor structure associated with these practices, I factor-analyzed each item's standard score, using principal component extraction with varimax rotation. Two factors emerged from these analyses; and I constructed a scale for each by averaging the questions loading unambiguously at .30 or greater on a single factor. Table 1 shows these results and the questionnaire items.

Following Bailey (1993), I named the first factor "employee skills and organizational structures." This factor includes a broad range of practices intended to enhance employees' knowledge, skills, and abilities and thereafter provide a mechanism through which employees can use those attributes in performing their roles. Specifically, a formal job design program

TABLE 1
Factor Structure of High Performance Work Practices[a]

Questionnaire Item	1	2	Alpha
Employee skills and organizational structures			.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 nonentry 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) programs, 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			.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.[b]	−.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] Bold type indicates that the associated question loads unambiguously at .30 or greater on a single factor.

[b] Item was reverse-coded.

and enhanced selectivity will help ensure employee-job fit, and providing formal training will enhance the knowledge, skills, and abilities of both new and old employees. Quality of work life programs, quality circles, and labor-management teams are all forms of participation that allow em-

ployees to have direct input into the production process. Likewise, infor-
mation-sharing programs, formal grievance procedures, and profit- and
gain-sharing plans help to increase the probability that employee partici-
pation efforts will be effective because such programs provide a formal
mechanism for employer-employee communication on work-related issues.
The Cronbach's alpha for this scale was .67.

The second factor, which I named "employee motivation" (Bailey,
1993), is composed of a more narrowly focused set of High Performance
Work Practices designed to recognize and reinforce desired employee be-
haviors. These practices include using formal performance appraisals,
linking those appraisals tightly with employee compensation, and focus-
ing on employee merit in promotion decisions. Conceptually, core com-
petencies among employees are developed through selection, training,
and the design of work (factor 1, employee skills and organizational struc-
tures) and are subsequently reinforced through the second factor, em-
ployee motivation. The Cronbach's alpha for the employee motivation
scale was .66.

Scale validation. Although the correspondence between these scales
and the prior conceptual work was encouraging, I also performed several
analyses to demonstrate their convergent validity. I began by identifying
two external measures of the degree to which firms valued their employ-
ees by investing in them. First, widespread investments in High Perfor-
mance Work Practices are likely to require additional human resources staff
to assist in their implementation. Thus, the ratio of human resources staff
to total employees is a proxy for the importance a firm places on its hu-
man resources. I found the simple correlation between both factors and this
ratio to be .19 ($p < .001$). Thus, as expected, firms with high levels of High
Performance Work Practices also "vote with their dollars" and invest in
human resources staff. However, those staff levels may also reflect a firm's
level of bureaucracy or institutional conditions related to its industry, ar-
eas potentially unrelated to the importance it places on human resources.
As a test of this possibility, I also regressed the work practices scales on
the human resources staff ratio and controls for firm size and industry. The
human resources staff ratio remained positive and highly significant in
each of these equations.

Second, I assumed that if a firm's senior managers saw human re-
sources as crucial to organizational performance, it would (1) communi-
cate this importance to external audiences and (2) invest in High Perfor-
mance Work Practices. Thus, following Keats and Hitt (1988), I took all
available president's letters and management's discussions for each firm
from the annual reports contained in Compact Disclosure. These docu-
ments were subsequently content-analyzed for any reference to the im-
portance of human resources, human capital, or the like, or to the impor-
tance of personnel, people, employee, staff, or workforce. Firms that made
such comments were coded 1; others were coded 0. Of the 763 firms for
which annual reports were available, 310 mentioned the importance of hu-

man resources (41 percent), and 453 did not. The employee skills and organizational structures score of firms citing the importance of human resources was significantly higher than that of those making no such comments ($t = 2.33$, $p < .01$). This difference remained significant in a logistic regression model with controls for firm size and industry. Although the equivalent tests for the employee motivation scale had the expected sign, they did not reach significance at conventional levels. These findings are plausible given the nature of the items included in each scale. The items included in the employee skills and organization structures factor reflect widespread investments in High Performance Work Practices intended to develop employee core competencies and thereafter provide a mechanism through which employees can influence their roles. The items included in the employee motivation factor, however, are much more narrow in that they are intended to recognize and compensate employees for behaviors consistent with the interests of the firm's shareholders. Thus, it is perhaps unsurprising that they are not reflected in such a broad context as the firm's annual report.

Finally, using different samples and time periods, but similar measures of High Performance Work Practices, Delaney (in press) reported results for turnover, and Ichniowski (1990) and Ichniowski and colleagues (1993) reported results for productivity that are highly similar to those presented below. In short, as an initial attempt to develop indexes of the adoption of High Performance Work Practices that can be used to determine if extensive use of these practices really is better, these scales demonstrate encouraging levels of reliability and validity.

Measurement of Internal and External Fit

Despite prior work arguing that enhanced internal and external fit will enhance firm performance, the relevant research has not specified the functional form that fit can be expected to take. In the business strategy literature, however, Venkatraman (1989) concluded that fit is most commonly measured in terms of a moderated relationship, or interaction, between two variables. For example, the relationship between a firm's competitive strategy and its performance could co-vary with the type of environment in which it operates. A second category of fit that is relevant in this context is the degree of match between two variables. Fit as matching differs from fit as moderation in that an explicit external performance criterion is lacking (Venkatraman, 1989). For example, one might argue that fit has been achieved if a firm's competitive strategy and its structure have been aligned, based on an a priori theoretical prediction, regardless of the outcome. In the following sections, I develop several alternative indexes to assess degree of internal and external High Performance Work Practices fit, using Venkatraman's categories of fit as moderation and fit as matching. Given the paucity of prior work in the area, however, these measures should be considered highly exploratory and the results interpreted with caution.

Internal fit as moderation. Internal fit among work practices could be expected to take the form of complementarity or synergy both within and between the employee skills and organizational structures and employee motivation factors. An indication of complementarity within each factor would be reflected in positive mixed partial derivatives among the High Performance Work Practices (Milgrom & Roberts, 1993), a rough proxy of which would involve interacting each practice within each factor with every other practice. Unfortunately, the use of such a measure is highly impractical, largely because of the generally high levels of multicollinearity among High Performance Work Practices. Therefore, in this study I focused on the development of measures of internal fit between factors. Conceptually, the potential for synergies among High Performance Work Practices should increase when these practices have been consistently implemented throughout a firm. Moreover, the degree of consistency in the implementation of practices should interact with their overall level in that consistently applied high levels of High Performance Work Practices should have the greatest impact on firm performance. Thus, the first measure of internal fit I developed consists of the interaction between the degree of human resources policy consistency and the respective factors. Human resources policy consistency was assessed with this Likert-scale survey item: "How would you describe the *consistency* of your *human resource policies* across any *divisions* or *business units* your firm may have?" (emphasis in original). Unfortunately, this measure is less than ideal for two reasons. First, it has restricted range, as firms that by definition do not adopt human resource policies consistently, such as holding companies, were excluded from the sample. Second, because the two factor scales were based on the proportions of coverage of exempt and nonexempt employees throughout a firm, a firm with a high score on these variables must have widely adopted each practice.

The second measure of internal fit as moderation I adopted consists of the interaction between these two measures. Based on the assumption that the returns from investments in employee skills and organizational structures will be higher to the extent that firms have also devoted significant resources to employee motivation, this measure provides a straightforward test of the magnitude of any such returns. This scale is superior to the first internal fit-as-moderation measure in that it does not exhibit the psychometric problems outlined above.

Internal fit as matching. The second broad category of internal fit consists of the degree of match between the two factor scales (Venkatraman, 1989). In the current context, internal fit as matching would occur if a firm were consistently low, medium, or high on both factors. As a test of the matching model of internal fit, I calculated the absolute value of the difference between a firm's scores on the employee skills and organizational structures and employee motivation scales (Venkatraman, 1989).

External fit as moderation. My first measure of external fit as moderation indicates the degree of correspondence between each firm's com-

petitive strategy and its system of High Performance Work Practices. Porter (1985) provided the dominant typology of competitive strategies in the business policy literature; the types specified are cost leadership, differentiation, and focus. To provide an estimate of a firm's competitive strategy, each respondent indicated the proportion of its annual sales derived from each of those strategies. In view of prior work (Jackson et al., 1989; Jackson & Schuler, 1995), I assumed that a predominantly differentiation or focus strategy would require more intensive investments in High Performance Work Practices than would a cost leadership strategy. Thus, to test the external fit-as-moderation hypothesis, I interacted the proportion of sales derived from either a differentiation or focus strategy with scores on the employee skills and organizational structures and employee motivation scales, respectively.[2]

My second measure of external fit as moderation is based on behavioral indication of the emphasis each firm placed on aligning its human resource management practices and competitive strategy. Specifically, respondents indicated whether or not they attempted to implement each of seven strategic human resource management activities for all employees (the Appendix lists these activities). I then constructed an index by adding the number of affirmative responses to each question ($\alpha = .69$).[3] To test my expectation that the returns from investments in both factors will be greater when firms explicitly attempt to link human resources and business objectives, I interacted each firm's score on the strategic HRM index with each factor score.

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[2] I focused on the differentiation and focus strategies for two reasons. First, as noted, I assumed that the use of a differentiation or focus strategy would require more intensive investments in High Performance Work Practices than would use of a cost leadership strategy. Second, because survey respondents were asked to indicate the proportions of their firms' annual sales derived from each of these strategies, their responses were constrained to equal 100 percent. Thus, the proportion of sales derived from cost leadership equaled 1 − (differentiation + focus), and any model that included all the strategy variables and the interactions between these variables and the practices scales would be collinear. Therefore, to gauge the impact of each strategy separately, I estimated models for each type. In these analyses, cost leadership and its interactions with the practices scales produced results very similar to those for differentiation and focus (the results were generally nonsignificant). In addition, I created a dummy variable that equaled 1 if the combined value of differentiation plus focus was greater than 67 percent (that is, the majority) and 0 otherwise, thereby incorporating all three competitive strategies in a single variable. These results were also consistent with the results presented in the text.

[3] This measure was adapted from Devanna, Fombrun, Tichy, and Warren (1982). One might argue that, given prior theoretical work, these activities should also be considered High Performance Work Practices and included in the measurement scales. However, as presented in the questionnaire, these seven items represent broad human resources management goals, and respondents were only asked to indicate whether they attempted to implement them for all employees. In comparison, the 13 items included in the practices scales refer to specific policies, and respondents were asked to indicate the current prevalence of each type of activity by category of employee. Thus, the items included in the scales and the strategic HRM index differ in both scale of measurement and level of analysis.

   External fit as matching. Finally, I calculated the fit-as-matching variable by taking the absolute value of the difference between the Z score of the proportion of sales resulting from a differentiation or focus strategy and the respective factor scores (Venkatraman, 1989). This variable indicates the degree to which firms adopting differentiation or focus strategies also employ high levels of High Performance Work Practices and vice versa.

   My expectation was that each fit-as-moderation interaction would be positive and significant for the financial performance dependent variables. Given that a lower score for the fit-as-matching variables indicates greater fit, I expected each of these measures to be negative and significant.

Dependent Variables

   Turnover. The level of turnover within each firm was assessed with a single questionnaire item, "What is your *average annual rate* of turnover?" (emphasis in original). This question was asked separately for exempt and nonexempt employees, and the level of turnover for each firm is therefore the weighted average across each of these categories. This variable should be interpreted with caution, however. First, consistent with most of the prior work in this area (Cotton & Tuttle, 1986), this measure includes both voluntary employee departures (quitting) and involuntary ones (firings). Therefore, to the extent that human resource management practices affect voluntary but not involuntary separation, my estimates of the impact of HRM practices on turnover may be understated. The salience of this issue is increased as my data were collected in a period of widespread corporate downsizings (fiscal year 1991), which increase all forms of turnover.

   Second, economists typically view turnover as a choice variable for firms, involving a trade-off between employee separations and wages, benefits, and working conditions. Prior empirical work has substantiated this view (Bluedorn, 1982; Osterman, 1987b). However, in a substantial body of empirical research lower turnover has been associated with desirable organizational outcomes (Baysinger & Mobley, 1983; Osterman, 1987b). Although recognizing that each firm may have an optimal rate of turnover (Abelson & Baysinger, 1984), in this study I assumed that low rates of turnover are preferred to high rates. Given that my model for turnover controls for employee compensation, I believe this assumption to be justified.

   Productivity. The logarithm of sales per employee is a widely used measure of organizational productivity and was adopted here to enhance comparability with prior work (Ichniowski, 1990; Pritchard, 1992). The primary advantages of this measure are that it provides a single index that can be used to compare firms' productivity as well as to estimate the dollar value of returns for investments in High Performance Work Practices. It should be emphasized that productivity is not synonymous with profitability, however; a firm can go bankrupt maximizing sales per employ-

ee while ignoring current costs. Models specifying productivity as the logarithm of net income per employee (an alternative, although less frequently used measure) produced very similar results.

Corporate financial performance. Prior work on the measurement of corporate financial performance is extensive. Perhaps the primary distinction to be made among the many alternative measures is between measurements of accounting and economic profits (Becker & Olson, 1987; Hirsch, 1991). Economic profits represent the net cash flows that accrue to shareholders; these are represented by capital (stock) market returns. Accounting profits can differ from economic profits as a result of timing issues, adjustments for depreciation, choice of accounting method, and measurement error. Additionally, economic profits are forward-looking and reflect the market's perception of both potential and current profitability, but accounting data reflect an historical perspective. Although there is widespread agreement in the literature that capital market measures are superior to accounting data, accounting data provide additional relevant information (Hirschey & Wichern, 1984). Moreover, accounting data are often the focus of human resource managers who must allocate scarce resources. Therefore, I used both a market-based measure (Tobin's q) and an accounting measure (gross rate of return on capital, or GRATE) of corporate financial performance. Each is the best available measure of its type (Hall, Cummins, Laderman, & Mundy, 1988; Hirsch, 1991; Hirschey & Wichern, 1984).

The logarithm of Tobin's q was calculated by dividing the market value of a firm by the replacement cost of its assets (Hall et al., 1988; Hirsch, 1991). Conceptually, q is a measure of the value added by management. I calculated the measure of accounting profits, gross rate of return on capital, by dividing cash flow by gross capital stock (Hall et al., 1988; Hirsch, 1991). GRATE is a better measure of accounting profits than the traditional return on assets or return on equity because it is not as greatly affected by depreciation or other noncash transactions (Brainard, Shoven, & Weiss, 1980; Hall et al., 1988). The calculations I used for q and GRATE were taken from Hall and colleagues. Because some data were missing, I was unable to complete all the adjustments to firm capital structure those sources recommend. However, I was able to estimate the sensitivity of my results to the missing variables by substituting values for them across all reasonable ranges into my calculations; the analyses indicated that the missing data did not materially affect my estimates. As is described below, I employed both contemporaneous and subsequent ($t + 1$) years' corporate financial performance data as a partial control for the effects of simultaneity bias.

Research in the field of financial economics often omits firms in the utility and banking industries because they are subject to governmental regulation. In this study, these industries accounted for 184 of the firms on which I had complete data. Results of analyses omitting these firms were consistent with the results presented below.

Control Variables

The estimation models were developed to provide unbiased estimates of the impact of High Performance Work Practices on firm performance. Thus, the selection of the control variables for each dependent variable was based on a careful review of the prior empirical work (cf. Huselid, 1993), focusing on those variables likely to be related to both the dependent variables and the use of High Performance Work Practices. The controls for each dependent variable included firm size (total employment), capital intensity, firm- and industry-levels of union coverage, industry concentration, recent (five-year) growth in sales, research and development intensity, firm-specific risk (beta), industry levels of profitability, net sales, total assets, and 34 dummy variables representing 35 two-digit Standard Industrial Classification (SIC) codes. Unfortunately, there was no straightforward measure of firms' total wage bills available for inclusion in the turnover model. However, selling, general, and administrative expenses is a common income statement item that serves as a proxy for employee compensation. This variable is measured with error because it includes a number of items not directly related to wage expenses and excludes some wages directly related to production (the latter are typically included in the cost of goods sold). If selling, general, and administrative expenses is an adequate proxy, however, the level of union coverage should have a positive and sizable effect on it, as it does on compensation (Lewis, 1986), if the elements unrelated to compensation are invariant to union coverage. As a test of this proposition, I regressed selling, general, and administrative expenses on firm-level union coverage and a series of control variables. Union coverage was significant and positive, and the magnitude of this effect was economically significant. Firms with an average level of union coverage (11.34 percent) had 8.1 percent higher selling, general, and administrative expenses than firms with no union coverage. Alternatively, each one-standard-deviation increase in union coverage created a 19 percent increase in these expenses. Finally, firms with 100 percent union coverage had 125 percent higher selling, general, and administrative expenses than firms with no unions. These figures are broadly consistent with the 11 to 14 percent union wage premium calculated by Lewis (1986) and provide support for the assertion that these expenses are an adequate proxy for employee compensation. Finally, turnover was also included as a control variable in the productivity models because prior work has identified it as an important determinant of productivity with strong links to High Performance Work Practices.

Financial data were taken primarily from Compact Disclosure. I took considerable care to ensure that all data were matched to the same accounting period (July 1, 1991, to June 30, 1992). Missing data were retrieved from *Moody's Industrial Manual* or the *Standard & Poor's Stock Price Guide,* where possible. Otherwise, missing data were eliminated listwise for each dependent variable. Stock price data were gathered from

the *Investment Statistics Laboratory Daily Stock Price Record* for December 31. Stock dividend and stock split data were gathered from *Standard & Poor's Stock Price Guide.* Capital intensity was calculated as the logarithm of the ratio of gross property, plant, and equipment over total employment. The five-year trend in sales growth and R&D intensity (the logarithm of the ratio of R&D expenditures to sales) and compensation levels (proxied by selling, general, and administrative expenses) were calculated directly from the accounting data. Firm-level union coverage and total employment were taken from the questionnaire, and industry-level unionization data were taken from Curme, Hirsch, and Macpherson (1990). Concentration ratios were calculated by dividing the sum of the largest four firms' sales within each industry by the total sales for that industry. The systematic component in the variability of a firm's stock price (systematic risk, or beta) was calculated using the Center for Research on Stock Prices (CRSP) database and a 250-day period. Initially, betas were only available for 543 firms. Using an auxiliary regression equation, I inputed data for the missing observations (R^2 = .40).

RESULTS

Table 2 presents means, standard deviations, and correlations. The employee skills and organizational structures and employee motivation scales reflect an average of standard scores, so their means are very near zero. Turnover averaged 18.36 percent per year, and the logarithm of the productivity averaged 12.05, or annual sales of $171,099 per employee. The mean q was .46, and the average annual gross rate of return was 5.10 percent. This value for q ($e^{.46}$ = 1.58) implies that the market value of the average firm was 58 percent greater than the current replacement cost of its assets. This result indicates that managements were generally working in the interest of the shareholders to increase the value of their equity. A GRATE value of 5.10 implies that each dollar invested in capital stock generates five cents in annual cash flow. Each of these values is consistent with the results of prior work (Becker & Olson, 1992; Hirsch, 1991). Average total employment was 4,413 (the logarithm of this variable was used in all subsequent analyses); firm level unionization averaged 11.34 percent; and industry-level unionization averaged 13.97 percent. Total employment and union coverage were lower than in most prior work in this area, primarily because previous research has focused on the manufacturing sector, which is more heavily unionized. Finally, as expected, the employee skills and organizational structures scale was negatively related to turnover, while both scales were positively related to productivity and corporate financial performance.

Tables 3 through 6 present the regression analysis results for Hypotheses 1a and 1b. The first equation in each table contains the first factor scale, employee skills and organizational structures, the second equation contains the employee motivation scale, and the third equation contains both. These analyses provide some indication of the sensitivity of the

TABLE 2
Means, Standard Deviations, and Correlations[a]

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Turnover	18.36	21.87																	
2. Productivity	12.05	0.99	-.24																
3. Tobin's *q*	0.46	1.64	-.10	.07															
4. Gross rate of return on assets	5.10	23.00	-.03	.15	.35														
5. Employee skills and organizational structures	0.02	0.52	-.08	.06	.09	.13													
6. Employee motivation	0.00	0.78	.04	.03	.20	.01	.15												
7. Total employment	4,412.80	18,967.45	.13	-.22	.02	.12	.18	-.15											
8. Capital intensity	3.96	1.32	-.29	.48	-.11	.02	.05	-.23	-.01										
9. Firm union coverage	11.34	24.28	-.14	.05	-.09	.02	-.05	-.51	.21	.29									
10. Industry union coverage	13.97	13.55	-.22	.11	-.11	.00	.04	-.36	.19	.40	.36								
11. Concentration ratio	0.38	0.25	.05	-.15	-.03	-.14	-.08	-.12	.17	.02	.08	.16							
12. Sales growth	0.61	1.08	.06	.06	.13	.01	-.03	.12	-.02	-.04	-.16	-.03	.10						
13. R&D intensity	0.03	0.06	-.09	-.01	.10	-.11	-.01	.18	-.14	.06	-.12	-.12	.03	.04					
14. Systematic risk	1.06	0.32	.09	-.08	.05	-.05	.00	.19	.06	-.23	-.18	-.20	.08	.09	.10				
15. Selling, general & administrative expenses[b]	286.54	1,622.02	-.02	.31	.09	.18	.23	.00	.77	.21	.16	.13	-.01	.00	-.11	-.01			
16. HRM policy consistency	4.54	1.10	-.10	-.04	.01	.04	.14	.23	-.12	-.06	-.12	-.07	-.08	.00	.03	-.03	-.08		
17. Differentiation/focus	-0.01	1.02	-.03	-.10	.12	-.02	.05	.18	-.03	-.13	-.15	-.15	.00	.01	.10	.06	.01	.05	
18. Strategic HRM index	3.36	1.98	-.02	.01	.00	.08	.33	.06	.25	-.01	.08	.01	-.04	.01	-.04	.07	.24	.05	.05

[a] $N = 816$. All correlations greater than or equal to .05 are significant at the .05 level; those $\geq$ .07 are significant at the .01 level, and those $\geq$ .10 are significant at the .001 level (one-tailed tests). Raw means are reported for total employment and selling, general, and administrative expenses to ease interpretation. The logarithms for these variables are used in all subsequent analyses.

[b] In millions of dollars.

findings to my specification and a very rough estimate of the degree of bias associated with a focus on individual facets of High Performance Work Practices. As a test of Hypothesis 1b, in the fourth equation in Tables 5 and 6 I added turnover and productivity to the models for Tobin's q and GRATE.

Turnover

Table 3 shows the regression results for turnover. Each equation reached significance at conventional levels, and the control variables generally had the expected signs and significance levels. Although employee skills and organizational structures was consistently negative and significant, employee motivation was not significant in either model. This result is less surprising when it is recognized that the use of incentive compensation systems may actually encourage employees who are performing poorly to leave a firm.

I next estimated the practical significance of the impact of High Performance Work Practices on turnover, from the results of the third equation shown in Table 3. With all other variables held at their means, firms with employee skills and organizational structures and employee motivation scores three standard deviations below the mean exhibited 21.48 percent turnover, but firms with scores three standard deviations above the mean had 15.36 percent turnover. This 40 percent decrease of course would be the maximum expected effect of high performance practices, because it implies that a firm has moved from the total absence of any effective human resource programs to complete participation across all dimensions. A more representative estimate can be made by calculating the effect of a one-standard-deviation increase in each practice scale on turnover. Each such increase reduced turnover 1.30 raw percentage points, or 7.05 percent relative to the mean. Considering that this model controls for firm size, the impact of unions, and employee compensation (selling, general, and administrative expenses), this effect is practically as well as statistically significant. In fact, this specification provides a highly restrictive test of the impact of High Performance Work Practices on turnover, as the inclusion of selling, general, and administrative expenses controls not only for employee wage levels but also for any direct costs associated with the implementation of these practices. Removing this variable and thus allowing the effect of High Performance Work Practices on compensation to be reflected in the direct effect of such practices increased the magnitude of their impact on turnover by more than 20 percent.

Productivity

Table 4 presents the regression results for productivity. As above, each equation reached significance at conventional levels, and the control variables generally had the expected signs and significance levels. When employee skills and organizational structures and employee motivation were entered individually (models 4 and 5), each was positive and sig-

TABLE 3
Results of Regression Analysis for Turnover

Variables	Model 1		Model 2		Model 3	
	b	s.e.	*b*	s.e.	*b*	s.e.
Constant	44.965***	9.418	46.363***	9.420	44.758***	9.486
Logarithm of total employment	2.656***	0.772	2.507***	0.778	2.637***	0.783
Capital intensity	−2.229***	0.659	−2.279***	0.663	−2.240***	0.663
Firm union coverage	−0.088***	0.029	−0.089***	0.032	−0.090***	0.032
Industry union coverage	−0.222***	0.080	−0.225***	0.080	−0.222***	0.080
Concentration ratio	−1.376	3.611	−1.369	3.617	−1.360	3.615
Sales growth	0.329	0.592	0.362	0.592	0.332	0.593
R&D/sales	−3.509	11.298	−3.211	11.409	−3.278	11.403
Systematic risk	1.490	2.158	1.577	2.177	1.532	2.176
Selling, general, & administrative expenses	−2.168***	0.749	−2.175***	0.763	−2.145***	0.763
Employee skills and organizational structures	−1.769*	1.245			−1.743*	1.258
Employee motivation			−0.359	1.036	−0.162	1.045
R^2	0.385***		0.383***		0.385***	
ΔR^2	0.002[a]		0.120[a]		0.002[a]	
F for ΔR^2	2.017		0.730		1.020	
N	855		855		855	

[a] These statistics reflect the incremental variance accounted for when employee skills and organizational structures and employee motivation, respectively, are added to the complete specification for each model. The impact of High Performance Work Practices on the dependent variable is underestimated by this statistic because the assumptions that the independent variables are orthogonal and have been entered on the basis of a clear causal ordering are not appropriate in the current study. This caveat applies to all reported results.
 *$p < .10$, one-tailed test
 **$p < .05$, one-tailed test
 ***$p < .01$, one-tailed test

nificant at conventional levels. In model 6, which includes both employee skills and organizational structures and employee motivation, only the coefficient for the later remained significant. This finding graphically demonstrates the need to adopt a systems perspective in evaluating the links between High Performance Work Practices and firm-level outcomes and the way in which focusing on a subset of human resources management practices may overstate their effects. In fact, these analyses are likely to understate the biases associated with a focus on individual High Performance Work Practices, as I focus here on the impact of omitting an entire facet of these practices, rather than a single practice.

To estimate the practical significance of the impact of High Performance Work Practices on productivity, I next calculated the impact of a one-standard-deviation increase in each practices scale on the numerator of productivity (net sales) while holding total employment and all other variables at their means. These analyses were based on model 6 from

TABLE 4
Results of Regression Analysis for Productivity

Variables	Model 4		Model 5		Model 6	
	b	s.e.	*b*	s.e.	*b*	s.e.
Constant	10.919***	0.227	10.899***	0.225	10.899***	0.225
Logarithm of total employment	−0.123***	0.018	−0.119***	0.017	−0.123***	0.018
Capital intensity	0.399***	0.025	0.404***	0.025	0.403***	0.024
Firm union coverage	0.000	0.001	0.001	0.001	0.001	0.001
Industry union coverage	0.001	0.003	0.001	0.003	0.000	0.003
Concentration ratio	−0.240**	0.146	−0.251**	0.145	−0.251**	0.145
Sales growth	0.105***	0.024	0.100***	0.024	0.101***	0.024
R&D/sales	−0.771**	0.457	−1.004**	0.457	−1.002**	0.457
Systematic risk	0.083	0.087	0.042	0.087	0.043	0.087
Turnover	−0.003**	0.001	−0.003**	0.001	−0.003**	0.001
Employee skills and organizational structures	0.073*	0.050			0.046	0.051
Employee motivation			0.160***	0.041	0.154***	0.041
R^2	0.490***		0.498***		0.498***	
ΔR^2	0.001[a]		0.010[a]		0.010[a]	
F for ΔR^2	2.100		15.448***		8.136***	
N	855		855		855	

[a] These statistics reflect the incremental variance accounted for when employee skills and organizational structures and employee motivation, respectively, are added to the complete specification for each model. The impact of High Performance Work Practices on the dependent variable is underestimated by this statistic because the assumptions that the independent variables are orthogonal and have been entered on the basis of a clear causal ordering are not appropriate in the current study. This caveat applies to all reported results.

  *$p < .10$, one-tailed test
 **$p < .05$, one-tailed test
***$p < .01$, one-tailed test

Table 4. The findings indicate that each one-standard-deviation increase raises sales an average of $27,044 per employee. This substantial figure represents nearly 16 percent of the mean sales per employee ($171,099). However, this is a single-period estimate, and spending on High Performance Work Practices should be thought of as an investment that can reasonably be assumed to produce gains for longer than a single year. If the effects of increasing such practices are arbitrarily assumed to accrue for a five-year period at an 8 percent discount rate, the present value increase in sales will be $107,979 per employee. It should be noted that the assumption underlying this specification is that High Performance Work Practices increase sales for a fixed number of employees rather than increase efficiency (lower employment) given a constant level of sales. Otherwise identical specifications that modeled sales as a function of total employment produced very similar results.

Corporate Financial Performance

Table 5 presents the results for Tobin's q, and Table 6 shows the same specifications for the gross rate of return on assets. Each equation reached significance at conventional levels, and the control variables generally had the expected signs and significance levels. For example, consistent with Hirsch (1991), R&D expenditures were positively related to q but negatively related to GRATE. Hirsch speculated that these relationships occur because firms with high current R&D expenditures have lower reported profits but higher expected future earnings. More centrally, the results for q showed the employee skills and organizational structures and employee motivation scales to be significant in each equation. For GRATE, employee skills and organizational structures was positive and significant in each model but employee motivation was not. Although the diversity in these results reinforces the importance of researchers' considering multiple outcomes when evaluating the impact of human resources department activities (Tsui, 1990), the structure of incentive systems in many firms may help to explain them. Given the numerous problems associated with the use of accounting measures of firm performance in incentive compensation systems (Gerhart & Milkovich, 1992), many firms have begun to explicitly link employee compensation with capital market returns. This shift may help to explain why employee motivation has a much stronger impact on the market-based performance measure than on the accounting returns–based measure.

I next assessed the practical significance of the impact of High Performance Work Practices on firm profits. To do so, I estimated the impact of a one-standard-deviation increase on the numerator of both Tobin's q and GRATE while holding their denominators and all other variables at their means. These analyses were based on models 9 and 13 from Tables 5 and 6, respectively. In terms of market value, the per employee effect of increasing such practices one standard deviation was $18,641 (relative to q). Such an increase in market value is not likely to occur immediately, however. A more likely scenario is that investments in High Performance Work Practices create an asset that provides an annual return. If one assumes (again, arbitrarily) that these returns accrue over a five-year period at an 8 percent discount rate, then such an investment would provide an annuity of $4,669 per employee per year.

Estimates of the practical effects of increasing use of these practices can also be made on the basis of annual accounting profits. Relative to GRATE, each one-standard-deviation increase in High Performance Work Practices increased cash flow $3,814. These figures are remarkably close to the five-year annuity values calculated above.

Summary of financial performance results. In short, although there is strong support for the hypotheses predicting that High Performance Work Practices will affect firm performance and important employment

TABLE 5
Results of Regression Analysis Results for Tobin's q

Variables	Model 7		Model 8		Model 9		Model 10	
	b	s.e.	*b*	s.e.	*b*	s.e.	*b*	s.e.
Constant	0.672*	0.505	0.515	0.495	0.642	0.502	−2.166*	0.995
Log of total employment	0.065**	0.040	0.082**	0.039	0.067**	0.040	0.106***	0.041
Capital intensity	−0.125***	0.054	−0.115**	0.054	−0.119**	0.054	−0.251***	0.063
Firm union coverage	0.000	0.002	0.004	0.003	0.004*	0.003	0.003	0.003
Industry union coverage	−0.002	0.007	−0.003	0.007	−0.003	0.007	−0.005	0.007
Concentration ratio	−0.443*	0.326	−0.469*	0.325	−0.471*	0.324	−0.400	0.321
Sales growth	0.205***	0.053	0.195***	0.053	0.198***	0.054	0.172***	0.054
R&D/sales	2.354***	1.009	1.935***	1.013	1.937**	1.013	2.198**	1.005
Systematic risk	−0.039	0.194	−0.115	0.194	−0.112	0.194	−0.099	0.192
Employee skills and organizational structures	0.215*	0.113			0.165*	0.113	0.139	0.112
Employee motivation			0.297***	0.090	0.277***	0.091	0.227***	0.091
Turnover							−0.007***	0.003
Productivity							0.271***	0.078
R^2	0.138***		0.146***		0.148***		0.167***	
ΔR^2	0.004[a]		0.012[a]		0.014[a]		0.033[a]	
F for ΔR^2	3.635*		10.842***		6.483***		7.781***	
N	826		826		826		826	

[a] These statistics reflect the incremental variance accounted for when employee skills and organizational structures, employee motivation, turnover, and productivity, respectively, are added to the complete specification for each model. The impact of High Performance Work Practices on the dependent variable is underestimated by this statistic because the assumptions that the independent variables are orthogonal and have been entered on the basis of a clear causal ordering are not appropriate in the current study.

* $p < .10$, one-tailed test
** $p < .05$, one-tailed test
*** $p < .01$, one-tailed test

TABLE 6
Results of Regression Analysis for Gross Rate of Return on Assets

Variables	Model 11		Model 12		Model 13		Model 14	
	b	s.e	b	s.e	b	s.e	b	s.e
Constant	−0.126**	0.072	−0.159**	0.072	−0.125***	0.072	−0.588***	0.140
Log of total employment	0.019***	0.006	0.023***	0.006	0.019***	0.006	0.025***	0.006
Capital intensity	0.011*	0.007	0.012*	0.008	0.011*	0.008	−0.009	0.009
Firm union coverage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Industry union coverage	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.000
Concentration ration	−0.077**	0.046	−0.075**	0.046	−0.076**	0.045	−0.065*	0.046
Sales growth	0.008	0.007	0.008	0.007	0.008	0.007	0.004	0.008
R&D/sales	−0.213*	0.144	−0.202**	0.146	−0.201**	0.145	−0.153**	0.145
Systematic risk	−0.050*	0.027	−0.049*	0.028	−0.048*	0.027	−0.048	0.027
Employee skills and organizational structures	0.041**	0.016			0.043**	0.016	0.040*	0.016
Employee motivation			−0.003	0.013	−0.008	0.013	−0.015	0.013
Turnover							−0.000	0.000
Productivity							0.044***	0.011
R^2	0.117***		0.109***		0.117***		0.137***	
ΔR^2	0.008[a]		0.001[a]		0.008[a]		0.027[a]	
F for ΔR^2	6.649***		0.680***		3.356***		6.157***	
N	826		826		826		826	

[a] These statistics reflect the incremental variance accounted for when employee skills and organizational structures, employee motivation, turnover, and productivity, respectively, are added to the complete specification for each model. The impact of High Performance Work Practices on the dependent variable is underestimated by this statistic because the assumptions that the independent variables are orthogonal and have been entered on the basis of a clear causal ordering are not appropriate in the current study.

* $p < .10$, one-tailed test
** $p < .05$, one-tailed test
*** $p < .01$, one-tailed test

outcomes, the results are not completely unambiguous. Notably, the significant effects found are also financially meaningful. Moreover, where these effects are meaningful their magnitude is consistent across very different measures of financial performance. For example, a one-standard-deviation increase in High Performance Work Practices yields a $27,044 increase in sales and a $3,814 increase in profits. The ratio of these variables (cash flow to sales) at 14 percent is very near the sample mean of 10 percent. And assuming that the market value of a firm reflects the discounted net present value of all future cash flows, the present value of these cash flows ($15,277 at 8 percent for five years) is remarkably close to the estimated per employee impact on firm market value of $18,614. The point of these analyses is to demonstrate that High Performance Work Practices have impacts of similar magnitude on each dependent variable of interest. In fact, these results show a remarkable level of internal consistency, especially given the fact that they are based on measures of firm performance that are only moderately intercorrelated.

Sources of the Gains from High Performance Work Practices

The next series of analyses examined the processes through which High Performance Work Practices affect corporate financial performance. Specifically, Hypothesis 1b states that employee turnover and productivity will mediate the relationship between systems of work practices and corporate financial performance. Following Baron and Kenny (1986), I first regressed the mediating variables (turnover and productivity) on the practices scales (see Tables 3 and 4). The next step was to regress each dependent variable on those scales (see models 7, 8, and 9 in Table 5 and models 11, 12, and 13 in Table 6). The significant effects shown in each case are necessary but not sufficient conditions to establish that mediation exists. Finally, as an estimate of the magnitude of any mediation effect, I regressed the dependent variables on the work practices scales and the mediating variables. These results are shown in the final models in Tables 5 and 6. Here, the decrement in the coefficients for the employee skills and organizational structures and employee motivation scales as turnover and productivity are entered into the profitability equations provides an estimate of the degree to which the effects of High Performance Work Practices on firm performance can be attributed to these factors.

As expected, the coefficient on each practices scale becomes smaller once turnover and productivity have been entered into the models. The magnitude of this effect can be shown by calculating the proportionate change in the impact of High Performance Work Practices on corporate financial performance that can be attributed to the inclusion of turnover and productivity. Although, on the average, the coefficients on the two scales fall by approximately 20 percent each when turnover and productivity are entered into the models, the joint effect is to reduce the estimated financial impact of High Performance Work Practices on q by 74 percent and on GRATE by 77 percent. This effect is sizable and suggests that a significant

proportion of the impact of High Performance Work Practices on corporate financial performance is attributable to either lower turnover or higher employee productivity, or to both. The fact that turnover and productivity are temporally antecedent to my measures of firm profits and that the contemporaneous estimates of the profitability effects were highly similar increases my confidence in these results.

Evidence of Complementarity

The final phase in the analyses was to evaluate the influence of internal and external fit on the dependent variables. Owing to space constraints, I focus here on firm profits, but the results for turnover and productivity were similar. The results of Tobin's q and GRATE appear in Tables 7 and 8, respectively, where the internal and external fit measures I developed were individually added to the complete specifications presented in Tables 5 and 6.

Internal fit as moderation. The first measure of fit I developed was the interaction between the degree of human resources policy consistency and each of the scales measuring High Performance Work Practices. These results were uniformly nonsignificant. Conversely, the second measure of internal fit, the interaction between the employee skills and organizational structures and employee motivation scales, was positive and significant for both Tobin's q and GRATE.

Internal fit as matching. The internal fit-as-matching variable, which assesses the degree to which a firm adopts the same level of High Performance Work Practices throughout its operations, is presented in the final column of Tables 7 and 8. These results were negative and significant for GRATE but nonsignificant for q.

External fit as moderation. The first external fit-as-moderation variables reflect the interaction between the proportion of sales associated with differentiation and focus strategies and the employee skills and organizational structures and employee motivation scales respectively. These results were uniformly nonsignificant.

The second measures of external fit as moderation reflects the interaction between firms' scores on the strategic HRM index and the practices scales. With the exception of the interaction between this index and employee motivation for GRATE, these analyses were also uniformly nonsignificant.

External fit as matching. Finally, the fit-as-matching variables for external fit show the coefficient for q to be positive—in the unanticipated direction—and significant, but nonsignificant elsewhere.

In summary, most of the coefficients on the fit measures had the expected signs, and the interaction of employee skills and organizational structures and employee motivation was consistently positive and significant. But despite the strong theoretical expectation that better internal and external fit would be reflected in better financial performance, on the whole the results did not support the contention that either type of fit has

TABLE 7
Estimates of the Impact of Internal and External Fit on Tobin's q[a]

Variables	Model 15	Model 16	Model 17	Model 18	Model 19
Employee skills and	1.676*	0.165*	0.157*	0.182	0.136
organizational structures	(0.121)	(0.119)	(0.114)	(0.228)	(0.121)
Employee motivation	0.287***	0.299***	0.283***	0.295**	0.248**
	(0.095)	(0.094)	(0.092)	(0.145)	(0.101)
Internal fit					
HR policy consistency	−0.080				
	(0.064)				
HR policy consistency ×					
employee skills and	0.005				
organization structures	(0.117)				
HR policy consistency ×	−0.040				
employee motivation	(0.072)				
Employee skills and					
organizational structures ×		0.192*			
employee motivation		(0.139)			
Match: Employee skills and					
organizational structures					−0.084
and employee motivation					(0.129)
External fit					
Differentiation/focus			0.063		
			(0.057)		
Differentiation/focus ×					
employee skills and			−0.114		
organizational structures			(0.105)		
Differentiation/focus ×			0.048		
employee motivation			(0.066)		
Strategic HR index				−0.061**	
				(0.032)	
Strategic HR index ×					
employee skills and				0.014	
organizational structures				(0.061)	
Strategic HR index ×				−0.002	
employee motivation				(0.040)	
Match: Differentiation/focus					
and employee skills and					0.145*
organizational structures					(0.099)
Match: Differentiation/focus					−0.034
and employee motivation					(0.097)
R^2	0.152***	0.153***	0.151***	0.155***	0.153***
ΔR^2	0.002	0.002	0.003	0.004	0.003
F for ΔR^2	0.658	1.924	1.003	1.185	0.858
N	826	826	826	826	826

[a] Standard errors are in parentheses.
 *$p < .10$, one-tailed test
 **$p < .05$, one-tailed test
 ***$p < .01$, one-tailed test

TABLE 8
Estimates of the Impact of Internal and External Fit on Gross Rate of Return on Assets[a]

Variables	Model 20	Model 21	Model 22	Model 23	Model 24
Employee skills and organizational structures	0.045*** (0.017)	0.054*** (0.017)	0.044*** (0.016)	0.070** (0.032)	0.050*** (0.017)
Employee motivation	−0.011 (0.013)	−0.009 (0.013)	−0.009 (0.013)	−0.045** (0.020)	−0.025* (0.015)
Internal fit					
HR policy consistency	0.011 (0.008)				
HR policy consistency × employee skills and organization structures	0.016 (0.016)				
HR policy consistency × employee motivation	0.007 (0.010)				
Employee skills and organizational structures × employee motivation		0.035** (0.019)			
Match: Employee skills and organizational structures and employee motivation					−0.040** (0.019)
External fit					
Differentiation/focus			0.003 (0.015)		
Differentiation/focus × employee skills and organizational structures			0.003 (0.016)		
Differentiation/focus × employee motivation			−0.003 (0.010)		
Strategic HR index				−0.000 (0.005)	
Strategic HR index × employee skills and organizational structures				−0.005 (0.009)	
Strategic HR index × employee motivation				0.012** (0.006)	
Match: Differentiation/focus and employee skills and organizational structures					−0.004 (0.014)
Match: Differentiation/focus and employee motivation					−0.002 (0.014)
R^2	0.132***	0.131***	0.127***	0.132***	0.133***
ΔR^2	0.003	0.004	0.001	0.005	0.006
F for ΔR^2	0.438	3.299	0.121	1.430	1.659
N	826	826	826	826	826

[a] Standard errors are in parentheses.

  $*p < .10$, one-tailed test

  $**p < .05$, one-tailed test

  $***p < .01$, one-tailed test

any incremental value over the main effects associated with the use of High Performance Work Practices.

Empirical Estimation Issues

The strength and magnitude of these results must be interpreted in light of several potential confounds inherent in the design of this study. Perhaps the primary threat to the validity of this study's findings is the potential for endogeneity or simultaneity between corporate financial performance and High Performance Work Practices. I dealt with this issue in two ways. First, because a firm's current work practices can be expected to affect both present and future profitability, I used both contemporaneous and subsequent ($t + 1$ year) measures of corporate financial performance. Although the results for the subsequent years' profits were slightly weaker than the contemporaneous results, they were highly consistent. Thus, I present them here because they are more conservative.

Second, to assess the magnitude of any simultaneity between High Performance Work Practices and firm profits, I used Hausman's (1978) test to evaluate the ordinary-least-squares (OLS) regression assumption that the High Performance Work Practices scales are exogenous in the profitability models. In analyses whose results are not shown, I generated a predicted value for the employee skills and organizational structures and employee motivation scales using a reduced-form model. Then I included each scale and its predicted value in an OLS model for Tobin's q and GRATE. A significant coefficient on the predicted value for each scale would indicate it is endogenous in the model being estimated (Hausman, 1978). Although these results showed that the High Performance Work Practices scales were not in fact endogenous in the profitability models, the general controversy surrounding the use of this test (Addison & Portugal, 1989) led me to estimate two-stage least-squares models for each dependent variable as a formal correction for simultaneity. Not only were these results consistent with the OLS results, but they were in each case somewhat larger than the OLS results presented here.

Survey response bias was also considered directly. The presence of response bias implies that unobserved determinants of the decision to respond to this study's survey are related to both firm performance and High Performance Work Practices. Given the extensive control variables included in my models, such bias in unlikely. However, to formally test this possibility, I used Heckman's (1979) procedure, which generates an inverse Mills' ratio that I then included in the OLS and two-stage least-squares regression models for each dependent variable to control for selectivity bias. In each case, the relationship between the work practice measures and the dependent variables remained consistent with the results presented above, and in no case would these corrections have altered my conclusions. In fact, most of the corrections for simultaneity and selectivity bias produced estimates of the impact of High Performance Work Practices larg-

er than my OLS regression results, which implies that the specifications relied on here are conservative.

DISCUSSION

Prior work in both the academic and popular press has argued that the use of High Performance Work Practices will be reflected in better firm performance. This study provides broad evidence in support of these assertions. Across a wide range of industries and firm sizes, I found considerable support for the hypothesis that investments in such practices are associated with lower employee turnover and greater productivity and corporate financial performance. That my results were consistent across diverse measures of firm performance and corrections for selectivity and simultaneity biases lends considerable confidence to these conclusions.

The magnitude of the returns for investments in High Performance Work Practices is substantial. A one-standard-deviation increase in such practices is associated with a relative 7.05 percent decrease in turnover and, on a per employee basis, $27,044 more in sales and $18,641 and $3,814 more in market value and profits, respectively. These internally consistent and economically and statistically significant values suggest that firms can indeed obtain substantial financial benefits from investing in the practices studied here. In addition, these estimates imply a constant level of investment in such practices each year. If an increase requires only a one-time expense (as perhaps could be the case with recruiting or selection costs), these values will be underestimates of the impact of High Performance Work Practices on firm performance. Moreover, these calculations only include a firm's portion of the gains from increasing use of these practices. Presumably, some of the value created by adopting more effective HRM practices will accrue to employees, in the form of higher wages and benefits (Becker & Olson, 1987). Since higher levels of High Performance Work Practices lead to lower turnover, and presumably greater employment security, there appears to be considerable justification for encouraging firms to make such investments from a public policy perspective.

The impact of High Performance Work Practices on corporate financial performance is in part due to their influence on employee turnover and productivity. The identification of some of the processes through which these practices affect firm profits helps to establish the plausibility of a link with corporate financial performance. However, some of their influence on firm profits remains unaccounted for, and the source of these remaining gains is an important topic for future research.

But despite the compelling theoretical argument that better internal and external fit will increase firm performance, I found only modest evidence of such an effect for internal fit and little evidence for external fit. These findings are in fact consistent with recent attempts to model fit in the organizational strategy literature (Venkatraman, 1989), and they are per-

haps unsurprising given the preliminary nature of the measures of fit I developed. And given the substantial main effects associated with systems of High Performance Work Practices, one might conclude that the simple adoption of such practices is more important than any efforts to ensure these policies are internally consistent or aligned with firm competitive strategy. However, the theoretical arguments for internal and external fit remain compelling, and research based on refined theoretical and psychometric development of these constructs is clearly required before such a conclusion can be accepted with any confidence. The very large theoretical literature in the fields of human resources management based on the premise that fit makes a difference cries out for more work in this area, and the primary import of the current findings may in fact be to call attention to this important line of research.

Finally, the reader is cautioned to recognize the limitations associated with the use of cross-sectional data when an attempt to draw conclusions about causality is made. Although the use in this work of simultaneous equations, corrections for response bias, measures of current and subsequent years' profits, extensive control variables, and a large and diverse sample mitigate many of the traditional methodological concerns, longitudinal data on both High Performance Work Practices and firm performance are needed to conclusively replicate the findings presented here. But such data are extremely costly to generate and are as yet unavailable.

This caveat is not intended to obviate the central conclusions of this study, however. Although traditional economic theory would suggest that the gains associated with the adoption of High Performance Work Practices cannot survive into perpetuity (because the returns from these investments will be driven toward equilibrium as more and more firms make them), the substantial variance in the HRM practices adopted by domestic firms and the expectation that investments in such practices help to create firm-specific human capital that is difficult to imitate suggest that, at least in the near term, such returns are available for the taking.

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APPENDIX
Components of the Strategic Human Resources Management Index[a]

1. Match the characteristics of managers to the strategic plan of the firm.
2. Identify managerial characteristics necessary to run the firm in the long term.
3. Modify the compensation system to encourage managers to achieve long-term strategic objectives.
4. Change staffing patterns to help implement business or corporate strategies.
5. Evaluate key personnel based on their potential for carrying out strategic goals.
6. Conduct job analyses based on what the job may entail in the future.
7. Conduct development programs designed to support strategic changes.

[a] Adapted from Devanna, Fombrun, Tichy, and Warren (1982).

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