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PAY DISPERSION AND WORKFORCE PERFORMANCE: MODERATING EFFECTS OF INCENTIVES AND INTERDEPENDENCE

JASON D. SHAW,[1]* NINA GUPTA[2] and JOHN E. DELERY[2]
[1] *Gatton College of Business and Economics, University of Kentucky, Lexington, Kentucky, U.S.A.*
[2] *Sam M. Walton College of Business Administration, University of Arkansas, Fayetteville, Arkansas, U.S.A.*

The compensation literature is replete with arguments, but lacking in empirical tests, regarding the effects of pay dispersion on organizational outcomes. Pay dispersion may increase effort and provide incentives for high workforce performance levels, but may also inhibit cooperation and goal orientation among employees. Drawing on several theoretical perspectives (individual motivation, institutional theory, organizational justice, and neoclassical economics), this study predicts that pay dispersion will be associated with higher levels of workforce performance when accompanied by formal individual incentive systems and independent work, while pay compression is desirable in the absence of individual incentive systems and when work is interdependent. Survey research studies in two industrial sectors (the motor carrier and concrete pipe industries) were conducted to address these issues. Interactive regression results were generally supportive of the predictions across several measures of workforce performance (accident rates, safety violations, and productivity). Implications of these studies for strategy implementation in terms of compensation theory and practice are addressed.

Effective strategy implementation demands a synergistic amalgam of organizational processes and systems; i.e., congruence is necessary to ensure that organizational elements work together to promote strategic goals. Most theories extol the virtues of congruence; few empiricists explore the issue systematically. An organization's compensation system is arguably the most significant human resource management system for effective strategy implementation (Montemayor, 1996), particularly in view of the enormous costs that a compensation system entails. Compensation researchers and practitioners alike posit that pay structures, particularly pay dispersion vs. compression, have critical implications for strategy implementation and organizational performance (e.g., see Lawler, 1981). But is pay more strategically valuable or more effective when it is widely dispersed or compressed? This question spurs theoretical disagreement (Bloom, 1999; Pfeffer and Langton, 1993), providing little resolution to the conditions under which widely dispersed or tightly compressed compensation systems result in superior strategy implementation. This study is designed to begin answering the question theoretically and empirically.

Specifically, this research addresses several notable omissions in the pay dispersion/strategy implementation literature. One, we view pay dispersion as effective, not across the board, but under certain organizational contingencies. Thus, we define theoretically the conditions under which effective strategy implementation is advanced or impeded by wage dispersion. Two, we address pay dispersion at the *organizational* level, in contrast to the individual focus of much prior research (Becker and Huselid, 1992; Ehrenberg

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*Correspondence to: Jason D. Shaw, Gatton College of Business and Economics, University of Kentucky, Lexington, KY, 40506-0034, U.S.A.

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and Bognanno, 1990; Pfeffer and Langton, 1993; but see Bloom, 1999, and Cowherd and Levine, 1992, for exceptions). Three, we address the issue of *horizontal* wage dispersion, i.e., dispersion of pay within the same organizational echelon or core group of employees, whereas prior research primarily concerned *vertical* pay dispersion, i.e., the spread of pay across organizational echelons (Cowherd and Levine, 1992). Based on social identity and equity considerations (Baron and Pfeffer, 1994; Bloom, 1999; Lazear, 1989; Oldham *et al.*, 1982), it is reasonable to infer that intraclass dispersion evokes stronger employee reactions than interclass dispersion. Four, we examine the impact of wage dispersion on intermediate organizational outcomes. Improved financial performance is, of course, the ultimate strategic goal of most organizations, but intermediate outcomes are more proximal indicators of strategic success. The logical theoretical progression moves from strategic compensation decisions through employee performance behaviors (Lawler and Jenkins, 1992) to financial performance. In other words, employee performance is the intermediate outcome or the path through which compensation strategies affect organizational performance. Thus, this study examines the relationship between pay dispersion and intermediate workforce performance, focusing on pay dispersion within a core employee group, and outlining specific contingencies that determine whether pay dispersion is beneficial. These dynamics are explored in two different industrial settings to enhance generalizability.

BACKGROUND AND THEORY

Despite implicit universality—pay dispersion is either good or bad—the literature reveals at least two tacit moderators or conditions for pay dispersion to be an effective element of strategy implementation. When pay dispersion results from the use of individual financial incentive systems, and when it is used in the context of independent work, it is more likely to be an effective implementation tool than otherwise. These contingency dynamics are outlined below.

Positive effects of dispersion: the role of individual incentives

Bishop (1987) outlined three primary benefits of dispersed pay structures: they provide incentives for higher employee effort, they attract a higher caliber of workforce (Freeman, 1977), and they reduce attrition of good performers for better jobs elsewhere. These arguments assume that dispersion occurs for legitimate reasons, and that highly valued human capital receives higher pay than less valued human capital. But when pay dispersion occurs for illegitimate reasons, it is unlikely to yield these benefits. Dispersion due to dysfunctional procedures, a lack of formal procedures, game-playing, or politics is unlikely to be effective (Gupta and Jenkins, 1996). That is, the presumed benefits of pay dispersion are attributable, not to highly dispersed pay *per se*, but to normatively accepted dispersion-creating practices. Indeed, internal labor market (e.g., Lazear, 1989) and similar theories of pay dispersion assume that higher-performing individuals receive higher pay, an assumption that is valid only when procedures are in place to ensure this outcome. It is not surprising that organizations that are unable to defend outcomes with 'acceptable legitimized accounts of their activities ... are more vulnerable to claims that they are negligent, irrational, or unnecessary' (Meyer and Rowan, 1991: 50). These arguments are consistent with Suchman's (1995) descriptions of moral legitimacy, or the normative evaluation of an organization's activities. Suchman outlined how outcomes of decisions are perceived as legitimate when organizations embrace 'socially accepted techniques and procedures' to demonstrate that they are 'making a good-faith effort to achieve valued ... ends' (Suchman, 1995 : 580). In essence, the motivating aspects of pay dispersion will be realized only when accompanied by legitimate or normatively accepted factors.

More than 90 percent of U.S. organizations use some kind of individual incentives; this speaks to the normative or societal acceptance of such systems (Heneman, 1992; Lawler and Jenkins, 1992). Paying for individual performance 'is so widely accepted that almost every organization says it pays for performance' (Lawler and Jenkins, 1992: 1026). In view of the popularity of these systems, it is likely that pay dispersion is perceived positively, and behavioral reactions to pay dispersion are more favorable, when individual incentives are used. Several theoretical perspectives (e.g., expectancy, goal-setting, operant conditioning, and justice theories at the individual level and institutional theory at the organizational level) support the argument that pay dispersion enhances workforce performance when formal individual incentive systems are used. The use of financial incentives is consistently related to individual performance levels (Jenkins *et al.*, 1998). But individual incentives are not necessarily effective without corresponding *perceptible* pay differentials among employees. Individual-level research (e.g., Mitra, Gupta, and Jenkins, 1997; Rambo and Pinto, 1989) validates arguments that meaningful pay differentiations, i.e., highly dispersed pay levels, are necessary for individuals to be motivated 'to obtain the prize of high pay' (Bloom, 1999: 28). An impressive array of individual-level tournament compensation research shows that performance improves as the spread of pay increases (Ehrenberg and Bognanno, 1990). Beyond employee performance, Becker and Huselid (1992) reported that driver safety in automobile racing also improved as the spread of pay increased.

Organizational justice arguments (Sheppard, Lewicki, and Minton, 1992) also support the benefits of pay dispersion resulting from the use of individual incentives. Linking individual incentives and pay dispersion to organizationally desired outcomes involves a consideration of the appearance of justice (or pseudo-justice; Sheppard *et al.*, 1992). It also provides a strong link to behavioral reactions resulting from justice (improved workforce performance) and injustice (effort reduction, retaliation, skepticism, and sabotage) (e.g., Bishop, 1987; Skarlicki and Folger, 1997). Organizations continually manage impressions of the systems or procedures used to make decisions, in particular, decisions about allocation of outcomes among organizational members. In doing so, organizations must establish the first critical component of perceived fairness: consistency (Leventhal, Karuza, and Fry, 1980). Formal procedures, such as individual incentive systems, reduce the suspicion that justice rules have been violated and the probability of unexpected results (Gergen, Greenberg, and Willis, 1980), and hence the perceived likelihood that favoritism, nepotism, and other political factors can account for the dispersion in pay among individuals (Gupta and Jenkins, 1996). Moreover, reliance on incentives conveys a greater sense of perceived control over the outcome, i.e., the dispersion of pay. Such perceptions of control are an essential component of organizational justice (Folger and Greenberg, 1985).

To summarize, a variety of theoretical perspectives supports the argument that pay dispersion is motivation enhancing and results in higher levels of workforce performance, but these benefits are concomitant with the use of individual incentives. Pay dispersion in the absence of individual incentives is likely to weaken performance–reward linkages and valences (individual motivation theories), diminish the perceived legitimacy of the system (institutional theory), and violate rules of consistency and control (organizational justice theory). By contrast, dispersed pay combined with individual incentives is likely to enhance workforce performance including productivity (e.g., Freeman and Kleiner, 1998; Lind and Tyler, 1988) and safety (e.g., Becker and Huselid, 1992). Thus, the following formal hypothesis is proposed:

> *Hypothesis 1: The interaction of pay dispersion and individual incentives will be significantly related to dimensions of workforce performance. The form of the predicted interaction is such that the relationship between pay dispersion and performance will be positive when individual incentives are high and negative when individual incentives are low.*

Negative effects of dispersion: the role of work interdependence

The idea that a low level of pay dispersion—pay compression—is a desirable organizational outcome gained popularity in recent years. In a list of 'best' HR practices, Pfeffer (1995) included pay compression as something for which organizations should strive. But a contingency factor is again couched in this seemingly universal argument. Pfeffer (1995) notes that pay compression is effective in enhancing organizational performance by reducing interpersonal competition and enhancing cooperation, but only when work is interdependent. These arguments can be traced to earlier suggestions (e.g., Hicks, 1963) that the distribution of pay must be set against its impact on the social fabric of organizations. More recent sociological (e.g., Deutsch, 1985) and economic (e.g., Levine, 1991) works extend this line of reasoning. Deutsch (1985) argued that pay dispersion diminishes performance when work is interdependent by reducing cooperation among employees. He later noted that any movement toward compression in interdependent situations increases efficiency (Deutsch, 1988; cited in Levine, 1991). The difficulties 'created by a given degree of earnings dispersion in a work group increase with the degree of contact that occurs between the group's members' (Frank, 1984: 564). Levine (1991) also noted that in participative organizations compression fosters cohesiveness, promotes an atmosphere of trust and confidence, and increases the likelihood that group norms will be followed.

Thus, work interdependence is the implicit key to the effectiveness of pay compression. These theoretical propositions found empirical support in Bloom (1999). The author reported a negative relationship between pay dispersion and performance among a sample of professional baseball teams, a context where work interdependence is presumably high and fairly constant across organizations. This relationship was evident in terms of *behavioral* performance (e.g., on-field performance such as winning percentage and finishing position), similar in nature to the intermediate workforce performance outcomes at issue here.

In short, sociological and economic theories suggest that pay compression enhances cohesiveness, fosters cooperation, and coincides with higher levels of workforce performance when work interdependencies are high, and some empirical research supports this. Interestingly, this theoretical derivation provides no foundation for the positive effects of dispersion, but rather suggests that the negative effects of dispersion will be more pronounced when work interdependence is high. The following interactive hypothesis is therefore proposed:

> *Hypothesis 2: The interaction of pay dispersion and work interdependence will be significantly related to dimensions of workforce performance. The form of the predicted interaction is such that the relationship between pay dispersion and performance will be more strongly negative when work interdependence is high.*

Theoretical integration

The arguments outlined above suggest a more complex interactive picture than that painted by absolute approaches to pay dispersion and performance. Drawing from individual motivation and justice theories, we predicted that individual incentives would enhance the efficacy of pay dispersion in terms of performance. Drawing from sociological and economic efficiency perspectives, we predicted that the negative effects of pay dispersion would be more pronounced when work interdependence was high. These seemingly divergent perspectives can be integrated to develop a more balanced picture of the relationship between pay dispersion and performance. That is, the perspectives *in toto* provide the theoretical context for predicting a three-way interaction among pay dispersion, individual incentives, and work interdependence.

When employees do not have to rely on one another to accomplish work, individual incentives provide the motivational impetus for increasing effort and reaching higher levels in the pay distribution. Independent work also reduces the need for employees to engage in dysfunctional competition with their colleagues (Gupta and Jenkins, 1996; Lazear, 1989; 1995) to receive higher pay. When work interdependence is low, pay dispersion should be associated with better workforce performance among firms using individual incentives; i.e., the individual motivation and justice arguments (Hypothesis 1) should prevail under these conditions. Individual incentives provide the impetus for higher individual performance (and higher pay); increases in individual effort contribute independently to overall workforce performance and do not detract from the performance of others.

By contrast, when work interdependence is high, a prevailing negative relationship between pay dispersion and performance should be evident (Hypothesis 2), but the negative relationship should be stronger among firms also using individual incentives. The potential benefits of pay compression, i.e., higher workforce performance levels through cooperation and cohesiveness, are less likely among firms also using individual incentives, since the simultaneous use of individual incentives and interdependent work sends a mixed message to employees. Bloom (although there was no direct test of this argument) notes that in such situations individuals 'will concentrate only on their own performance—to the exclusion of organizational goals—since their own performance is what matters for moving up in the pay distribution' (Bloom, 1999: 28). Thus, integrating the perspectives allows for a resolution of the theoretical dilemma. When work interdependence is low, the relationship between pay dispersion and performance should be positive when individual incentives are used. When work interdependence is high, the use of individual incentives should exacerbate the negative relationship between pay dispersion and performance. Thus, the following hypothesis is proposed:

Hypothesis 3: A three-way interaction among pay dispersion, individual incentives, and work interdependence will be significantly related to dimensions of workforce performance. When work interdependence is low, the relationship between pay dispersion and performance will be strongly positive when individual incentives are high. When work interdependence is high, the relationship between pay dispersion and performance will be more strongly negative when individual incentives are high.

STUDY 1 METHOD

Context

Study 1 was conducted in the trucking industry. Motor carrier organizations provide a relevant, but interestingly constrained, context in which to study pay dispersion. The key employees in trucking organizations are, obviously, the truck drivers themselves. Drivers, on average, comprised about 73 percent of total employees in the organizations in our sample and therefore compensation manipulations for drivers have significant strategic implications (Bloom, 1999). Driver or workforce performance (i.e., intermediate outcomes) is of critical concern in the industry but, by definition, the primary tasks that drivers engage in are almost completely *independent* in nature. Thus, this industry provides a unique opportunity to examine Hypothesis 1 in a setting isolated from the influence of interdependent work. By contrast, Bloom (1999) conducted his ambitious study in a setting (professional baseball) where high work *interdependence* was an assumed constant. The Study 1 setting constrains interdependence in the converse fashion, thereby enabling a direct test of Hypothesis 1.

Sample

The population for this study consisted of 3104 trucking organizations that reported information to the Interstate Commerce Commission (ICC) and were included in the 1993–94 *TTS Blue Book of Trucking Companies* (*Blue Book*). Since motor carrier companies are generally small, it was imperative that the sampled organizations have a sufficient number of employees to have established formal policies for drivers and other employees. Thus, included companies were required to have at least 30 total employees in either the 1991, 1992, or 1993 *Blue Book* data, be listed in the most recent version (1993 calendar year), use company drivers (rather than 'owner-operators' exclusively), and still be in business when contacted. The 1072 companies that met all relevant criteria constituted the final sample for the study. A 24-page questionnaire was mailed to the highest human resource manager in each company, and completed responses were returned by 379, yielding a 36% (379/1072) response rate. All compensation measures in the questionnaire refer to *driver* compensation practices. Because of missing data, the analysis sample sizes varied and are reported in the tables.

Data sources

Three data sources were used: the key informant questionnaire noted above and two archival sources. The first archival source was the *Blue Book*. The *Blue Book* database is publicly available and reports organizational and financial information that motor carriers file with the federal government. The second archival source was the *SAFER* database. *SAFER* reports 2-year running totals of accident, inspection violations, and other information that motor carriers file with the Federal Highway Administration—Office of Motor Carriers (FHWA). Safety information on motor carriers is publicly available from the FHWA. *Blue Book* information was obtained for the 1994 (the year corresponding to the questionnaire administration) and 1995 (the year following) calendar years, and *SAFER* information was obtained to correspond precisely to this 2-year time frame (i.e., for 1994–95).

Measures: independent variables

Data for all independent variables were obtained from the questionnaire.

Pay dispersion

Respondents reported how much (a) a new driver earned per year and (b) a senior driver earned per year. The difference between the two numbers forms the measure.

Individual incentives

A list of four types of individual incentives, common in the trucking industry and derived through pilot testing and discussions with industry officials, was used for this measure. Respondents reported the extent to which these incentive systems (individual incentives tied to individual performance, on-the-spot bonuses for exceptional performance, lump-sum bonuses, and merit pay systems) were used. Responses were obtained on a scale from 1 (Not at all) to 5 (To a very great extent). The mean of the items forms the measure.

Measures: dependent variables

All three data sources—the questionnaire, the *Blue Book* and *SAFER*—were used to obtain information on the dependent variables.

Accident frequency ratio

This is the traditional bellwether safety measure in the industry. It was operationalized as the number of accidents per million miles driven. The measure was calculated using information from the *Blue Book* and *SAFER*. Total highway miles driven were reported in the *Blue Book* for 1994 and 1995 and were summed. Total accidents for 1994 and 1995 (combined) were reported in *SAFER*. Total accidents for these years, divided by total highway miles for these years, and multiplied by 1,000,000 yields the measure.

Out of service percentage

This measure was obtained from *SAFER*. Motor carriers are subject to various random and regular inspections by federal agencies (e.g., U.S. Department of Transportation) and state transportation authorities. Violators of federal or state regulations pertaining to equipment or drivers (e.g., log book violations) are often removed from service until the problem is corrected. Our measure is specific to driver performance, i.e., the frequency of violations attributable to *driver* mistakes, and does not include factors beyond the driver's control (e.g., dilapidated equipment). It was operationalized as the number of trucks/drivers taken out of service due to driver fault, divided by the total number of inspections, and multiplied by 100.

Perceptual performance

This variable was operationalized as the extent to which driver performance in the focal company compared to the performance of other drivers in the industry. Performance was compared on 14 dimensions in the questionnaire. These dimensions concerned controllable aspects of driver performance: on-time deliveries, on-time pickups, consistent transit times, drivers' friendliness to customers, drivers' helpfulness to customers, drivers' willingness to accommodate special customer needs, adherence to special shipping instructions, customer complaints concerning drivers, loss/damage history, 'logging compliance,' driver accident rates, fuel consumption, speed limit compliance, and traffic safety rules compliance. Responses were obtained using 7-point response options ranging from 'Ours are much worse' (1) to 'Ours are much better' (7). The mean of the items forms the measure.

This perceptual measure of the aggregate performance of the driver workforce was derived through extensive pilot testing and intensive discussions with high-ranking industry executives. Items were selected if drivers themselves, not factors beyond the drivers' control, were primarily responsible for performance variations. The measure is benchmarked against the performance of other drivers in the industry, strengthening its validity (Delaney and Huselid, 1996). Such key informant performance reports are often positively (moderately to strongly) correlated with corresponding archival measures (e.g., Dollinger and Golden, 1992; Powell, 1992). It is particularly useful in the present study since it is not susceptible to contamination by factors beyond driver control (e.g., asset utilization, operating capacity, technology).

Measures: control variables

Interorganizational studies require control of factors that may affect independent or dependent variables. We controlled for several such variables based on the literature dealing with performance, compensation, and the transportation industry. Organizational characteristics—size (Terborg and Lee, 1984), age (Arthur, 1994), and unionization (Freeman and Medoff, 1984)—may influence pay dispersion, compensation practices, and performance. An industry-specific control was carrier type, since pay dispersion and other compensation practices may vary across industry segments (Perser, 1994).

Given the focus of the present study, several specific controls were also necessary. One is the average tenure of drivers. Human capital differences (e.g., training and experience; see Powell, Montgomery, and Cosgrove, 1994) could well influence pay dispersion creating a need to control for tenure differences across firms. Three compensation practices—pay level, benefits level, and pay system communication—were included as controls since they are related to performance and may influence perceptions of compensation decisions (e.g., Lawler, 1971). In addition, since our focus was assessing incentive pay dynamics, it was also necessary to control for pay differentials as a result of seniority (Lazear, 1981).

Of the organizational controls, *size* was operationalized as the log of total number of employees in the company, as reported by the respondent. Organizational *age* was operationalized as the log of 1994 minus the founding year. Information on founding year was obtained from the *Blue Book*. *Unionization* was measured as the percent of drivers covered under a collective bargaining agreement, as reported by the respondent. *Carrier type* was coded 1 for truckload firms and 0 for less-than-truckload (LTL) firms. *Tenure* was operationalized as the percent of drivers who had worked for the company for more than 24 months. Of the compensation controls, *pay level* was measured as the average annual pay for a typical driver in the company. *Benefits level* was operationalized as the mean percent of health insurance, disability, and life insurance premiums paid by the company. *Pay system communication* was measured as a mean of two items with 7-point agree/disagree response options. The items were 'Drivers know exactly what they need to do to get pay raises' and 'We make it clear to our drivers what they must do to get more pay.' *Seniority-based pay* was assessed with a single item with five response options concerning the extent to which differences in pay rates across drivers were the result of seniority.

Response bias check

It was possible to use archival data from the *Blue Book* and *SAFER* to compare responding and non-responding organizations. We chose a sample of organizational and operating characteristics from the *Blue Book* (number of drivers, total fringe benefits cost, total highway miles driven, total wages paid, average haul (in miles), total insurance costs, current assets, company age, tons per mile, and average load (in tons)) and the safety measures available in *SAFER* as comparison variables. Following Osterman (1994), we used logistic regression to test for differences, coding a dichotomous dependent variable '1' if a usable questionnaire was returned and '0' if not. No independent variable was significant in the equation. Since missing data reduced our analysis sample to 258, we also conducted a logistic regression comparing analysis cases (1) to all other cases (0) on the variables noted above. Again no independent variable was significant, indicating that response bias should not affect our results.

STUDY 1 RESULTS

Table 1 shows descriptive statistics and correlations for all variables. Coefficient α reliabilities are shown in the main diagonal of Table 1 where appropriate. As Table 1 shows, the use of individual incentives is moderately and significantly related to pay dispersion ($r = 0.23$, $p < 0.01$), providing a level of confidence that the individual incentives create some pay dispersion.

The results in Table 2 contain the tests of Hypothesis 1. The first block in the hierarchical regression consisted of control variables, the second block contained pay dispersion and individual incentives, and the last block contained the pay dispersion by individual incentives product term. The interaction term was significant in each equation, but support for Hypothesis 1 is evident with only a specific pattern of interaction. To investigate the pattern, the interactions were plotted for each of the three dependent variables using the standardized β's and values of plus one (+1) and minus one (−1) standard deviation. The resulting interaction patterns are shown in Figures 1–3.

Figure 1 depicts the interaction between pay dispersion and individual incentives in predicting accident frequency ratio. The figure is generally supportive of Hypothesis 1. When the use of individual incentives is low, there is a strong positive relationship between pay dispersion and accident frequency ratio (recall that a higher ratio indicates

Table 1. Study 1: correlations and descriptive statistics for all variables

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control variables																
1. Organizational Size	4.72	1.06	#													
2. Organizational Age	3.57	0.89	−0.09	#												
3. Unionization	21.81	39.64	−0.08	0.18**	#											
4. Carrier Type	0.85	0.35	−0.19**	−0.15*	−0.28**	#										
5. Tenure	60.24	24.99	−0.29**	0.15*	0.26**	−0.21**	#									
6. Pay Level	34882	5616	0.22	−0.01	0.16*	−0.14*	0.13*	#								
7. Benefits Level	68.88	26.07	0.01	0.05	0.30**	−0.12	0.18**	0.11	#							
8. Pay System Communication	4.77	1.42	0.09	−0.15*	−0.20**	0.11	−0.20**	0.05	−0.15*	(0.71)						
9. Seniority-based Pay	2.92	1.57	0.22**	−0.08	−0.09	−0.05	−0.28**	−0.01	−0.14*	0.26**	#					
Independent variables																
10. Pay Dispersion	10410	6646	0.13*	−0.03	0.05	0.08	−0.03	0.29**	0.07	0.21**	0.31**	#				
11. Individual Incentives	1.92	0.77	0.05	−0.09	−0.32**	0.19**	−0.15*	0.03	−0.15*	0.24**	0.22**	0.23**	(.73)			
Workforce performance variables																
12. Accident Frequency Ratio	0.95	0.74	0.05	−0.13*	−0.08	−0.03	−0.08	−0.07	0.03	0.01	0.00	0.09	−0.02	#		
13. Out of Service Percentage	5.08	4.32	−0.05	−0.11	−0.26**	0.29**	−0.19**	−0.09	−0.20**	0.05	0.09	0.01	0.07	0.09	#	
14. Perceptual Performance	5.22	0.70	−0.03	0.16*	0.03	−0.08	0.23**	0.20**	0.10	0.13*	−0.01	−0.02	0.07	−0.06	−0.27**	(0.90)

** $p < 0.01$; * $p < 0.05$. $N = 258$. Coefficient α reliability estimates are reported in the diagonal where appropriate.

Table 2. Study 1: hierarchical regression results of the relationship of individual incentives and pay dispersion of performance

Block	Accident frequency ratio	Out-of-service percentage	Perceptual performance
Control Variables	†	†	†
Independent variables			
Pay Dispersion	0.12	−0.02	−0.19**
Individual Incentives	−0.01	0.02	−0.01
Interaction			
Pay Dispersion × individual incentives	−0.15*	−0.15*	0.13*
Total R^2	0.084*	0.194**	0.238**
ΔR^2—interaction step	0.019*	0.017*	0.013*

† Regression coefficients for control variables omitted.
** $p < 0.01$; * $p < 0.05$. $N = 258$.
Final equation standardized regression coefficients are reported in the columns.

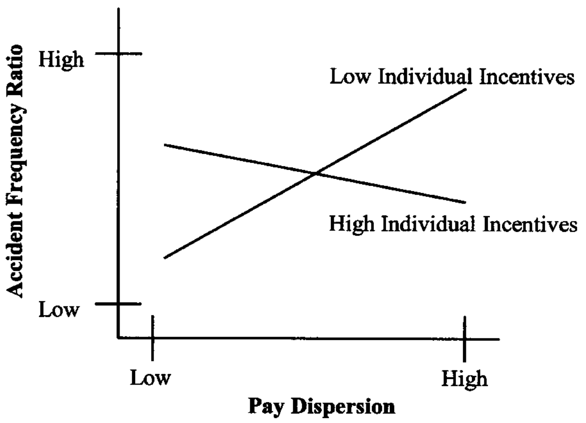

Figure 1. Study 1: interaction between pay dispersion and individual incentives in predicting accident frequency ratio

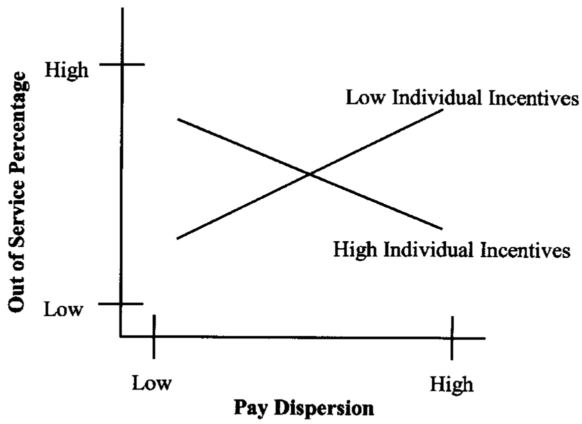

Figure 2. Study 1: interaction between pay dispersion and individual incentives in predicting out-of-service percentage

poorer performance). By contrast, the relationship is negative when the use of individual incentives is high. Notable in this context is that the poorer levels of workforce performance, i.e., the highest accident rates, are seen when pay is dispersed, but individual incentives are low, or when pay dispersion is low and individual incentives are strongly used. A similarly supportive pattern of findings is evident in Figure 2 for out-of-service percentage. In this case, there is an almost symmetric crossing pattern where poorer workforce performance occurs at the low incentives–high dispersion and high incentives–low dispersion plots points. Conversely, more favorable performance levels occur when pay dispersion is accompanied by individual incentives or when neither is present. Figure 3 shows the pattern of the interaction for perceptual performance. In this case, there is a prevailing negative relationship between pay dispersion and performance regardless of the use of individual incentives. Consistent with expectations, the relationship is more strongly negative when individual incentives use is low. Inconsistent with expectations, the relationship between pay dispersion and perceptual performance is slightly negative when the use of individual incentives is high. Taken together, the results show strong support for Hypothesis 1 for accident frequency ratio and out-of-service percentage and partial support with respect to perceptual performance.

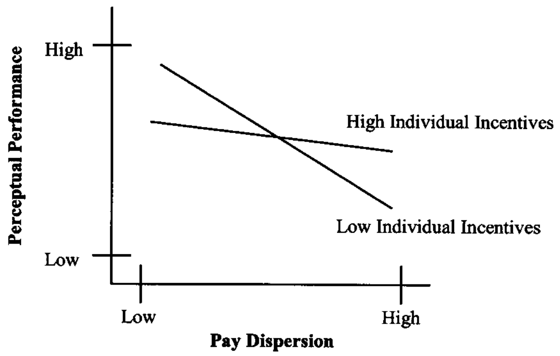

Figure 3. Study 1: interaction between pay dispersion and individual incentives predicting perceptual performance

STUDY 2 METHOD

Context, extensions, and methodological improvements

Study 2 was conducted in the concrete pipe industry among member organizations of the American Concrete Pipe Association (ACPA). The population for the study was the membership of the ACPA, currently about 65 organizations representing about 202 different concrete pipe plants across the United States and Canada. Production workers comprise the key employee group in this industry, accounting for roughly 70 percent of total employees in our sample.

This setting allowed for a more thorough investigation of the pay dispersion issue. In particular, plants varied on pay dispersion, individual incentives, and work interdependence, which made possible a test of all three hypotheses. In addition, two aspects of Study 1 in particular warranted methodological improvements that could be addressed in Study 2. First, the measure of pay dispersion in Study 1 was based on only two data points per organization; i.e., it did not provide information on the actual *distribution*, but rather the range, of pay. Three different measures of pay dispersion, two of which estimate the actual distribution of pay, could be gleaned from the Study 2 database. Also, Study 1 used perceived workforce performance as an outcome, but a common productivity metric (*labor hours per ton*; Arthur, 1994) was also available in the concrete pipe study.

Sample

After extensive prior contacts, plant managers of each of the 202 plants were mailed a 44-page survey dealing with general management, human resource management, production and operation, and effectiveness issues. The plant manager was instructed to complete the survey himself/herself or to have the most knowledgeable people in the plant complete relevant sections. Completed responses were obtained from 141 plant managers, representing a 71 percent response rate (141/202). The plant survey constitutes the sole data source in this study.

Measures: independent variables

Pay dispersion

Three alternative operationalizations of pay dispersion were available in this data set. The analyses were repeated using each of these three measures. Since it was practically impossible to obtain a complete pay distribution from each organization, plant managers reported instead the starting hourly rate, the hourly rate at the middle of the pay range, and the top hourly rate for production employees in the facility. Respondents also reported the amount of overtime that production employees typically worked per week. The pay rates (including estimated overtime pay) were annualized to create an estimated annual pay for each of the three categories (minimum, middle, and maximum). Respondents also reported the approximate number of production employees earning each of these three rates. On average, respondents reported the estimated pay of about 90 percent of their total production employees, building confidence that the derived estimates accurately reflect the pay distribution.

The first operationalization (*high minus low*) corresponds to the measure used in Study 1. It is simply defined as the highest pay level minus the lowest (or starting) pay level. The second is the *coefficient of variation* (Pfeffer and Langton, 1993), defined as the standard deviation divided by the mean. In a review of measures of dispersion, Allison (1978) reported that the coefficient of variation was generally preferable to the high minus low measure. The third measure was an estimated *gini coefficient*, the commonly used measure of income inequality in economics (Bloom, 1999; Donaldson and Weymark, 1980). The maximum gini coefficient is 1.0, indicating absolute inequality of pay; the minimum is zero, indicating complete pay compression. As noted, the precise distribution of pay was unknown and could only be estimated by the number of individuals reported to be making near the minimum, middle, and highest pay levels. As a consequence, the coefficient of variation and gini coefficient estimates are underestimated in this study.[1]

Individual incentives

Pilot tests and discussions with industry officials were again used to develop a list of individual incentive practices applicable to the sample. The mean of seven items—individual incentives tied to individual performance, on-the-spot incentives for exceptional performance, merit pay systems, lump-sum salary increases, cash incentives for quality improvement suggestions, individual pay increases based on individual quality performance or outcomes, and bonuses or lump-sum payments based on quality—was used. Responses were obtained on a 5-point scale ranging from 1 (Not at all) to 5 (To a very large extent).

Work interdependence

The production of concrete pipe must be accomplished sequentially: mixing, casting, and curing. Since sequential interdependence is therefore constant across the industry, a measure of work interdependence that captured interdependence levels beyond the production sequence was needed. To achieve this, we assessed the extent of use of self-managed teams. Key characteristics of self-managed work teams include groups of individuals that: (1) regulate behavior on interdependent tasks; (2) engage in face-to-face interaction; and (3) work on interrelated tasks to make a product or deliver a service (Cohen and Ledford, 1994). Thus, use of self-managing work teams captures incremental interdependence yielded through self-regulation and control over a changing work environment. The item assessed the percent of production employees currently involved in self-managing work teams. Response options were 1 (None), 2 (Almost none, 1–20%), 3 (Some, 21–40%), 4 (About half, 41–60%), 5 (Most, 61–80%), 6 (Almost all, 81–99%), and 7 (All, 100%).

[1] A fourth measure of pay dispersion, the ratio of the minimum pay to maximum pay, was also used by Bloom (1999). In the present study the correlation between the ratio measure and the *high minus low* measure was 0.96. The reported results were substantively identical using either measure. To conserve space, only the *high minus low* results are reported.

Measures: dependent variables

Labor hours per ton

This variable was operationalized as the number of labor hours worked by production employees in the focal year divided by the tons of concrete products produced in the same year. It was derived by multiplying the average number of full-time production employees in the plant by 2008 hours (the number of working hours in a typical year; also adjusted for average overtime hours reported by the respondent) and dividing by the tons of concrete products produced. With this operationalization, fewer labor hours per ton is indicative of high productivity. Labor hours per ton is a common productivity measure in heavy manufacturing, and although an independent or archival measure was not available, previous research demonstrates that key informant reports of labor hours per ton correspond well with archival measures (e.g., Arthur, 1994; Hogan, 1987). Since the key informant in this study was the plant manager, presumably with a vested interest in this information, the reports are likely to be accurate estimates.

Lost-time accidents

This variable was operationalized as the natural log of the number of lost-time accidents in the plant in the last 5 years.[2] As with labor hours per ton, fewer lost-time accidents indicates better workforce performance.

Perceptual performance

The perceptual performance measure was designed to parallel the measure used in Study 1, i.e., one which assessed controllable aspects of production employee performance in the industry. It

[2] The use of a 5-year time frame introduces inconsistency into the timing of the independent and dependent variables. The decision to include a longer time frame was the result of consultation with industry experts. The relatively small size of concrete pipe plants results in a few number of accidents per year. Because accidents are rare, a 1-year accident total is likely to yield a biased estimate of workforce performance. A 5-year period allows for the averaging out of a peculiar year and, according to knowledgeable industry insiders, provides a better indication of safety performance.

was developed after extensive pilot testing, several site visits, and extensive contacts with industry officials. The resulting 5-item scale assessed the percent of pipe meeting technical specifications, raw material waste, percent of pipe needing to be reworked, percent of production scrapped, and production efficiency. Responses were obtained using 7-point response options ranging from 'Ours are much worse' (1) to 'Ours are much better' (7). The mean of the items forms the measure. As with the Study 1 measure, responses were benchmarked against the industry.

Measures: control variables

As in Study 1, several organizational and industry controls were used. *Size* (natural log of total employees), *age* (natural log of years since founding date), and *unionization* (1 = unionized plant, 0 = no union) were included as organizational controls. An important consideration in the concrete pipe industry is corporate dependence, which can influence compensation policies and performance (Dean and Snell, 1991; Majchrzak, 1988). *Corporate dependence* was controlled by coding plants that were part of multiplant corporations 1 and free-standing plants 0. An average tenure variable was not available among these data. As a proxy, the total turnover rate was included. Including the turnover rate (as the converse of average tenure) should control for human capital and performance differentials. *Total turnover rate* was calculated as the number of production workers who quit or were fired divided by the total number of production workers. *Pay level* (average annualized pay for production workers), *benefits level* (mean percent of health insurance, disability, and life insurance premiums paid by the company), and the mean of a three-item *pay system communications* scale (e.g., 'We make it clear to our employees what they must do to get more pay') were also included. *Seniority-based pay* was assessed with a single item with five response options concerning the extent to which differences in pay rates across drivers were the result of seniority.

STUDY 2 RESULTS

Table 3 shows descriptive statistics and correlations for all variables. Coefficient α reliabilities are shown in the main diagonal of Table 3 where appropriate. The table shows a strong correspondence among the pay dispersion measures. High minus low is strongly related to the coefficient of variation ($r = 0.58$, $p < 0.01$) and gini coefficient ($r = 0.61$, $p < 0.01$), while the coefficient of variation and gini coefficient are even more highly correlated ($r = 0.75$, $p < 0.01$). These findings correspond to previous research (e.g., coefficient of variation and gini coefficient were correlated 0.71 in the Bloom, 1999, study) and provide evidence of the construct validity of the measure of dispersion used in Study 1. The individual incentives variable is significantly related to the coefficient of variation ($r = 0.21$, $p < 0.01$) and gini coefficient ($r = 0.19$, $p < 0.05$) and marginally related to the high minus low measure ($r = 0.17$, $p < 0.10$). Individual incentives and work independence are also significantly related ($r = 0.32$, $p < 0.01$).

The first series of analyses, shown in Table 4, was designed to test Hypotheses 1 and 2. In these regressions, the two-way interaction terms (pay dispersion × individual incentives and pay dispersion × work interdependence) were entered alternatively in the final steps after controls and the main effects of the substantive variables. Hypothesis 3 was tested in the second set of analyses (Table 5). Here, the three-way interaction term was entered in the final step after controls, main effects, and the two-way terms. Changes in R^2 and standardized regression coefficients (β) were examined. These analyses were repeated for each of three measures of pay dispersion (high minus low, coefficient of variation, and gini coefficient).

As Table 4 shows, the pay dispersion × individual incentives interaction term (test of Hypothesis 1) is significant in two of the labor hours per ton and all three of the lost-time accidents equations, but fails to reach significance in any of the perceptual performance equations. The pattern of these interactions generally conforms to the predicted form (and the results from Study 1), i.e., a crossing pattern is evident and the highest level of labor hours per ton and lost-time accidents (poorer performance) is found when pay dispersion is high but use of incentives is low. Overall, the results in Table 4 provide moderate to strong support for Hypothesis 1.

The pay dispersion × work interdependence interaction step (Hypothesis 2) was also consistently significant across all three outcomes variables. The interaction term is significant with labor hours per ton as the dependent variable and coefficient of

Table 3. Study 2: correlations and descriptive statistics for all variables

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Control variables																			
1. Organizational Size	3.22	0.62	#																
2. Organizational Age	3.45	1.04	−0.06	#															
3. Unionization	0.36	0.49	0.23**	0.14	#														
4. Corporate Dependence	0.87	0.34	−0.15	−0.01	0.00	#													
5. Total Turnover Rate	0.18	0.23	−0.02	−0.11	−0.25**	0.10	#												
6. Pay Level	18968	4285	0.17*	0.08	0.60**	−0.03	−0.24**	#											
7. Benefits Level	74.34	43.58	−0.09	0.11	−0.22**	−0.04	0.13	−0.09	#										
8. Pay System Communication	4.17	1.28	0.00	−0.08	−0.32**	0.12	0.22**	−0.37**	0.26**	(0.72)									
9. Seniority-based pay	2.73	1.33	−0.02	−0.17*	−0.15	−0.10	0.08	−0.26**	0.09	0.10	#								
Pay dispersion variables																			
10. High Minus Low	4799	3112	0.14	−0.03	−0.01	−0.05	−0.05	0.25**	0.10	0.08	0.02	#							
11. Coefficient of Variation	0.07	0.03	−0.32**	−0.02	−0.30**	0.01	0.10	−0.20**	0.18*	0.23**	0.08	0.58**	#						
12. Gini Coefficient	0.11	0.04	0.11	−0.03	−0.22**	−0.08	0.12	−0.11	0.10	0.25**	0.10	0.61**	0.75**	#					
Incentives and interdependence																			
13. Individual Incentives	1.86	0.60	0.11	0.03	−0.27**	−0.04	0.20**	−0.23**	0.30**	0.31**	0.08	0.17	0.21**	0.19*	(.75)				
14. Work Interdependence	1.45	0.84	0.11	0.24**	−0.04	−0.04	−0.09	−0.04	0.08	0.18*	0.04	0.06	0.08	0.32**	−0.05	#			
Workforce performance variables																			
15. Labor Hours per Ton	1.43	0.62	0.28**	−0.05	0.31**	−0.05	−0.10	0.11	−0.17	−0.17	0.06	0.04	−0.12	0.07	−0.14	−0.05	#		
16. Lost-time Accidents	1.56	1.06	0.50**	−0.03	0.27**	−0.24**	0.05	0.16	0.11	0.08	0.01	0.05	−0.13	0.01	−0.15	0.08	0.26**	#	
17. Perceptual Performance	4.67	0.79	0.03	−0.07	0.02	−0.03	0.00	0.12	−0.04	0.17	−0.10	0.13	−0.02	0.01	0.12	−0.23**	−0.04	−0.02	(0.90)

$^{**}p < 0.01$; $^{*}p < 0.05$; $N = 113$.
Coefficient α reliability estimates are reported in the diagonal where appropriate.

variation as the dispersion measure, with all three dispersion measures in the lost-time accidents, and for the high minus low and gini coefficient measures when perceptual performance is the dependent variable. Again, plots of these interactions generally conform to expectations; i.e., the poorest performance (highest labor hours per ton, highest lost-time accidents, and lowest perceptual performance) is evident when pay dispersion and work interdependence are both high. Moderately strong support therefore is found for Hypothesis 2.

The critical test, of course, is that of Hypothesis 3, which is essentially a synthesis of the somewhat contradictory predictions from Hypotheses 1 and 2. Table 5 shows the results for these tests. The three-way interaction among pay dispersion, individual incentives, and work interdependence is significant in four of the nine equations. In particular, the three-way interaction is significant in all three labor hours per ton equations and, in the case of accidents, when high minus low was the pay dispersion measure. Where the three-way interactions are significant, these effects supersede the significant two-way interactions in Table 4.

To support Hypothesis 3 fully, the pattern of the interactions must be consistent with expectations. Plots of the significant three-way interactions (Figures 4 and 5) provide substantial support for the rationale grounding Hypothesis 3, but they also reveal a more complex pattern than expected. As an example, the three-way interaction among pay dispersion (gini coefficient), individual incentives, and work interdependence is shown in Figure 4. The plot was split by levels (low vs. high) of work interdependence. The left-hand panel of Figure 4 depicts the interactive relationship between pay dispersion and individual incentives when work interdependence is low. The expected fully crossing pattern of results, i.e., similar to the patterns found in Study 1, failed to materialize in these analyses. Instead, there is essentially no relationship between pay dispersion and labor hours per ton when work interdependence is low. By contrast, the right-hand panel shows the relationships when work is highly interdependent. Here, a prevailing positive relationship between pay dispersion and labor hours per ton (recall that higher labor hours per ton indicates poorer performance) is apparent. Interestingly, this relationship is stronger when the use of individual incentives is low, and is attenuated somewhat by the use of individual incentives.

Figure 5 shows the significant three-way interaction with accidents as the dependent variable. A variation of the expected pattern emerges when work interdependence is low. That is, pay dispersion (measured as high minus low) is strongly and positively associated with accidents, i.e., poorer performance, in the absence of individual incentives. When incentive use is high, there is a slightly negative, but nonsignificant, relationship between pay dispersion and accidents. On the other hand, when work interdependence is high, there is a prevailing, but weak, negative pattern between pay dispersion and accidents and no significant differential effects of individual incentives.

To summarize, Hypothesis 3, the integration of previously distinct theoretical predictions, receives moderate support in Study 2, but the results varied according to a more complex pattern than that predicted. In particular, for labor hour per ton (see Figure 4), the expected pattern of poorer performance emerged when pay dispersion and work interdependence were high; the observation that individual incentives attenuate the pay dispersion → performance relationship in situations of high interdependence is unexpected, as is an observation of the lack of strongly differential relationships when interdependence is low. With respect to accidents, differential effects were evident when work interdependence was low and were generally consistent with expectations, but not when work interdependence was high.

DISCUSSION

This study focused on the specific dynamics of a key element of strategy implementation, attempting to reconcile seemingly conflicting perspectives about the effects of pay dispersion on organizational performance. We argued that dispersion *per se* is neither functional nor dysfunctional; rather, situational contingencies determine the strategic effectiveness of dispersion (or lack thereof). We predicted that dispersion is more likely to be beneficial when individual incentives are used in conjunction with it; conversely, dispersion is likely to be ineffective when used in the context of high work interdependence. Tests of these predictions in two industrial settings using a range of performance measures provides interesting insights about the dispersion phenomenon. Our results show that dispersion is indeed more effective when it exists

Table 4. Study 2: hierarchical regression analyses with alternative measures of pay dispersion—tests of Hypotheses 1 and 2

Block	Labor hours per ton						Lost-time accidents						Perceptual performance					
	High minus low		C. of variation		Gini coefficient		High minus low		C. of variation		Gini coefficient		High minus low		C. of variation		Gini coefficient	
Control variables	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
Independent variables																		
Pay Dispersion—High Minus Low	−0.05	0.02					0.17*	0.05					0.07	0.06				
Pay Dispersion—Coefficient of Variation			0.25**	0.03					0.13	0.13					−0.05	−0.03		
Pay Dispersion—Gini Coefficient					0.21*	0.16					0.01	0.06					−0.06	−0.05
Individual Incentives	−0.17	−0.08	0.12	0.09	0.14	0.03	−0.23*	−0.21*	−0.29**	−0.20*	−0.29**	−0.27**	0.04	−0.03	0.02	0.03	0.08	0.01
Work Interdependence	−0.04	0.01	0.06	−0.06	0.05	−0.03	0.03	0.12	0.19*	−0.07	0.24**	−0.03	−0.23*	−0.15	−0.24**	−0.28**	−0.21*	−0.12
Two-way interaction																		
Pay Dispersion × Individual Incentives (H1)	−0.05		−0.25**		−0.20*		−0.17*		−0.16*		−0.18*		0.09		0.13		0.11	
Pay Dispersion × Work Interdependence (H2)		0.07		0.21*		0.14		0.25**		0.19*		0.24*		−0.21*		−0.08		−0.18*
Total R^2	0.194*	0.200*	0.278**	0.273**	0.261**	0.236**	0.338**	0.353**	0.312**	0.313**	0.339**	0.346**	0.212**	0.231**	0.224*	0.214*	0.192*	0.205*
ΔR^2—interaction step	0.008	0.014	0.056**	0.051**	0.047**	0.022	0.024*	0.039**	0.024*	0.025*	0.024*	0.031*	0.010	0.029*	0.019	0.009	0.010	0.023*

† Regression coefficients for control variables omitted.
** $p < 0.01$; * $p < 0.05$. $N = 110$.
Final equation standardized regression coefficients are reported in the columns. The first column in each set reports the results with individual incentives, and the second column the results with interdependence.

Table 5. Study 2: hierarchical regression analyses with incentives, interdependence, and alternative measures of pay dispersion—tests of Hypothesis 3

Block	Labor hours per ton			Lost-time accidents			Perceptual performance		
	High minus low	Coefficient of variation	Gini coefficient	High minus low	Coefficient of variation	Gini coefficient	High minus low	Coefficient of variation	Gini coefficient
Control variables	†	†	†	†	†	†	†	†	†
Independent variables									
Pay Dispersion—High Minus Low	0.16			0.07			0.02		
Pay Dispersion—Coefficient of Variation		0.28**			0.22*			−0.08	
Pay Dispersion—Gini Coefficient			0.34**			0.03			−0.11
Individual Incentives	−0.12	0.09	0.09	−0.20	−0.35**	−0.24*	0.09	0.13	0.12
Work Interdependence	0.09	0.01	0.01	0.06	0.17	0.05	−0.31**	−0.31**	−0.18
Two-way interactions									
Pay Dispersion × Individual Incentives	0.04	−0.18*	−0.26**	0.01	0.06	0.01	0.05	0.16	0.15
Pay Dispersion × Work Interdependence	0.18	0.36**	0.42**	−0.29**	−0.10	−0.12	−0.21*	−0.09	−0.22*
Individual Incentives × Work Interdependence	−0.08	−0.03	−0.04	0.19*	0.10	0.18	0.02	0.05	−0.07
Three-way interaction									
Pay Dispersion × Individual Incentives × Work Interdependence (H3)	−0.23*	−0.28**	−0.30**	0.22*	0.04	0.07	0.06	−0.14	−0.02
Total R^2	0.244*	0.460**	0.419**	0.414**	0.310**	0.356**	0.248**	0.256**	0.248**
ΔR^2—two-way interaction step	0.027	0.184**	0.149**	0.071**	0.021	0.037	0.044	0.038	0.066*
ΔR^2—three-way interaction step	0.031*	0.054**	0.056**	0.029*	0.001	0.004	0.002	0.013	0.000

† Regression coefficients for control variables omitted.
** $p < 0.01$; * $p < 0.05$. $N = 110$.
Final equation standardized regression coefficients are reported in the columns.

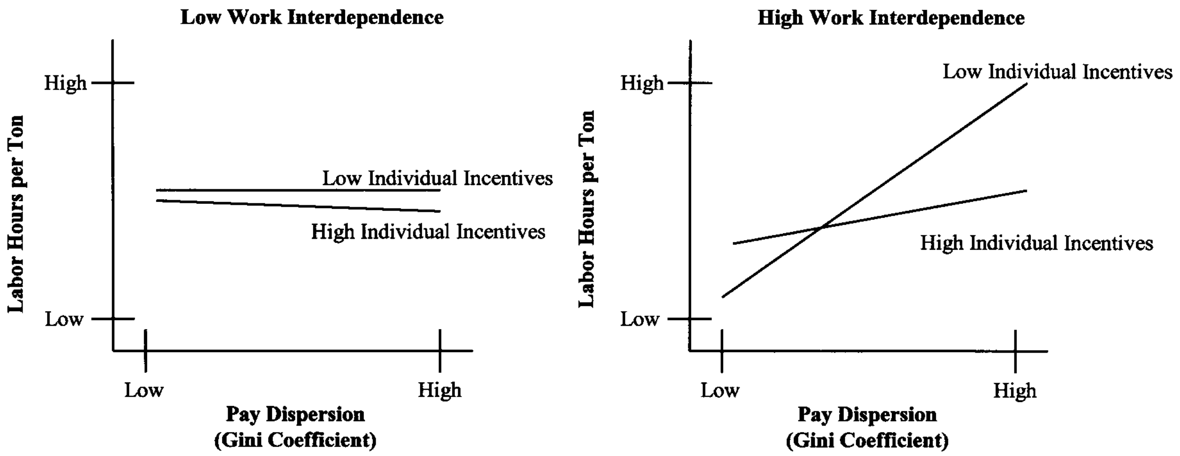

Figure 4. Study 2: Three-way interaction among pay dispersion (gini coefficient), individual incentives, and work interdependence in predicting labor hours per ton

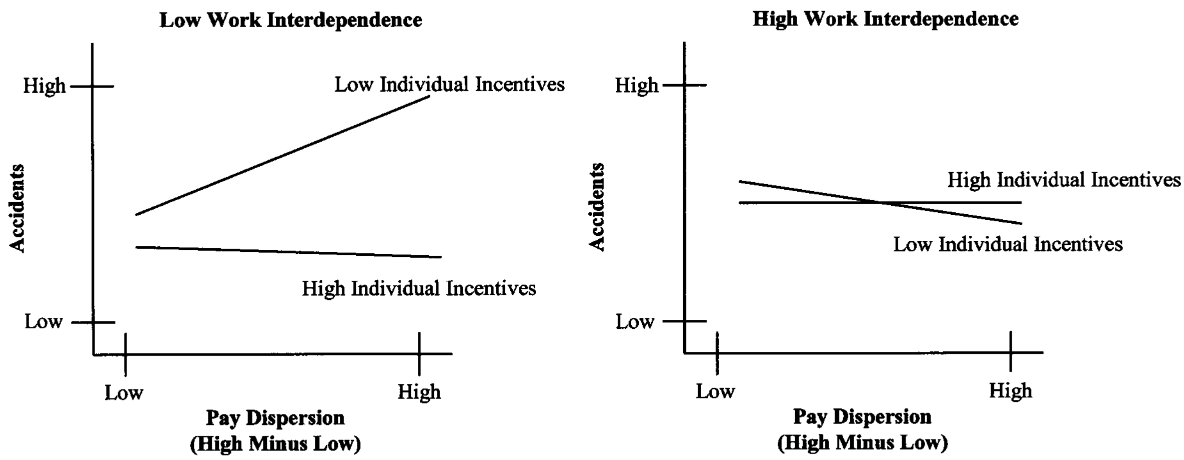

Figure 5. Study 2: Three-way interaction among pay dispersion (high minus low), individual incentives, and work interdependence in predicting accidents

in conjunction with individual incentives and that, at least for some performance measures, dispersion is less effective when used in interdependent settings. In addition, the results indicate a rather complex pattern of interrelationships among pay dispersion, individual incentives, work interdependence, and organizational effectiveness. These issues are discussed below.

Both studies supported the hypothesized interaction between the use of individual incentives and pay dispersion in predicting measures of effectiveness. This finding spanned measures of dispersion (in Study 2) and measures of organizational performance (in both studies). We argued that dispersion is functional only when it is attributable to legitimate sources, and that basing pay on performance is normatively viewed as legitimate. This argument is supported. Performance is lower when pay dispersion occurs in the absence of incentives than when it occurs in the presence of incentives. The consistency of this effect underscores the dangers of widely dispersed pay without normatively acceptable reasons. The problems with politically based pay policies have been discussed before (e.g., Gupta and Jenkins, 1996). As Pfeffer and Langton note, pay dispersion 'does not necessarily imply that a pay-for-performance scheme exists. Dispersed wages can result from the operation of favoritism or rewards for other things than performance' (Pfeffer and Langton, 1993: 387). The present results suggest that illegitimate sources of pay dispersion may hurt not just employee attitudes but organizational performance as well. We could not test this proposition directly, but it is a fruitful area of inquiry.

The second hypothesis predicted that pay dispersion in interdependent work contexts is dysfunctional. This hypothesis received moderately strong support in Study 2 across all three measures of performance and with varying degrees of significance across three alternative measures of pay dispersion. These findings lend credence to the argument that dispersion can foster competition and lack of cooperation—dynamics that are diametrically opposed to the goals of interdependence.

The moderating effects of individual incentives and work interdependence when taken in isolation are illuminating. But arguably even more important are the results of Hypothesis 3 tests, which explored the interaction of both variables with pay dispersion simultaneously in predicting work performance. In several cases, especially in the labor hour per ton equations, the significant three-way interaction superseded the two-way interaction effects. Overall, our predictions in Hypothesis 3 are supported to some extent, but a more complex picture than predicted emerges from the results. Particularly interesting in this regard is the right panel of Figure 4. When interdependence is high, pay dispersion is negatively related to performance, but this negative effect is *weaker* when individual incentives are used than when they are not! This effect occurs despite the fact that the use of individual incentives is inconsistent with the goals of interdependence (e.g., Shaw, Duffy, and Stark, 2000). These results underscore the importance of basing pay dispersion on legitimate grounds. As argued above it is likely, that individual incentives supply a legitimate justification for dispersion. The inconsistency between interdependence and individual incentives may be less corrosive for performance than is dispersion created through illegitimate avenues. That is, a good justification for dispersion, despite its incongruence, may be more acceptable than inconsistency accompanied by no legitimate justification. An individual incentive system may ameliorate deleterious effects when work is interdependent by providing a rationale for pay differentials. This explanation is particularly compelling in light of previous results showing broad-ranging and severe dysfunctional effects of illegitimate or unjust systems (e.g., Sheppard *et al.*, 1992; Skarlicki and Folger, 1997). Nonetheless, this explanation is speculative, and should be addressed systematically in the future.

The complex dynamics regarding Hypothesis 3 also highlight a critical dilemma for managers as they attempt effective strategy implementation. Managerially, a seemingly valid justification (use of individual incentives) for an organizational outcome (pay dispersion) is better than no justification, even when the justification is inconsistent with work design, or more broadly, the objectives of the organization. Since pay practices do not always accompany work design changes hand in hand (see Snell and Dean, 1994), it is likely that strategic decision-makers face such dilemmas on a regular basis. At a conceptual level, researchers tend to view congruence issues in isolation (e.g., certain pay practices are more or less congruent with different work designs). They rarely consider the decision-making constraints that managers face on a daily basis and the satisfying, but not completely satisfying, solutions that often result. It quickly becomes a particularly complex theoretical task, then, to identify when inconsistent practices buffer (and when they exacerbate) the negative effects of already difficult situations. But complexity may be necessary to provide an adequate description of organizational dynamics, as is the use of multitheoretical approaches to disentangle such complexities; one theory in isolation is unlikely to explain the gamut of effects (Lewis and Grimes, 1999).

The implications of this complexity for strategy implementation are further highlighted when our results are set against those of Bloom (1999). In Bloom's sample of professional baseball teams, work interdependence was high and relatively constant. The study reported a negative relationship between pay dispersion and workforce performance. Likewise, in our research, Study 2 showed any main significant main effects of pay dispersion on performance to be in the same direction: poorer performance was evident when dispersion was high. In fact, Study 1, where work interdependence was *low*, also showed a negative main effect on one performance dimension. Do our results, combined with those of Bloom (1999), then suggest a largely negative relationship between dispersion and performance? Actually not. Overall, the pattern of our significant main effects was inconsistent, indicating a more complex higher-order relationship than would be inferred from simple main effects. The Study 1 results, combined with tests of Hypothesis

3, clarify the issue. The use of individual incentives and dispersed wages is associated with better performance in low interdependence settings. In high interdependence settings, wage dispersion is likely to have negative effects, but these negative effects are buffered by the use of legitimate dispersion-creating practices such as individual incentives. In essence, Bloom's (1999) findings are reinforced by our results. At the same time, his findings contain only a partial picture; our results bring the picture into clearer focus.

This study is rare in that it focused on horizontal, lateral, or intraclass pay dispersion. Albeit argued otherwise elsewhere (e.g., Cowherd and Levine, 1992), there is strong justification for the fact that horizontal pay dispersion has the most broad-ranging effects on organizational performance (Baron and Pfeffer, 1994). Horizontal pay distributions hold constant many potentially confounding factors (e.g., differences in status, social class, job titles) that could reasonably explain variations in pay levels. They highlight performance, justice, and legitimacy issues among relevant comparison individuals. As Bloom (1999) notes, individuals may tolerate vertical dispersion more readily than horizontal dispersion since differences in job requirements, prestige, social status, etc., are acceptable reasons for the higher pay of higher-ranking individuals. But differences in pay among individuals at the *same* organizational level hit closer to home. As suggested above, justifiable differences (especially when work is independent) facilitate higher performance, but unplanned or illegitimate differences endanger performance and outcomes. A useful extension of this research is a comparison of the benefits and difficulties of vertical and horizontal dispersion.

Our results reinforce the idea that *consistency* between an organization's management and human resource management philosophy on the one hand and the structure of the pay system on the other is of vital importance.[3] Organizational design is not necessarily consistent with the pay system an organization uses; the consequent mismatches are detrimental to workforce performance in many instances. Of course, this study focused only on *pay* system dynamics. Still, it has broader implications. The strategic human resource management literature (e.g., Arthur, 1994; Delery and Doty, 1996; Huselid, 1995; Ichniowski, Shaw, and Prennushi, 1997; Youndt *et al.*, 1996) emphasizes the value of human resource 'bundles' in promoting organizational outcomes. The implicit or explicit assumption is that the bundles must be internally consistent, and this approach is supported by our results to a large extent. Higher performance can be achieved through appropriate combinations of practices. For instance, Figure 2 shows high performance under high dispersion/high incentive or low dispersion/low incentive conditions. In other words, organizations may possibly perform well by following a 'high road' or a 'low road' (both internally consistent) human resource management strategy.

In addition, however, the results also provide insights about inconsistent human resource management practices. They imply that inconsistency can be useful in some circumstances—an inconsistent pay system (individual incentives) can buffer detrimental effects. This finding, if upheld in other studies, poses new dilemmas for the strategic human resource management area. On the one hand, consistency is necessary; on the other hand, some inconsistencies may be beneficial. Researchers already struggling with the theoretical and empirical issues regarding appropriate combinations of human resource management practices (Delery and Shaw, 2001) must also contend with these inconsistent nuances as they develop conceptual frameworks of strategic human resource management.

This study suggests several other interesting avenues for research, particularly those related to the unexpected findings in Study 2. A valuable program of research would start with dispersion issues at the individual level and build up to the strategic level. To begin with, this program would focus on individual reactions to pay structures encompassing legitimate and illegitimate sources of variation in independent and interdependent settings. Such studies would have the ability to support or falsify our speculations. The second step in this research program would entail the development of organizational-level theories examining strategic compensation frameworks. Our focus on horizontal dispersion is particularly significant in this context due to the increased prevalence of flatter rather than taller organizational designs. As hierarchical levels are removed, more individuals pursue technical (as opposed to managerial) career paths, and a 'broad-banding' approach to compensation design is adopted. The result is fewer

[3] We thank an anonymous reviewer for these suggestions.

job titles, fewer status differentials, and wider pay bands. Horizontal pay dispersion becomes a much more critical concern in these settings since more individuals occupy jobs at the same hierarchical level. The importance of this issue is further underscored by the finding (in testing Hypothesis 3) that inconsistent pay dynamics may buffer deleterious effects. The interplay among organizational structure, sociotechnical systems, and pay dispersion in affecting critical organizational outcomes assumes critical proportions in this regard. For example, the benefits of an egalitarianism organizational system may be jeopardized without careful consideration of the complexities inherent in designing and administering, not merely consistent, but also just and legitimate compensation systems.

No study is perfect, and ours is no exception. The first issue concerns pay measures. Our measures of pay dispersion are estimates and thus open to challenge, but the high overlap among alternative measures in Study 2 ameliorates this concern. Our measures of individual incentives can be questioned. The incentive measures were significantly correlated with dispersion, but the magnitude of these correlations was not extraordinarily high. That the measures were moderately correlated speaks to their validity as dispersion-creating practices. That they did not account for more variance in pay dispersion likely speaks to the variety of dispersion-creating factors found in organizations. We controlled for a multitude of factors that could affect dispersion (e.g., size, age, tenure), but many other legitimate and illegitimate factors (politics, nepotism, favoritism) also affect dispersion levels (Bartol and Martin, 1990; Gupta and Jenkins, 1996). Moreover, pay dispersion and individual incentives are not synonymous but distinct constructs (Pfeffer and Langton, 1993). They should be moderately, not perfectly, correlated. In fact, simultaneous use of pay *compression* and individual incentives is advocated on occasion (Pfeffer, 1995)—something that would be impossible if the two were perfectly (but negatively) related. In addition, our measures of pay dispersion in Study 2 relied on hourly rates rather than total annual pay. This reliance may not have allowed us to capture all the variation in dispersion created by individual incentives since lump-sum bonuses and other incentives may not be included in hourly pay rates. We conducted some analyses *post hoc* using single incentive items (e.g., merit pay) and found similar results across the items, but this issue warrants further research.

Our outcome variables in Study 2 were based exclusively on key informant reports—something researchers have challenged in the past. On the other hand, key informants are commonly used in organizational research. The perceptual performance equations in Study 1, and all equations in Study 2, were estimated using data from the same source, raising common method variance concerns. But common method variance should not support substantive predictions across the level of a third (or the in three-way interaction cases, a fourth) variable, ameliorating these concerns. Also, our data are essentially cross-sectional in nature and causal conclusions cannot be drawn. Since the research was confined to two industry settings and focused on two key jobs, the generalizability of our results to other industries and other jobs is not certain. In addition, the study was limited to two potential moderators (incentives and interdependence), but other contingencies likely to be relevant should also be examined in the future. Our focus *by design* on mid-level outcomes (workforce performance) also makes it imperative for future research to examine the applicability of our results to other outcomes (such as operating ratio).

Assuaging these concerns is the fact that strong interactive results were obtained across three dependent variables derived from three distinct data sources in Study 1, and the fact that the strongest interactions in Study 2 were observed with 'hard' (labor hours per ton and accidents), rather than purely perceptual, dependent variables. Furthermore, common method variance is an unlikely substantive explanation of theoretically derived higher-order interaction effects. The support (albeit moderate) across two settings and across different measures of both independent and dependent variables further points to the robustness of the results.

Confidence in the substantive validity of the results is also bolstered by other aspects of our design. We conducted organizational-level analyses of a large sample of organizations within one industry (trucking) and a sample comprising more than half of the total population of plants in another (concrete pipe). We held the focal job constant in both studies and controlled for a variety of factors that could contaminate observed relationships. In Study 1, we obtained data from key informants and two distinct archival sources, eliminating concerns about common method variance. In Study 2, we examined two 'hard' performance measures (labor hours per ton and accidents) and found significant interaction results. Furthermore, the sample in Study 2 consisted primarily of small companies, whereas the sample in Study 1 covered a broad spectrum of organizational size.

Taken together, the results clearly demonstrate the complexity of pay dispersion effects on workforce performance. In the final analysis, the sources of pay dispersion, the way work is designed, and the way compensation dynamics are perceived are critical to organizational effectiveness. These contextual factors must be incorporated in systematic research on the effects of pay dispersion.

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