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**THE IMPACT OF HIGH PERFORMANCE WORK SYSTEMS,  
IMPLEMENTATION EFFECTIVENESS, AND ALIGNMENT  
WITH STRATEGY ON SHAREHOLDER WEALTH**

by

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**The Impact of High Performance Work Systems,  
Implementation Effectiveness, and Alignment  
With Strategy on Shareholder Wealth**

**Abstract (max 50 words)**

We estimate the impact of the presence of a High Performance Work System and its effectiveness and alignment with firm competitive strategy on shareholder wealth in 702 firms. We find that a one standard deviation increase in these factors is associated with a \$42,000 per employee increase in market value.

## **The Impact of High Performance Work Systems, Implementation Effectiveness, and Alignment With Strategy on Shareholder Wealth**

The nature and pace of recent changes in the economic environment have motivated both managers and scholars to look for new sources of competitive advantage and profitability. As many of the traditional sources of competitive advantage (technology, economies of scale, patents, etc.) have diminished in value, the role of a skilled, motivated and flexible workforce has become more prominent (Pfeffer, 1994). The form and structure of organizational policies and practices that might produce such a work force, and in turn have an economically meaningful effect on firm performance, has been the focus of an emerging literature in strategic human resource management (HRM). Within that context a broadly defined *High Performance Work System* (HPWS) can be viewed as a key strategic lever, both as a means to develop and sustain core competencies and as a necessary condition for strategy implementation (Dyer, 1993; Pfeffer, 1994; Levine, 1995). Such systems include rigorous recruiting and selection protocols, performance management and incentive compensation systems, and employee training and development activities that are designed to acquire, refine, and reinforce employee skills and behaviors necessary to implement the firm's competitive strategy (Huselid, 1995). Indeed, HPWS have attracted considerable interdisciplinary interest and been the subject of recent special issues in three leading journals (*Academy of Management Journal*, *Industrial Relations*, *Journal of Accounting and Economics*).

This study focuses on a recurring theme in this literature; namely, to what extent is the HRM-firm performance relationship contingent upon the degree to which such systems have been implemented effectively, the "fit" among HRM policies, and the "fit" between those policies and the firm's larger strategic objectives? Prior empirical work on this topic reflects an inherent tension between methodology and theory. The underlying theoretical literature suggesting the presence of a HRM-firm performance relationship focuses on comprehensive firm-level measures of financial performance (Hamel and Prahalad, 1994). However, the extent of "implementation effectiveness," the fit among HR policies, and their consistency with larger business objectives, are more easily observed within individual plants and industry sectors; the focus of most of the empirical work on this issue (Arthur, 1992; Cutcher-Gershenfeld, 1992; MacDuffie, 1995; Youndt, Snell, Dean, & Lepak, 1996). Perhaps not surprisingly, while mixed, the empirical support for the benefits of contingencies tends to be stronger as the level of analysis approaches the plant or unit level (Becker and Gerhart, 1996).<sup>1</sup> We believe it is equally important to establish similar relationships at the level of the firm. Such efforts will not only provide a complement to more narrowly focused analyses, and thereby promote theory development in this literature, but also address the most salient concerns of senior managers.

In this paper we extend the empirical literature on this topic by examining firm performance effects of the HR system as well as the broader organizational context that supports and reinforces a high performance HR management system. We term this latter dimension of the firm's HR strategy Effectiveness and Alignment because it includes conventional notions of "fit" and contingency, but defines these contextual factors more broadly to include both senior leadership style and HR function effectiveness. We compare this broader measure of "fit" with more conventional estimates based on interactions, including those with generic measures of corporate strategy (Porter, 1985). Our results indicate strong support for a positive relationship between a high performance HR system and firm performance. The evidence supporting the Effectiveness and Alignment strategy is mixed. The strongest support for complementarities is suggested by a pattern of strategy configurations (Delery & Doty, 1996) derived from cluster analysis.

### **THEORETICAL BACKGROUND AND HYPOTHESES**

The prior conceptual literature speaks both to the mechanism through which the HR management system might affect firm performance as well as the necessary conditions for these

systems to have a strategic impact. The *behavioral* perspective (Jackson, Schuler, & Rivero, 1987) suggests that an effective HR management system will acquire, develop and motivate the behaviors necessary to enhance firm performance (Bailey, 1993; Jackson et al., 1987; Pfeffer, 1994; Schuler & MacMillan, 1984). Complementary work argues that HR management systems provide additional value when they are purposively designed to be internally consistent and are thereafter linked with firm competitive strategy (Butler, Ferris, & Napier, 1991; Cappelli & Singh, 1992; Jackson & Schuler, 1995; Milgrom & Roberts, 1995; Ulrich & Lake, 1990; Wright & MacMahan, 1992). In essence, prior theoretical work in this area concludes that competitive advantage is in part a product of HR management systems that elicit employee behaviors consistent with the firm's broader strategic and environmental contingencies (Jackson & Schuler, 1995).

Promoting desirable employee behaviors, however, is not sufficient to create a strategic impact. Following the *resource-based view of the firm* (Barney, 1991) it is clear that if these HR management systems are to in fact create sustained competitive advantage, they must be difficult to imitate. HPWS are characterized by at least two features that are associated with inimitability: path dependency and causal ambiguity (Collis and Montgomery, 1995). Path dependency describes organizational policies that are developed over time and cannot be simply purchased in the market by competitors. A competitor can understand that a particular policy or practice is valuable and would like to adopt it, but is precluded from immediate imitation by the time required to fully implement the strategy. Causal ambiguity reflects policies that are easily understood in concept, but in practice require numerous and subtle interrelationships that are not readily observed by those outside the firm. An example is the challenge of aligning HR policies with the firm's strategy and their larger "embeddedness" in management practice (Lengnick-Hall & Lengnick-Hall, 1988; Lado & Wilson, 1994).

The *behavioral perspective* describes how the HR management system creates new firm capabilities, while *resource-based view* emphasizes the attributes required for these capabilities to generate competitive advantage. Complementarities within the HRM system, as well as the alignment of the HR strategy with appropriate business strategies and goals, therefore provide a theoretical rationale for a positive link between HR and firm financial performance. This notion is also consistent with recent theoretical work in the field of strategic management (Amit and Shoemaker, 1993) that develops the concept of *strategic assets* as "the set of difficult to trade and imitate, scarce, appropriable, and specialized *resources* and *capabilities* that bestow the firm's competitive advantage" (pg. 36). Our view is that HR strategies that successfully develop and implement a coordinated HPWS create "invisible assets" (Itami, 1987) that both create value and are difficult to imitate. These asset values are maximized when the HPWS is so embedded in the operational systems of the organization that it enhances a firm's *capabilities*. Therefore, unlike more traditional "personnel" activities, organizational high performance work systems have a strategic impact at the level of the firm. This interpretation is also consistent with the recent emphasis on "core competencies" developed by Hamel and Prahalad (1994) who argue that conventional measures of economic rents such as the difference between market and book value of assets (i.e., Tobin's *q*) reflect "core competence, (or) people embodied skills" (pg. 232). Following this logic, we expect that:

**Hypothesis #1:** The presence of a *High Performance Work System* will be positively associated with corporate financial performance.

### **Complementarities and HR Bundles**

The theoretical rationale that HR can represent a "strategic asset" requires that the HR strategy of a successful firm not be easily imitated by its competitors. The logic of inimitability has in part motivated the focus on complementarities (Milgrom and Roberts, 1995), "bundles" (MacDuffie, 1995; Arthur, 1994; Ichniowski, Shaw, & Prenzushi, 1994) and systems (Delery & Doty, 1996; Huselid, 1995; Jackson & Schuler, 1995) rather than the emphasis on individual HR policies and practices that characterizes much of the traditional HR literature. Milgrom and Roberts (1995)

develop a theoretical rationale for both the internal (within the HR management system) and external (with firm competitive strategy) alignment of an HR management system. In their view complementarities or synergies related to HR management practices are possible when an internally consistent and externally aligned system of such practices is adopted. Their most persuasive empirical test of these propositions was the familiar experience of Lincoln Electric. Cappelli & Crocker-Hefter (1996) provide a number of very convincing case analyses in support of this view. Similarly, Arthur (1994), Ichniowski, et al. (1994) and MacDuffie (1995) develop taxonomies of “high performance” bundles of HR practices in auto and steel plants. In general they find that such “high performance” bundles have a consistently more positive effect on unit performance than more “traditional” HR bundles.

Several studies have focused on the entire HR system in an effort to determine whether those firms with HR systems comprised of *high performance* HR practices enjoyed greater financial success. While the choice of HR practices to include in these systems varies across studies, all are an attempt to describe HR systems at the level of the firm. They are therefore necessarily more general than practices described in studies that focus at the plant level in a single industry. An example would be the 16 HR practices recommended by Pfeffer (1994). These include selective hiring, high pay, pay-performance linkages, employee ownership, information sharing, empowerment, an emphasis on team structures and training, and promotion from within, among others. Ichniowski (1990), Huselid (1995a), Huselid and Becker (1996a, 1996b) all support the conclusion that a high performance HR system has an economically meaningful effect on firm level measures of financial performance. For example, Huselid and Becker report increases in shareholder value from plausible improvements in a firm’s HR system on the order of \$20,000 - \$30,000 per employee.

Studies that take a systems perspective in effect approach the entire HR system as one bundle of integrated practices intended to make the labor force a strategic asset rather than a cost to be minimized. While a systems perspective would in principle be appropriate at any unit of analysis, it seems particularly appropriate when the focus is at the firm level. Indeed when the unit of analysis is at the organizational level across a wide spectrum of industries, an emphasis on narrow work practices and interrelationships is both infeasible, and probably inappropriate. However, while the prior empirical work has focused on the firm-level impact of the existence of a practice or systems of practices, little attention has been given to effective *implementation* of these practices across firms. Whereas the presence of some aspects of an HRM system may well be a necessary condition for effective utilization of a firm's human capital, research focusing on extant HRM systems may be biased when there are differences in the quality of the implementation of those systems across firms. For example, one firm, supported in the implementation of an HRM practice by an appropriate organizational culture and the requisite top management support, might use their compensation and performance management practices as effective tools to help implement competitive strategy. In contrast, a second firm, with ostensibly the same HRM system, may be constrained in the implementation of this system by the lack of top management support or perhaps an organizational culture resistant to change. Thus, the present study investigates the firm level consequences of overall HRM *effectiveness*. Specifically, we test the following hypothesis:

**Hypothesis 2:** HRM effectiveness and alignment will be positively associated with corporate financial performance.

Although we expect that firms adopting a HPWS more extensively will also be more likely to facilitate the alignment of business and HR strategies, the conceptual literature in this area would also suggest the presence of complementarities or synergies between these two elements. Specifically, we expect that alignment and effectiveness will be more likely to be observed at higher levels of a HPWS. Thus:

**Hypothesis 3:** The financial returns to alignment and effectiveness will be greater to the

extent the firm has adopted a more comprehensive HPWS.

Finally, prior work has begun to explore the potential interactions between the competitive strategy firms adopt and their HRM systems. Consistent with the conceptual expectation that firms adopting differentiation or focus competitive strategies will be more likely to adopt a HPWS than would firms pursuing a low cost competitive strategy, Jackson, Schuler, & Rivero (1989), Arthur (1994), and Huselid & Rau (1997) have observed significant relationships between competitive strategy and a firm's work system. Based on this reasoning, we expect the *returns* from investments in a HPWS to vary by competitive strategy as well. Thus:

**Hypothesis 4:** The returns to investments in a HPWS will be greater for firms adopting a differentiation or a focus competitive strategy than for firms adopting a cost leadership competitive strategy.

## METHODS

### Sample and Data Collection

This study draws on data collected in 1996, and focuses on the HRM systems and strategies of firms in calendar year 1995. The sample was drawn from *Compact Disclosure*, a commercial database comprised of annual corporate 10-K filings.<sup>2</sup> The sampling frame consisted of all publicly-held domestic firms with more than 100 employees and \$5 million dollars in sales, and comprised 3,840 firms. After extensive pretesting and piloting of all survey materials, data on firm HR management systems were solicited from the chief human resources officer in each firm. 702 respondents completed questionnaires, for an overall response rate of 18 percent. This response rate is consistent with the levels reported in similar studies using mailed surveys (Huselid, 1995; Delery and Doty, 1996; Youndt et. al., 1996.) Comparisons between firms in the sample and those in the sampling frame suggest no meaningful differences in terms of firm size or industry distribution.

For items focusing on general HR practices, informants were asked to respond separately for exempt and nonexempt employees, indicating the proportion of employees in each category who were affected by each practice. To derive a measure of the degree to which the practices were used by a particular firm, responses to each question were weighted by the proportion of employees in the exempt and nonexempt categories and summed. Survey responses were then matched with financial data taken from *Compact Disclosure*. Substantial care was taken to ensure that all data were matched to the same accounting periods. Missing data on some or all variables (primarily firm financial performance) reduced the sample for which complete data were available to 548 firms.

### Measures

**Financial Performance.** The focus of this paper, and indeed the rationale for a firm level of analysis, is that interest in *strategic* HR is largely motivated by the assumption that a firm's HRM system can provide a source of competitive advantage. The most appropriate measure of such success is the extent to which a firm's market value exceeds its asset base, and we therefore focus on a variant of the familiar Tobin's  $q$  as our dependent variable (Hirschey & Wichern, 1984). Tobin's  $q$  is a ratio and is typically a more direct theoretical representation of the strategic import of the HR management system we have incorporated the notion of numerator vs. denominator management described in Hamel and Prahalad (1994). They observe that while the numerator in most financial ratios is the objective for managers whose goal is to create value for their firm, too many managers focus on the denominator (reflecting the fact that increasing the ratio of market to book value can be achieved by *either* increasing market value *or* decreasing book value). Using Tobin's  $q$  we cannot separate the effects of HR on the numerator from the denominator. The latter has typically been the focus of HR policies in the past where HR activities are viewed as costs to be minimized rather than revenue generators. In contrast, the new strategic role of HR suggests that the effects on these ratios are to expand the numerator rather than to limit the size of the denominator. Since the conventional  $q$  measure is the natural logarithm of a ratio we can simply move the denominator to the right hand side of the equation and estimate the effects on the numerator of the HR systems

directly.<sup>3</sup>

Finally, we use contemporaneous values of firm performance in our analysis since data from subsequent years are not currently available. The potential for simultaneity bias is a common reservation in this literature, the concern being that more profitable firms can afford more of these policies and any positive HR-firm performance relationship is therefore positively biased. Of course the alternative bias is equally plausible; less profitable firms have a greater need for high performance HR strategies and are therefore more likely to pursue them. However, there is little theoretical or empirical reason to believe that contemporaneous measures of firm performance pose a fundamental problem. First, prior empirical tests (Huselid, 1995; Huselid & Becker, 1996a; Ichniowski, 1990) have found no evidence of meaningful simultaneity bias in these relationships. Second, many of the elements of a high performance HR strategy are not inherently more expensive than “low performance” practices. For example, compensation policies that link pay to performance or promotion policies based on merit rather than seniority are not necessarily more expensive than the alternative approach. Third, the elements of the HR system that we are examining are expected to increase productivity and profitability, and therefore will presumably pay for themselves. We are not focusing on policies that simply reflect greater corporate largesse. Finally, we assume that these policies are not implemented instantaneously and that, in fact, we are observing “equilibrium” relationships. Even though we measure the HR system in 1995 it does not imply that the system was *implemented* in 1995. In short, the effects of these policies are not observed immediately and probably take several years to influence firm performance. Using contemporaneous measures of firm performance simply assumes that across firm differences are in the HR management systems are relatively stable.<sup>4</sup> To the extent that the contemporaneous “levels” of the HR system include recent changes our estimates are likely to underestimate the true effects given the evidence from prior work of an implementation-benefit lag of several years (Huselid and Becker, 1996a).

**HR Management System Measures** The survey data includes more than 50 questions about the nature, coverage and effects of a firm’s HR system, strategy and management practices. Following our theoretical focus on the HR system and HR effectiveness and alignment, we developed two indexes to reflect these perspectives. The first, an index of the HR management “system,” was constructed from the mean of 24 standardized questions that focused on the intensity with which HR policies practices generally considered high performance work practices (Huselid, 1995; Huselid and Becker, 1996b; Youndt, et. al., 1996; MacDuffie, 1995; Osterman, 1994; Arthur, 1992; 1994) have been adopted throughout the firm. The use of an index to reflect the HR system is consistent with both the emphasis on “bundles” and “systems” that is emerging in this literature (Youndt, et. al., 1996; MacDuffie, 1995; Osterman, 1994). This scale (HR System) had a Cronbach’s alpha of .71. A list of these questions and descriptive statistics are provided in Table 1.

Insert Table 1 About Here

The second index (Effectiveness and Alignment) is constructed from the mean of the standardized values from 16 questions that broadly reflect the alignment of organizational context with the principle of a high performance work organization. This contextual alignment includes the functional effectiveness of the HR function, the involvement and alignment of HR with the firm’s business strategy, the role of the HR function in the organization (as a business partner), and the leadership style of top management including the success in communicating the firm’s mission. We believe that each of is an integral part of an organizational context that supports and reinforces the returns from a high performance HR system. Note that unlike prior work (Arthur, 1992; MacDuffie, 1995; Youndt, et. al, 1996) that depicts two types of HR systems, we are measuring two different characteristics that can exist simultaneously in the same organization. The two indices we have developed should not be considered substitutes, but rather as two separate elements in the portfolio of a high performance organization.

The Effectiveness and Alignment index had a Cronbach’s alpha of .90. To further evaluate the psychometric characteristics of our measures, we also conducted a maximum likelihood confirmatory factor analysis of these two indexes. The null model combined the two indexes into one

factor. The alternative model allowed each index as a separate factor and allowed the error terms to be correlated given that we do not consider decisions on the HR system or Effectiveness and Alignment to be independent. The one factor hypothesis was rejected with a  $\chi^2=372$ ;  $p < .001$ .

**Cluster Analysis.** The HR System and Effectiveness and Alignment indices allow us to test Hypothesis 2; namely that internal and external fit has an incremental effect on firm performance over and above the presence of a HPWS. However, while these two variables can be used to test for complementarities via interaction effects between the two, they do not provide a very rich picture of how firms might combine those two roles and whether different combinations of those roles have different effects on firm performance. Alternatively, cluster analysis provides a more flexible approach to analyzing these questions since it will give some indication of whether there are meaningful “clusters” of firms that combine both the traditional and strategic HR roles in significantly different ways. Moreover, by grouping firms based on items selected based on the prior theoretical and empirical work, cluster analysis allows the examination of individual item means by clusters in a way that factor analysis cannot.

Following the recommendations of Ketchen & Shook (1996), we performed a cluster analysis of the firms in our sample, grouping firms based on each of the individual items contained in the HR System and Effectiveness and Alignment indices. Using standardized variables and a variety of clustering algorithms to check for stability in the results, a four-cluster solution was found to provide a good fit to the data. The means of each item, by cluster, are presented in Table 2.

Insert Table 2 About Here

The results of the cluster analysis provide an interesting elaboration of our empirical findings. The firms in our sample combine HR system and Effectiveness and Alignment strategies in four different ways. In the Weak cluster ( $n=176$ ), firms are well below average on *both* strategies. These firms have neither developed an HR system that can build on the skills and motivation of the labor force as a source of competitive advantage, nor have they aligned the remainder of the organizational context with the principles of a high performance work organization. The next two clusters, Alignment and Compensation, occupy the middle range of the cluster results. Each is above average on one strategy, but below average on the other. The Alignment cluster ( $n=132$ ) is generally above average on the variables that comprise the Effectiveness and Alignment index, but below average on the variables that make up the HR System index. Alternatively, the Compensation cluster ( $n=123$ ) is above average on the HR system variables, but below average on the Effectiveness and Alignment variables. We refer to this cluster as the Compensation cluster because the primary reason for the high value of the HR system index in this cluster is the very high values on the compensation variables. In other words, these firms are relying overwhelmingly on a strong pay-performance link to enhance the performance of the workforce. Finally, the High Performance cluster ( $n=266$ ) is well above average on both indices. Table 2 also shows the mean values of HR System and Effectiveness and Alignment by cluster.

Cluster analysis is appealing because it allows us to focus on whether there are any systematic differences in the way firms balance the HR System and Effectiveness and Alignment strategies for HRM. However, because cluster analysis does not provide a well developed method of testing for the superiority of one clustering result among several alternatives, the identification of clusters is only of interest if those clusters are associated with differences in firm performance. In short, the “validation” of these clusters turns much more significantly on their relationship with firm performance. Hypothesis 3 predicts that the proper alignment between the HR System and Effectiveness and Alignment strategies will have a positive effect on firm performance. Our theoretical framework would predict that the effects of the clusters on firm performance would be ordered as follows: High Performance > Weak. However, while we would expect that the effects of the Alignment and Compensation clusters would fall somewhere in between the two other clusters, we have no *a priori* basis for predicting their relative order.

**Control Variables.** Our approach is to explore Hypotheses 1-4 within the conventional models of firm performance that have been well developed in this literature (Huselid, 1995;



Ichniowski; 1990) and elsewhere (Hall, Cummins, Laderman, & Mundy, 1988; Hirsch, 1991; Hirschey & Wichern, 1984). The challenge in specifying these models is not to fully explain the dependent variable, but rather to specify the model sufficiently so that we have confidence that our HR variables are not confounded by the effects of omitted variables. The conventional control variables in such a model include prior firm growth in sales, tangible assets (plant and equipment), number of employees, investment in research and development (normalized by sales), unionization, firm systematic risk (beta), and 34 dummy variables that represent 35 2 digit SIC industry codes.

## RESULTS

The descriptive statistics and correlations for all variables are reported in Table 3. Our measures HR System and Effectiveness and Alignment scales reflect an average of standard scores, hence their means are very near zero. The descriptive statistics for each of the other variables were consistent with prior empirical work on this topic.

Insert Table 3 About Here

### Hypothesis 1 and 2

The estimation model is a conventional OLS regression analysis of firm performance with the natural logarithm of market value as the dependent variable (See Table 4). The coefficients are unstandardized and can be interpreted as percentage changes in market value per unit change in the respective independent variable.<sup>5</sup> The results in Models 1 and 2 indicate the effects of the HR system and Effectiveness and Alignment indices in separate regressions. Both variables have economically and statistically significant positive effects on firm performance. A one standard deviation change in the HR System and Effectiveness and Alignment indices is associated with a 21 and 23 percent change in shareholder value, respectively.<sup>6</sup>

Insert Table 4 About Here

Model 3 combines both variables in the same model, and not surprisingly the effects of both variables fall considerably. Nevertheless, both coefficients continue to be statistically significant ( $p < .01$ , one-tailed test) and reflect economically meaningful relationships with firm performance. The effects of the HR system are consistent with prior work examining the effects of the HR system on firm performance (Huselid, 1995; Youndt et al., 1996) though our system measure is more comprehensive than those used in earlier studies. However, replicating the HR system-firm performance relationship with a different measure in a different time period is important support for these prior empirical results. We consider the Model 3 estimates a much more accurate reflection of the effects of these two variables since we would expect a positive correlation between the two as firms that develop a high performance HR management system would be more likely to understand the importance of alignment in the remainder of the organization.

### Hypothesis 3 and 4

The effect of the Effectiveness and Alignment index provides strong support for the presence of complementarities. However, we also tested for complementarities in several other ways. First, we tested for synergies between the HR System and Effectiveness and Alignment indices using a conventional moderator variable analysis, where the HR System and Effectiveness and Alignment variables are interacted (Model 4). Those results provide no support for such synergies. Second, we tested for synergies between the HR indices and corporate strategy; namely, the percentage of the firm's products that compete based on a "cost leadership strategy" strategy. Those effects (Model 5) were equally unresponsive of the presence of complementarities.

One of the challenges of multi-firm surveys is heterogeneity bias. The concern is that unmeasured differences among firms are correlated both with the nature of their HR strategy and firm performance. Huselid and Becker (1996b) and Becker and Gerhart (1996) have suggested that the positive HR-firm performance relationship may in part be an indication of better management in

general. Firms with the capability to develop high performance HR strategies also have leading edge managers in marketing and finance, for example. As a result, the apparent financial returns to HR may in part be attributable to better quality management in other areas of the firm. We have made an effort to test this hypothesis directly by asking respondents to rate the quality of other functional areas (as a group) within their firm relative to those same functions in their direct competitors. This measure (Other Management) is a 6 point Likert scale ranging from “much better than” (6) to “much worse than.” The results are reported in Model 6. When we control for judgements about the quality of other management in the firm, there is virtually no change in the effect of the System index, but the coefficient on Effectiveness and Alignment falls by nearly 70 percent and is no longer statistically significant. We should not be surprised that organizations that practice good management on the people side the firm also include good managers in other areas of responsibility ( $r=.51$ ). However, the instability of the point estimate on Effectiveness and Alignment makes it difficult to draw strong inferences from these results.

### Cluster Analysis

While the tests of Hypothesis 3 using interaction terms provided no support for the presence of synergies between the HR System and Effectiveness and Alignment strategies, the cluster analysis provides another approach to testing this same hypothesis. These results are reported in Model 7. Since each cluster is denoted as a binary variable, the Weak HR cluster is omitted from the model. Therefore, the coefficients on the included clusters can be interpreted as the difference in the effects of that particular cluster on shareholder value compared to this omitted group. All three clusters have economically and statistically significant effects on added cluster (Weak HR). The point estimates indicate that firm's in the High Performance, Alignment and Compensation clusters had 63, 32 and 43 percent higher market value, respectively, compared to firms in the Weak HR cluster.

Model 8 describes the cluster results when Other Management is included in the model. While the coefficients on all three clusters fall, the greatest effect is on the Alignment cluster, which is no longer statistically significant ( $p<.21$ , one-tailed). Indeed, the results in Model 8 suggest that both the Compensation and High Performance clusters have very similar effects on firm performance. A joint F-test, cannot reject the hypothesis that the two coefficients are equal ( $F_{1,501}=.21$ ;  $p<.64$ ). However, a joint F-test that High Performance and Alignment have the same effects rejects the null ( $F_{1,501}=3.05$ ;  $p<.08$ ).

The advantage of the cluster analysis for such a test is that it does not impose any *a priori* constraints on the nature of the complementarities between the two HR roles. For example, instead of the three clusters simply reflecting the same relative changes in the two roles as we move from the Weak to the High Performance cluster, the cluster results indicate that there are two subsets of firms that pursue dramatically different strategies. One emphasizes a strong pay-performance link, the other a much stronger organizational emphasis on HR, but one that does not change the underlying HR system. This mix of roles may be an indication of potential complementarities.

One simple test for the presence of these complementarities is to determine if the “whole is greater than the sum of the parts” for each cluster. For example, Table 2 reports the mean values for the HR System and Effectiveness and Alignment index in each cluster. From those values we can calculate how much of a difference in the effect on firm performance we could expect between the Weak and High Performance clusters based solely on the mean difference in the two indexes. The additive impact of changes in those two indexes is calculated based on the results in Model 6. Based on those calculations the High Performance cluster would have a 32 percent higher market value than the Weak cluster. The results in Model 7 indicate a 41 percent actual difference in the cluster effects. We would argue that the 21 percent relative difference reflects a synergy between the two HR System and Effectiveness and Alignment strategies.

## DISCUSSION

This study extends the strategic HR management literature by adopting a macro perspective on the impact of the HRM on firm performance. Reflecting the strategic aspect of this literature, we have focused on the level of analysis that provides a comprehensive measure of organizational

performance - the level of the firm. Rather than examining specific HR practices and policies and their complementarities, we focus broadly on two dimensions of a high performance HR strategy: the HR management system and its associated levels of effectiveness and alignment. By HR's effectiveness and alignment we are including a much broader notion of the organizational context than just corporate strategy. What we have called effectiveness and alignment includes not only the appropriate focus and effective operation of the HR function, but also the strategic role of HR in organizational decision making and the role of HR as business partner rather than compliance gatekeeper. Effectiveness and Alignment also implies that top management views the labor force as a source of competitive advantage rather than as merely a cost to be minimized, and engages in a leadership style that emphasizes vision and motivation, as well as effectively communicating that vision throughout the organization. Our multiple hypotheses can be summarized by two research questions:

- 1) Do the HR System and Effectiveness and Alignment strategies have independent and economically significant effects on firm performance?
- 2) Is there an optimal balance between these two dimension of a firm's HR strategy, or is there more than one combination of these two dimensions that can serve as effective HR strategy?

Analytically we have approached these research questions in two different ways. First, we constructed an index reflecting each of the two dimensions of HR strategy. There was uniformly consistent support for a strong positive relationship between the presence of a high performance work system and firm performance. Not only were these estimates always statistically significant, but more importantly the point estimates were economically meaningful. A one standard deviation improvement in the HR system index (Model 6) was associated with an increase in shareholder wealth of \$41,000 per employee.<sup>7</sup> This result is consistent with earlier work that has examined the HR system-firm performance relationship (Becker & Huselid, 1996; Huselid, 1995) but extends that literature by utilizing a much more comprehensive measure of the HR system.

The independent effects of Effectiveness and Alignment are more difficult to evaluate. Prior work has provided mixed support for the importance of "fit" and those efforts typically focused on more narrowly defined business units. However, we believe it is important to test this hypothesis as broadly and comprehensively as possible at the level of the firm. Most importantly, this approach does not impose a particular type or level of business strategy as a measure of fit. This is consistent with the notion of an "idiosyncratic contingency" (Huselid and Becker, 1996b; Becker and Gerhart, 1996) that points to the firm specific contingencies between HR and business objectives as the more likely source of inimitable competitive advantage. The limited support of any contingency effects with Porter's strategy types (cost leadership, differentiation, and focus) in prior work is also consistent with this interpretation. This type of fit would by implication suggest that there was only two or three "correct" HR strategies which would make the challenges of developing those strategies considerably more tractable. Alternatively, an idiosyncratic fit requires HR managers to have a thorough understanding of their firm's business problems and not simply rely on a best practice or benchmarking solution from other firms.

Models 2 and 3 indicate that in the simpler models, Effectiveness and Alignment has an effect on firm performance similar to that of HR System, for equal unit changes. However, when we control for the management quality in other functions of the firm, the coefficient on Effectiveness and Alignment, while economically meaningful, is no longer statistically significant at conventional levels. While the high correlation ( $r=.51$ ) between other management quality and Effectiveness and Alignment or Effectiveness and Alignment, and therefore diminishes their statistical significance, the smaller point estimates should be considered unbiased given the model we use. Equally important is that the effects of the HR System index was virtually unaffected by the inclusion of the Other Management variable.

Based on the regression analysis of the two indexes of HR strategy, in response to the first research question we would conclude that the HR System has a strong independent effect on firm

performance, while the impact of HR's organizational fit (Effectiveness and Alignment) is much more limited. However, the second research question remains an appropriate focus of inquiry if there are combinations of the two dimensions of HR strategy that provide synergy above and beyond the limited additive effect of Effectiveness and Alignment. Hypotheses 3 and 4 tested for the presence of such synergies between HR System and Effectiveness and Alignment, as well as between each of those two dimensions and measures of corporate strategy. We found no support for the fit hypothesis in either model based on an analysis of interaction terms. As Becker and Gerhart (1996) observe, the use of interactions to test for these complementarities is probably not entirely appropriate. For example, the contingency and universalistic perspectives are often presented as two competing hypotheses (Delery and Doty, 1996). However, statistical interactions which are often used to test for contingencies simply provide "universal" relationships at given levels of the contingent factor (e.g. strategy).<sup>8</sup> More importantly, our interpretations of interaction terms tend to rely on the underlying linear combinations of the variables that make up the HR indices where an analysis that imposes fewer restrictions might be more useful (Becker and Gerhart, 1996).

In an effort to develop a more flexible measure of complementarities between HR System and Effectiveness and Alignment, our second analytical approach involved a cluster analysis on the variables used to construct both indices. While there is an emerging theoretical and empirical consensus on the nature of a high performance HR system, our theoretical understanding of the other elements of an organization's policies that might provide a synergy with the HR system is much less well developed. The advantage of a cluster analysis is that it does not impose an *a priori* structure on the potential nature of this synergy, while the results in principle will provide separate and distinct combinations of the two dimensions of HR strategy. While the reservations about cluster analysis typically focus the absence of systematic tests for the presence of distinct clusters, our view is that the "significance" of these clusters is ultimately a question of their effects on firm performance.

The cluster analysis identified four clusters of firms with remarkably different HR strategies. The Weak HR cluster was well below average on both strategy dimensions. These appear to be firms that neither used HR as a source of competitive advantage or even had a professionally developed HR function. At the other extreme was what we termed the High Performance cluster because it was well above average on both strategic dimensions, though compared to the other clusters it was relatively highest on Effectiveness and Alignment. In between there were two mixed clusters: Compensation and Alignment. The Compensation Cluster was below average on Effectiveness and Alignment, but what distinguished it from the other clusters was the intensives) as the centerpiece of its HR strategy. Finally, the Alignment cluster seems to characterize firms that don't "walk the talk". The respondents described themselves as above average on Effectiveness and Alignment variables, but at the same time have an HR system that is as underdeveloped as the Weak HR cluster.

The cluster results suggest that, in practice, firms in our sample have taken two routes to a high performance HR strategy. One, the High Performance cluster, is consistent with our theoretical expectation that both the HR System and Effectiveness and Alignment matter. The above average levels of both strategic dimensions in this cluster is consistent with complementarities that are both difficult to implement and imitate. The presence of complementarities is further supported by the effect of this cluster exceeding the summed effects of the two strategic dimensions. The second strategy, the Compensation cluster, was about 75 percent as effective, though the point estimates were statistically indistinguishable. While this result is consistent with prior work linking appropriate designed compensation policies to firm performance (Gerhart & Milkovich, 1992), such strategies would seem to be easier to imitate than a comprehensive change in the HR system and associated organizational policies described by the Effectiveness and Alignment index. The "compensation" model as a plausible substitute for a comprehensive high performance HR strategy would be a useful focus for future research.

## **Conclusion**

In recent years there has been an emerging emphasis on the strategic role of HR and its

subsequent impact on firm performance. Much of this research has focused on HR practices and policies, and more broadly on the HRM system. Aside from efforts to identify an HR-strategy contingency, there has been much less attention given to those other elements of the organizational context that might complement the HR management system. We believe identifying the range of these complementarities is an important gap in the theoretical and empirical literature. There is an emerging consensus that a high performance HR *system* will have an economically positive and significant effect on firm performance. The results of this study supports that view. However, is equally important that we begin to focus on the importance of implementation effectiveness, top management support and consensus on the strategic role of HR, and indeed the acceptance by the HR function of such a role. This study is an initial effort to measure this diverse set of potential complementarities directly and estimate their effects on the performance of the firm.

## Endnotes

1. Some of the most compelling evidence for complementarities is the familiar case study of Lincoln Electric cited in Milgrom and Roberts (1995)

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

3. For example if,

$$\ln(\text{Market value}/\text{Book Value})=f(X), \quad (\text{a})$$

where X is a vector of independent variables, the dependent variable can be rewritten as

$$\ln(\text{Market value})-\ln(\text{Book Value}), \text{ so (a) is now,}$$

$$\ln(\text{Market value}) =f(X) + f \ln(\text{Book Value}). \quad (\text{b})$$

Now  $\ln(\text{Book Value})$  is simply a control variable in equation b. We have also calculated comparable estimates based on the ratio form of the dependent variable (available from the authors) and show that the results are not materially different in those models.

4. Prospective (t+1 year) measures of firm performance, which are equivalent to the values at time t plus a one year change, would still largely reflect the effects on the time t measure unless the effects of any system changes were immediate.

5. The exception is  $\ln \text{PlantEQ}$  which is a logged value. The coefficient on this term is an elasticity.

6. Throughout this paper we follow Cohen (1994), Schmidt (1996) and Becker and Gerhart (1996) and emphasize the point estimates of effect sizes, rather than statistical significance, as the useful measure of impact or importance. This is a literature with dependent variables that have meaningful natural metrics so that unstandardized regression coefficients can provide effect estimates in dollars.

7. The sample average market value per worker is \$300,000.

8. As Becker and Gerhart (1996) point out, what is commonly called the main effect in a regression model reflects all the contingencies in the sample and is simply the weighted average of all potential interactions that have been omitted from the model. When those interaction terms are included we can identify the "main effect" for high values of a contingent factor and low values, for example. It is a mistake to interpret the additive term as the "universal" effect and the interaction terms as the contingent effects. The additive term is simply the main effect when the contingent term is at zero.

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**Table 1**  
**Questionnaire Items and Scale Construction**

**HR System (alpha = .71)**

For the **five** positions that your firm (or business unit) hires **most frequently**, how many **qualified applicants** do you have **per position** (on average)?

What proportion of all **new hires** have been selected based **primarily** on the results of a **validated selection test**?

What proportion of **nonentry level jobs** have been **filled from within** in **recent (i.e., over the last five) years**?

What proportion of the workforce is **promoted based primarily on merit** (as opposed to seniority)?

What proportion of the workforce is included in a **formal written human resource or staffing plan** that **includes recruitment & succession**?

How many **hours of training** are typically received by a **new employee** in the **first year** of employment?

How many **hours of training per year** are typically received by an **experienced employee** (i.e., someone employed **more than one year**)?

What proportion of the workforce is **qualified or capable** (either through training or job rotation) to **perform more than one job**?

What proportion of the workforce **regularly receives** a **formal performance appraisal**?

What proportion of the workforce has their **merit increase or incentive pay determined by a performance appraisal**?

What proportion of the workforce holds jobs where an employee's performance appraisal is **primarily** determined by an **objective measure of individual performance** (e.g., sales, number of claims processed, etc.)

If the market rate for **total cash compensation** is considered to be the 50th percentile, what is your firm's **target percentile** for **total cash compensation**?

What proportion of the average employee's **total compensation** is accounted for by **CASH + DEFERRED BONUSES**.

What proportion of the workforce is **eligible** for **annual cash incentive plans, profit-sharing plans, and/or gain-sharing plans**?

What proportion of the workforce is **eligible** for **annual deferred incentive plans, profit-sharing plans, and/or gain-sharing plans**?

If your firm's **actual financial performance** was **50% below** its **target level**, by what proportion would the **target incentive** be **decreased**?

If your firm's **actual financial performance** was **50% above** its **target level**, by what proportion would the **target incentive** be **increased**?

What **percentage merit increase** could a **high performing employee** normally expect as a **result of a performance review**? PLUS What **percentage merit increase** could a **low performing employee** normally expect as a **result of a performance review**?

What proportion of the workforce **owns shares of the company's stock**?

What proportion of the workforce is included in a formal **information sharing program** (e.g., a **newsletter or regular meetings**) that **provides information on a wide variety of topics relevant to the business and its operations**?

What proportion of the workforce is regularly administered **attitude surveys**?

What proportion of the workforce holds jobs that have been subjected to a formal **job analysis**?

What proportion of the workforce **participate in Quality of Work Life (QWL), Quality Circles (QC), and/or labor-management participation programs**?

What proportion of the workforce has access to a formal **grievance procedure and/or complaint resolution system**?

**Table 1 (Con't)**  
**Questionnaire Items and Scale Construction**

**Effectiveness & Alignment (alpha = .90)**

To what extent does your firm **effectively hire qualified employees**?

To what extent does your firm **structure jobs and work** in a way that **enhances business performance**?

To what extent does your firm provide **employee training** that **effectively enhances business performance**?

To what extent does your firm's **performance management and appraisal system effectively reward employee behaviors that are consistent with the firm's competitive strategy**?

To what extent does your firm **effectively distribute rewards based on individual and team contributions**?

To what extent does management **effectively address chronically poor performing employees**?

To what extent does your firm **effectively communicate important organizational information to employees**?

To what extent does your firm **effectively elicit and act on suggestions and feedback provided by employees** (e.g., through employee surveys and suggestion systems)?

To what extent does your firm **effectively address workforce diversity issues** related to gender, race, age, physical challenge, etc., as an **integral part of its HR strategy**?

To what extent are HR managers throughout the firm viewed by those outside the function as partners in the management of the business and agents for change?

To what extent does your firm make an **explicit effort** to **align business and HR strategies**?

To what extent is the **HR department** involved in your firm's **strategic planning process**?

To what extent is HR (i.e., the people side of the business) seen **primarily** by **senior management** as a **cost to be minimized** versus a **source of value creation** throughout the organization?

**How well or poorly** does the following statement **describe the executive leadership** in your firm? **They are vision setters:** studying emerging trends, and concentrating on the formulation and communication of basileadership in your firm? **They are sources of motivation and energy for the rest of the organization:** challenging people with new goals, emphasizing company values, and getting people to be enthusiastic.

To what extent does your firm have a **clear strategic mission** that is **well communicated and understood at every level throughout the firm**?

**Other Management**

**Excluding the HR function**, how would you generally rate the **other functional areas** within your firm (e.g., finance, marketing, production, etc.) relative to those same functions in your **direct competitors**?

**Table 2**  
**Standardized Question Means by Cluster**

<b>Question</b>	<b>Cluster 1: Weak HRM (N = 176)</b>	<b>Cluster 2: Comp. (N = 123)</b>	<b>Cluster 3: Alignment (N = 132)</b>	<b>Cluster 4: High Perf. (N = 266)</b>
<b>HR System</b>				
Selection ratio	.04	-.08	.37	-.17
Selection testing	-.14	.03	.05	.04
Internal Promotion	-.19	.05	-.37	.28
Merit-based promotions	-.22	.25	-.29	.16
Formal HR plan	-.33	-.12	-.29	.42
Job rotation	-.20	-.16	-.34	.37
Training for new EEs	-.20	.08	-.82	.50
Training for old EEs	-.31	.11	-.85	.57
Total comp. Percentile	-.25	.46	-.23	.06
Cash + Deferred bonuses	-.30	.52	-.20	.06
Eligible for cash bonuses	-.46	.78	-.40	.13
Eligible for deferred bonuses	-.23	.39	-.29	.11
Comp. Decreased with F.P.	-.32	.94	-.60	.07
Comp. Increased with F.P.	-.34	.84	-.45	.06
Performance appraisals	-.34	.33	-.27	.20
Objective perf. Measures	-.38	.31	-.39	.30
Merit incr. By P.A.	-.31	.32	-.22	.17
High - Lo comp. Spread	-.10	.18	-.34	.18
% owning shares	-.23	.32	-.46	.23
Job analysis	-.40	.03	-.21	.36
QWL programs	-.29	-.04	-.29	.36
Grievance procedures	-.11	-.23	-.19	.28
Information sharing	-.53	.36	-.38	.36
Attitude surveys	-.32	-.06	-.39	.45
<b>Effectiveness &amp; Alignment</b>				
Effective hiring	-.53	.05	.06	.29
Effective job structure	-.78	-.11	.15	.50
Effective training	-.76	-.22	-.08	.64
Effective performance management	-.80	-.03	.00	.54
Effective compensation	-.84	.25	-.01	.46
Effective mgt. Of poor performance	-.57	-.22	.25	.36
Effective communication	-.92	.00	.10	.55
Effective suggestion management	-.75	-.29	.04	.61
Link diversity with strategy	-.62	-.30	.33	.38
HR managers are change agents	-.63	-.07	-.02	.45
Align business & HR strategies	-1.10	-.08	.15	.68
HR involved in strategic planning	-1.05	.08	.07	.62
HR seen as a cost to be minimized	-.88	-.01	.22	.47
Leadership - visionary	-.82	-.30	.32	.52
Leadership - motivate	-.87	-.26	.26	.56
Clear strategic mission	-.99	-.21	.21	.64
<b>Scale Means by Cluster</b>				
Mean HR System Index	-.29	.21	-.29	.24
Mean Effectiveness & Alignment Index	-.80	-.10	.10	.52

**Table 3**  
**Means, Standard Deviations, and Intercorrelations for all Variables <sup>a</sup>**

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Ln of market value	12.33	1.82														
2. Ln of book value	11.51	2.04	.69													
3. HR System	0.01	0.37	.25	.15												
4. Effectiveness & Align.	-0.01	0.62	.24	.15	.55											
5. Other Management	4.27	0.96	.30	.20	.29	.53										
6. Weak Cluster	0.25	0.43	-.26	-.18	-.50	-.74	-.39									
7. Comp. Cluster	0.19	0.39	.04	.01	.26	-.07	-.09	-.28								
8. Alignment Cluster	0.18	0.38	-.01	-.01	-.36	.07	.10	-.27	-.22							
9. High Perf. Cluster	0.39	0.49	.21	.16	.52	.66	.35	-.46	-.38	-.37						
10. Cost leadership	30.00	25.90	.10	.25	-.08	-.08	-.06	.08	-.06	.01	-.02					
11. Total Employment	5,506.2	27479	.35	.32	.05	.08	.09	-.06	-.03	.08	.02	.07				
12. Union Coverage	9.60	19.37	.14	.32	-.11	-.07	-.10	.06	-.07	.04	-.03	.22	.13			
13. R&D/Sales	0.13	1.44	-.05	-.13	.00	-.01	-.07	.01	-.03	-.01	.03	-.09	-.02	-.04		
14. Firm-specific risk (beta)	1.07	0.21	-.04	-.07	.07	-.02	-.02	.05	.06	-.06	-.05	-.11	-.01	-.13	.00	
15. Growth in sales	0.51	0.79	.18	.04	.08	.05	.13	-.07	.04	-.07	.08	-.10	.01	-.16	-.07	.14

<sup>a</sup> n = 547. All correlations  $\geq .05$  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-tail test).

Table 4  
OLS Regression Analysis for the log of Market Value

	1	2	3	4	5	6	7	8
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Constant	5.54 6***	5.54 6***	5.52 0***	5.56 0***	5.55 5***	4.78 0***	5.07 8***	4.43 0***
In of book value	(0.46 9)	(0.46 9)	(0.46 7)	(0.47 0)	(0.46 9)	(0.52 2)	(0.46 7)	(0.50 0)
HR System	0.59 8***	0.60 2***	0.59 4***	0.59 3***	0.59 8***	0.58 3***	0.58 9***	0.57 9***
Effectiveness & Alignment	(0.03 4)	(0.03 4)	(0.03 4)	(0.03 3)	(0.03 5)	(0.03 4)	(0.03 4)	(0.03 4)
HR System X Effectiveness & Alignment	0.59 4***		0.36 6*	0.37 4*	0.30 0	0.38 2*	(0.17 5)	
Cost Leadership Strategy	(0.15 3)	0.37 2***	(0.17 7)	(0.17 7)	0.24 5†	0.09 4	(0.11 7)	
HR System X Cost Leadership		(0.08 9)	0.26 1**	0.25 0**	(0.16 3)			
Effectiveness & Alignment X Cost Leadership			(0.10 4)	(0.10 6)				
Other Management				- 0.12 8	- 0.00 2			
Compensation Cluster				(0.20 9)	(0.00 2)			
Alignment Cluster					0.00 2			0.21 4***
High Perf. Cluster					(0.00 6)	0.43 5***	(0.16 7)	(0.06 3)
Total Employment					0.20 4***	(0.06 6)	0.34 7*	(0.16 7)
Union Coverage					0.00 1	(0.00 3)	0.31 9*	0.14 0
R&D/Sales							(0.16 8)	(0.17 4)
Firm-Specific Risk (Beta)		0.00 1***					0.63 3***	0.41 6***
Growth in Sales	0.00 1***	(0.00 1)	0.00 1***		0.00 1***	0.00 1***	(0.14 7)	(0.16 0)
	(0.00 1)		(0.00 1)		(0.00 1)	(0.00 1)	(0.00 1)	0.00 1***
	- 0.00 2	0.00 3	(0.00 1)	0.00 1***	- 0.00	- 0.00	- 0.00	(0.00 1)
	(0.00 3)	(0.00 3)	- 0.00	(0.00 1)	1*** (0.00 1)	0.00 1	0.00 2	- 0.00
		0.04 5	0.04 2	- 0.00	(0.00 1)	(0.00 3)	(0.00 4)	0.00 2
	0.04 5	(0.03 7)	(0.00 3)	0.00 2	- 0.00	- 0.05	0.04 0	(0.00 3)
	(0.03 7)			(0.00 3)	0.00 2	0.05 1†	0.04 0	0.04 7
		0.04 5	0.04 5	0.04 6	(0.00 3)	(0.03 7)	(0.03 7)	0.04 7
	- 0.18 1	0.04 5	(0.03 6)	0.04 6	0.04 2	- 0.10	0.00 9	(0.03 7)
	(0.27 9)	(0.27 8)		(0.03 7)	(0.03 7)	0.06 6	0.00 9	- 0.00
			0.11 1	- 0.11	- 0.11	(0.27 7)	(0.28 1)	0.00 5
		0.31 4***	(0.28 0)	- 0.11	- 0.12	(0.27 7)	(0.28 1)	(0.27 9)
	0.31 5***	(0.07 2)		0.08 8	0.12 2	0.28 6***	0.29 8***	
	(0.07 2)		0.31 0***	(0.28 0)	(0.28 1)	(0.07 2)	(0.07 3)	0.27 5***
			(0.07 2)	0.31 0***	(0.07 3)			(0.07 2)
				(0.07 3)	0.30 5***	(0.07 3)		

Sample size	548	548	548	548	548	548	548	548
R <sup>2</sup>	0.588	0.590	0.593	0.593	0.594	0.601	0.590	0.599
F	17.61***	17.72***	17.52***	17.10***	16.30***	17.62***	16.79***	17.02***

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