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Abstract

This study examines the determinants of performance measure choices in worker incentive plans. The results indicate that informativeness issues such as those addressed in economic theories have a significant effect on measurement choices. However, other reasons for adopting the plans, such as upgrading the workforce and linking bonuses to the firm's ability to pay, also influence measurement choices, as do union representation and management participation in plan design. Moreover, the factors influencing the use of specific measures vary, suggesting that the aggregate performance measure classifications commonly used in compensation research provide somewhat misleading inferences regarding performance measurement choices.

Disciplines

Accounting

Determinants of Performance Measure Choices in Worker Incentive Plans

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This study examines the determinants of performance measure choices in worker incentive plans. The results indicate that informativeness issues such as those addressed in economic theories have a significant effect on measurement choices. However, other reasons for adopting the plans, such as upgrading the workforce and linking bonuses to the firm's ability to pay, also influence measurement choices, as do union representation and management participation in plan design. Moreover, the factors influencing the use of specific measures vary, suggesting that the aggregate performance measure classifications commonly used in compensation research provide somewhat misleading inferences regarding performance measurement choices.

I. Introduction

This study examines some of the factors influencing the choice of performance measures in worker (nonmanagement) incentive plans. A large body of research has investigated the design of compensation contracts and reward systems, highlighting the importance of performance measure

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choice in contract design. Much of this research is based on economic theories showing that the choice of performance measures in incentive contracts should be based on the informativeness (or incremental information content) principle. Agency models by Holmstrom (1979), Banker and Datar (1989), and Feltham and Xie (1994), for example, demonstrate that performance measurement systems should include any (costless) performance measure that provides incremental information on the actions the principal wishes to motivate in order to promote congruence between the principal's objective and that of the agent.

Despite this theoretical research, relatively little empirical evidence exists on the factors associated with the choice of performance measures in incentive plans. Most studies have focused on CEO bonus contracts (e.g., Lambert and Larcker 1987; Ely 1991; Sloan 1993; Bushman, Indjejikian, and Smith 1996; Ittner, Larcker, and Rajan 1997) or business unit performance evaluation (e.g., Govindarajan and Gupta 1985; Simons 1987; Bushman, Indjejikian, and Smith 1995; Keating 1997) and have ignored worker-level incentive plans. Prior studies have generally examined aggregate performance measure classifications (e.g., financial vs. nonfinancial, business unit vs. corporate, etc.) rather than specific performance measures (e.g., accounting returns, cost control, quality, productivity, volume, etc.). Moreover, few studies have examined factors other than the measures' informativeness. Existing research typically assumes that incentive plans are designed purely to ensure that agents are motivated to take actions desired by the principal, even though other factors such as employee attraction and retention, the ability to shift financial risks to workers, and the relative power of different stakeholder groups can also affect these choices (e.g., Merchant 1989; Heneman, Ledford, and Gresham 1999; Waggoner, Neeley, and Kennerley 1999).

This study provides exploratory insights into these issues by examining a broad set of potential performance measure determinants in worker incentive plans. We conduct our analysis using survey data collected by the Consortium for Alternative Reward Strategies Research (McAdams and Hawk 1994). Our sample consists of 607 incentive plans covering nonmanagement employees and having a clear, preannounced performance-payout link. The survey provides data on the performance measures used to compute plan payouts, the reasons for adopting the plan, and the implementation process used by the organization.

Our results indicate that informativeness issues such as those addressed in economic theories are key factors in the selection of performance measures for worker incentive plans. However, we also find that other reasons for adopting the plan (i.e., promoting organizational change, improving the link between pay and firm performance, and upgrading the workforce) also play a role in performance measure choices, as do union representation and management participation in plan design. Moreover, the factors

influencing the use of specific measures vary, suggesting that the aggregate performance measure classifications commonly used in compensation research, such as the comparison of financial versus nonfinancial metrics, provide somewhat misleading inferences regarding performance measurement choices.

The remainder of the article is organized into four sections. In Section II, we provide an overview of theoretical discussions on the choice of performance measures. In Section III, we discuss the sample and variables used in the study, and in Section IV we analyze the determinants of incentive plan performance measures. Conclusions and limitations to our research are presented in Section V.

II. Theoretical Overview

A. Classifying Performance Measures

A variety of taxonomies have been proposed to classify the performance measures used in incentive plans. A common distinction is between financial (or accounting) measures and nonfinancial (or operational) measures. Although financial measures such as costs, profits, or accounting returns have traditionally played a major role in compensation contracts, many believe that nonfinancial measures such as defect rates, cycle time, and productivity, which tend to be more disaggregate and task-specific than financial measures, are better at signaling the actions workers can take to improve overall performance and at isolating the contribution of particular workers or activities (e.g., Wruck and Jensen 1994; Brancato 1995). Financial measures have also been criticized for being too historical and “backward-looking,” for rewarding short-term or incorrect behavior, and for giving inadequate consideration to the development of “intangible” assets such as intellectual capital and employee capabilities. As a result, many companies are supplementing or replacing their traditional financial measures with nonfinancial performance indicators (Ittner and Larcker 1998).

Other taxonomies suggest that the distinction between financial and nonfinancial measures is an incomplete representation of performance measure characteristics. Cross and Lynch (1988/1989), for example, propose a performance measurement “pyramid” that classifies measures based on their level in the organizational hierarchy. According to this classification, the key distinction between different types of performance measures is not whether they are financial or nonfinancial, but the breadth of activities captured by the measures and their level of specificity. At the top of the pyramid are broad corporate metrics that include financial measures such as profits and cash flow, as well as nonfinancial measures such as market penetration. At the next lower level, business operating system measures emphasize more tangible operating objectives such as

customer satisfaction, flexibility, productivity, and cost. Operational measures form the base of the pyramid, emphasizing the specific financial (e.g., unit cost) or nonfinancial (e.g., quality, delivery, or process time) goals needed to achieve higher-level results.

Heneman et al. (1999) stress the measures' controllability and the trade-offs between their motivational value and the firm's ability to pay bonuses. They argue that the performance measures in worker incentive plans can range from very concrete "behavioral" measures (accidents, absenteeism, safety inspection ratings, etc.) to measures of unit performance (productivity, cost, quality, on-time delivery, cycle time, etc.) to broad measures of financial performance (return on investment, profit, etc.). Heneman et al. (1999) contend that behavioral measures have the greatest motivational value at lower organizational levels because they have strong "line of sight," which refers to the ability of workers to understand how their actions affect bonus awards.¹ Financial performance metrics are more closely tied to the organization's ability to pay. If the organization is doing well, it can afford to pay bonuses. If it is not doing well, no bonuses are paid. However, workers often have modest control over broad financial results, reducing their motivational value. Unit performance metrics, which can be financial or nonfinancial, are in the middle on the criteria of motivation versus ability to pay. Employees can influence them more easily than broad financial measures, but not as easily as behavioral measures. Moreover, while improvements in unit performance metrics ultimately are expected to improve financial performance, the relation is far from perfect and may only occur with considerable lag.

Although the preceding taxonomies represent just a few that can be used to classify performance measures, they highlight a number of key characteristics that distinguish the performance measures in worker incentive plans. In the following sections, we discuss some of the theoretical factors that are expected to influence these measurement choices.

B. Informativeness

In a rational contracting setting, the performance measures in incentive plans should be selected to motivate workers to act in the manner desired by the owners of the firm. Economics-based agency models indicate that the choice of performance measures in this setting should be a function of the informativeness (or incremental information content) of each measure regarding the worker's action choices (e.g., Holmstrom 1979). The

¹ The desirability of strong "line of sight" is emphasized in expectancy theories, which argue that employees will be motivated to perform at higher levels when they understand how their efforts lead to outcomes, and how these outcomes lead to rewards. See Van Eerde and Thierry (1996) for a review of the expectancy literature.

relative weight placed on an individual measure, in turn, should be a function of the measure's sensitivity (or the change in its mean value in response to a change in the agent's action) and precision (or the inverse of the variance in the measure) (Lambert and Larcker 1987; Banker and Datar 1989).

While these models provide insight into the optimal design of incentive plans, they say little about the specific measures that should be used for compensation purposes. More recent agency models extend these studies to investigate the role of nonfinancial measures in compensation contracts (Feltham and Xie 1994; Hauser, Siemester, and Wernerfelt 1994; Hemmer 1996). These models suggest that financial measures alone are unlikely to be the most efficient means to motivate employees, and they demonstrate how incentives based on nonfinancial measures can improve contracting by incorporating information on agents' actions that is not fully captured in contemporaneous financial results. One implication of these studies is that nonfinancial measures should be relatively more informative when the lag between the agent's actions and the resulting financial consequences is longer.

Agency models have also examined the credibility of the "controllability" principle as a criterion for selecting performance measures. This principle holds that employees should only be held accountable for actions or results they control. In contrast, Antle and Demski (1988) rely on the informativeness principle to show that a performance measure may be useful even though it is not controllable by the agent, as long as it provides incremental information on the agent's performance (e.g., the use of competitors' results in relative performance evaluation). In a similar vein, Bushman et al. (1995) demonstrate that aggregate, higher-level performance measures that are not completely controllable by the agent can be informative of the agent's actions when interdependencies across units exist that are not captured in local, "own unit" measures.

Finally, a measure's informativeness may vary with the breadth of plan coverage. When a single incentive plan covers a broad and diverse set of activities and locations, it becomes difficult for management to prespecify a common set of specific actions that are desired for all participating employees. As a result, aggregate financial measures that capture a broader set of actions and allow comparisons across diverse units may be relatively more informative than specific nonfinancial or behavioral measures (Beischel and Smith 1991).

C. Reasons for Adopting Worker Incentive Plans

The compensation literature suggests that performance evaluation and reward systems have multiple objectives, not all of which are directly related to the motivational issues addressed in agency models (Merchant

1989; Lawler and Jenkins 1990; Heneman et al. 1999; Prendergast 1999). For example, incentive plans may be designed to attract and maintain key personnel. Plans can be used to control compensation costs or to make pay more variable with firm financial performance, thereby shifting financial risk from the company to the employees. Reward systems can help foster a desired organizational change by communicating new organizational goals. Some of these objectives may be in conflict with motivational objectives. For example, efforts to use the bonus plan to control compensation costs may limit the incentive value of the reward system. Alternatively, the need to attract adequate talent may lead organizations to minimize the link between pay and performance when determining bonus awards in order to increase compensation.

The differing objectives may also affect the choice of performance measures. Efforts to make pay more variable with company performance cause many companies to base bonus awards on firm-level financial performance to avoid paying bonuses when financial results are poor (Merchant 1989; Heneman et al. 1999). Behavioral or nonfinancial measures, on the other hand, may be more useful for promoting organizational change. Both economics and organizational psychology studies suggest that financial measures such as profits and costs provide weak direction to workers and make it difficult to communicate how a particular worker's actions affect new performance goals (e.g., Wruck and Jensen 1994; Heneman et al. 1999). Thus, the choice of performance measures is expected to be a function not only of the measures' informativeness but also of the other reasons for adopting the plan.

D. Stakeholder Interests

Economic models typically assume that compensation contracts are designed by the owners of the firm to minimize agency problems. However, behavioral research indicates that the interests of other stakeholder groups can also influence compensation plan design. Waggoner et al.'s (1999) interdisciplinary review of the performance measurement literature notes that organizations are "political arenas" in which divergent constituencies attempt to institutionalize performance criteria that serve their interests. The potential conflicts that arise as various constituencies try to promote self-interested performance measures are resolved through the use of power and bargaining.

Empirical studies support claims that stakeholder groups can influence compensation plan design. Sociology-based research, for example, finds that more powerful executives tend to have more favorable compensation contracts than less powerful executives (e.g., Tosi and Gomez-Mejia 1989; Wade, O' Reilly, and Chandratat 1990). Similarly, empirical studies indicate that unions can affect the design of incentive plans and the per-

formance gains from their implementation (e.g., Schwarz 1989; Kim 1996). The participation of these groups in incentive plan design is therefore expected to influence the performance measures included in the plan, independent of the measures' ability to motivate workers (Waggoner et al. 1999).

III. Sample and Measures

A. Sample

We conduct our analyses using survey data collected by the Consortium for Alternative Reward Strategies Research (CARS), an association of companies, consulting firms, and universities studying the effective use of reward systems. Several criteria had to be met before an incentive plan was included in the CARS sample: (i) the plan covered at least 20 employees; (ii) the plan was designed for nonmanagement employees (although it could also cover managers and executives); (iii) the plan had a clear, preannounced performance-payout link; and (iv) the plan did not require all payouts to be deferred. Excluded were skill-based pay plans, suggestion systems, plans in operation less than one year, or plans in the public sector (except health care). The CARS researchers used a detailed telephone-screening process to identify approximately 2,200 reward plans meeting these criteria. Surveys were mailed to potential respondents in 1991, 1992, and 1993, yielding information on 737 individual plans.² After deleting responses with missing data, 607 observations are used in our analyses.

The respondents span a variety of manufacturing and service sectors (see table 1). The organizational units covered by the incentive plans vary, with 26% covering workers throughout the entire company; 20% covering a group, subsidiary, division, or strategic business unit; 42% covering a plant, office, operating unit, or similar facility; 9% covering a department; and 3% covering a work group or small team. The mean plan covers a unit with 2,942 employees (median = 442 employees) that is part of a larger organization (mean = 15,730 employees; median = 3,237 employees). Descriptive statistics on plan and organizational characteristics are provided in table 2.

B. Performance Measures Used in the Incentive Plans

The survey gathered information on the use of seven general categories of performance measures for computing plan payouts: (i) accounting (e.g., profitability, earnings, revenues, return on assets), (ii) productivity (e.g., ratio of outputs to inputs), (iii) quality (e.g., internal defects and customer

² The full screening process used to identify the initial sample is described in McAdams and Hawk (1994).

Table 1
Industrial Categories of the Survey Participants

Industry of Unit	Number of Participants	% of Sample
Automotive and Farm Equipment	22	3.6
Building Materials	7	1.2
Chemicals	32	5.3
Communications	13	2.1
Computer Services & Software	16	2.6
Consulting	5	.8
Electrical & Electronics	30	4.9
Finance & Banking	55	9.1
Food & Beverage	43	7.1
Forest & Paper Products	18	3.0
Hospitals & Healthcare	21	3.5
Insurance	34	5.6
General Manufacturing	169	27.8
Printing & Publishing	14	2.3
Retail Trade	7	1.2
General Services	24	4.0
Transportation	6	1.0
Utilities	37	6.1
Other	54	8.9
Total	607	100.0

assessments), (iv) safety (e.g., number of injuries and results of safety audits), (v) attendance (e.g., perfect attendance or number of absences), (vi) cost control (e.g., actual costs relative to standard costs), and (vii) output or volume (e.g., unit goals for total output). Slightly more than half (52%) of the units use accounting measures (denoted ACCT), 48% use quality measures (denoted QUAL), 38% use cost measures (denoted COST), 34% use volume measures (denoted VOL), 25% use productivity measures (denoted PROD), 23% use safety measures (denoted SAFETY), and 12% use attendance measures (denoted ATTEND).

We computed a variety of variables to capture the various performance measure classifications discussed in Section II.A. The first variables assess the plans' use of nonfinancial measures. One limitation of the survey data is the lack of information on the specific weights applied to financial and nonfinancial measures when computing plan payouts. Consequently, we used two variables to provide insight into the relative importance placed on financial and nonfinancial measures. The first variable is coded one if at least one of the performance measurement categories is nonfinancial, and zero otherwise (denoted SOME_NF). We defined the accounting and cost categories as "financial" measures, and the other categories as "non-financial" measures. Sixty-nine percent of the plans use at least some nonfinancial measures to compute payouts to participants. Second, we developed a subsample of observations where we know the relative weights because the plan uses all financial or all nonfinancial performance measures (denoted ALL_NF). This variable is coded one if the unit uses

Table 2
Descriptive Statistics for Variables Used in the Analysis

Variable	Mean	SD	Minimum	Maximum
Criterion variables:				
SOME_NF	.69	.46	.00	1.00
ALL_NF	.45	.50	.00	1.00
ACCT	.52	.50	.00	1.00
COST	.38	.49	.00	1.00
VOL	.34	.47	.00	1.00
QUAL	.48	.50	.00	1.00
PROD	.25	.44	.00	1.00
SAFETY	.23	.42	.00	1.00
ATTEND	.12	.32	.00	1.00
WORKER	.22	.42	.00	1.00
BUS_UNIT	.34	.48	.00	1.00
PROFIT	.44	.50	.00	1.00
Predictor variables:				
Informativeness:				
INNOV	.00	.69	-2.17	3.39
INVOLVE	.00	.60	-.43	3.90
CONTIMP	.29	.46	.00	1.00
TELECOMM	.02	.14	.00	1.00
UTILITY	.06	.24	.00	1.00
DEREG	.06	.24	.00	1.00
MKTPERF	3.53	.92	1.00	5.00
LAYOFFS	5.57	9.24	.00	50.00
MFG	.61	.49	.00	1.00
Breath of plan coverage:				
GROUP	.20	.40	.00	1.00
OPER_UNIT	.42	.49	.00	1.00
DEPT	.09	.16	.00	1.00
TEAM	.03	.16	.00	1.00
PERTOT	.40	.41	.00	1.00
LOCATIONS	1.15	1.56	.00	8.16
Reasons for adopting:				
ORGCHG	.00	.73	-1.90	1.24
PAYPERF	.00	.80	-1.57	1.32
WKFORCE	.00	.81	-1.14	2.03
Stakeholder interests:				
MGTDESIGN	.66	.47	.00	1.00
MGTSPECIFY	.41	.49	.00	1.00
UNION	.26	.44	.00	1.00

NOTE.—See appendix for definition of the variables. Sample size is 607 for all variables, except for ALL_NF, where the total sample size is 346. INNOV, INVOLVE, ORGCHG, PAYPERF, and WKFORCE are averages of standardized item scores, and thus have a zero mean.

only nonfinancial measures, and zero if only financial measures are used. Forty-five percent of the plans in this subsample of 346 observations use only nonfinancial measures.

As an alternative method for categorizing the plans' performance measurement choices, we performed *k*-means cluster analysis on the individual measures. The analysis reveals three types of plans that roughly correspond to the classifications proposed by Heneman et al. (1999).³ The first

³ The assignment to the cluster is based on the standard distance between each

cluster includes 134 plans that make greater (but not necessarily exclusive) use of worker-related or behavioral measures such as safety, attendance, and productivity. The variable *WORKER* is coded one if the plan belongs to this cluster, and zero otherwise. The second cluster contains 265 plans that rely almost exclusively on accounting measures. We define this cluster as profit-based plans, with the variable *PROFIT* equal to one if the plan belongs to this cluster, and zero otherwise. The third cluster is characterized by greater (but not necessarily exclusive) use of cost, volume, and quality measures. These three measures are consistent with the business unit metrics outlined by Cross and Lynch (1988/1989) and Heneman et al. (1999). The variable *BUS_UNIT* is coded one for the 208 plans in this cluster, and zero otherwise.

In addition to these aggregate classifications, we examine the factors influencing the use of the seven individual performance measure categories. Each variable is coded one if that measurement category is used to compute payouts, and zero otherwise.

Finally, we examine whether the measurement occurs at the level of the unit covered by the plan (e.g., the plant) or at some higher organizational level (e.g., group or corporate). The survey provides information on the level at which each performance measure category is measured. We exclude plans that do not contain a specific measure and also plans that cover all workers in the corporation since it is not possible to measure performance above this organizational level. The resulting sample sizes range from 46 for attendance measures to 246 for quality measures. For each of the seven measurement categories, the dependent variable is coded one if the measure is used in the plan and is (at least partially) evaluated above the level of the organizational unit covered by the plan, and zero otherwise.⁴ Accounting performance is evaluated at a higher level most frequently (48% of plans using accounting metrics), followed by volume (30%), quality (30%), and cost (24%). Between 9% and 14% of plans using the other categories measure performance at higher organizational levels.

C. Predictor Variables

Consistent with the discussion in Section II, we investigate four sets of potential predictor variables for performance measure choices: (1) factors affecting the measures' informativeness, (2) the breadth of plan coverage, (3) the reasons for adopting the plan, and (4) alternative stakeholder interests.

observation and the centroid of the cluster. Cluster analysis results are not presented in the tables to simplify presentation.

⁴ For example, a plan that covers workers within a department but measures quality (at least partially) using plant-level quality statistics receives a value of one for the use of higher-level quality measures.

1. *Informativeness*

The performance measurement literature suggests a number of factors that are expected to influence the relative informativeness of alternative performance measures. We measure these factors using the following variables.

Strategy.—Perhaps the most frequently cited determinant of a measure's informativeness is the strategy or growth opportunities of the organization.⁵ The performance measurement literature typically represents strategy as a continuum between organizations following a “defender” or “cost leader” strategy and those following a growth-oriented “prospector” or “innovation” strategy. In firms following a cost leader strategy, the primary goal is increasing efficiency relative to the prior period. Consequently, short-term financial measures such as accounting returns and cost control are expected to be relatively informative indicators of employee performance. In innovative firms or firms with large growth opportunities, desired objectives such as new product development and market share increases may take some time to improve financial performance, making nonfinancial measures relatively more informative about current employee actions.

Consistent with prior studies, we use three proxy variables to measure the extent to which the company follows an innovation-oriented strategy: research and development expenditures as a percent of sales, the (reverse-coded) ratio of the firm's book value to market value (a proxy for the organization's growth opportunities, with lower book-to-market values assumed to reflect greater growth opportunities), and advertising expenditures as a percent of sales. Each ratio is computed over the 5 years prior to the year the survey was completed.⁶ The three variables load on a single factor that explains 47.3% of the variance in the data. However, the Cronbach alpha for the variables is relatively low (0.44), indicating that the internal consistency among the three indicators is lower than desired. The construct INNOV is computed using the average standardized scores for the three innovation proxies.

A second aspect of strategy that we examine is the extent to which the unit pursues an operational strategy of continuous improvement. Studies suggest that continuous improvement strategies increase the relative in-

⁵ See, e.g., Govindarajan and Gupta (1985), Lambert and Larcker (1987), Simons (1987), Clinch (1991), Smith and Watts (1992), Bushman et al. (1995), Ittner et al. (1997), and Keating (1997).

⁶ For firms with no Compustat data (either private firms or firms without names in the data file), median values for the unit's industry are used. One limitation to using Compustat data for computing the innovation construct is that the resulting measure pertains to the company as a whole rather than the individual unit covered by the plan. If the overall company strategy differs from the strategy of the covered unit, our innovation construct will be inappropriate.

formativeness of disaggregated, task-oriented nonfinancial measures because these measures are more closely related to the strategy's objectives (e.g., reduced defects or increased customer satisfaction) and provide more information on the root causes of problems (e.g., Wruck and Jensen 1994; Ittner and Larcker 1995, 1997; Ittner et al. 1997). In addition, since many benefits from continuous improvement activities may not be fully reflected in short-term financial measures (Anderson, Fornell, and Lehman 1994), nonfinancial indicators of improvement efforts can provide incremental information on current employee performance (Hauser et al. 1994; Hemmer 1996).

We use two measures to capture this aspect of operational strategy. The first variable addresses workers' involvement in making suggestions and changing work practices (denoted INVOLVE). This variable represents the average standardized response to five questions on the percentage of plan participants who are actively involved in individual suggestion programs, team/group suggestion programs, ad hoc problem-solving groups, self-directed work teams, and employee management teams. Principal component analysis of these five items produces one factor with an eigenvalue greater than one that retains 34.3% of the total variance. The Cronbach alpha for this scale is 0.52.

The second measure captures the interaction between the plan's design and the unit's operational strategy using an indicator variable for whether the plan is viewed as an integral part of an established organizational culture of continuous improvement (denoted CONTIMP). Twenty-nine percent of the units report that their plans are used to support a continuous improvement strategy.

Regulation.—Studies by Bushman et al. (1996) and Ittner et al. (1997) find that financial measures may be less informative in regulated industries, where regulators can implicitly or explicitly link profits or rate increases to nonfinancial goals such as customer satisfaction, reliability, and employee safety. In these cases, it is in the company's economic interest to motivate employees to increase performance on these nonfinancial dimensions.

We proxy for regulatory effects using indicator variables for units operating in the utility (denoted UTILITY) and telecommunication (denoted TELECOMM) industries. These indicators represent 6% and 2% of our sample, respectively. In addition, we include an indicator variable for changes in deregulation during the prior 2 years (denoted DEREG). Six percent of our sample indicate that deregulation had a significant impact on their markets during this period.

Type of operation.—Researchers suggest that the relative informativeness of different measures may differ in service and manufacturing operations. Hayes (1977) argues that, in production departments, cause-and-effect relations and standards can be relatively well established. As a result,

output and cost objectives can be evaluated using accounting techniques such as standard cost variance analysis and accounting returns. In service departments, activities are more heterogeneous and less standard, requiring a broader set of measures to evaluate performance. Mia and Chenhall (1994) offer similar arguments, claiming that marketing organizations are less routine and face more exceptions than production organizations, thereby requiring a more diverse set of performance measures.

We measure this potential influence on informativeness using an indicator variable (denoted MFG) that is coded one if the unit supported by the plan covers a manufacturing operation, and zero otherwise.⁷ Sixty-one percent of the plans cover manufacturing operations.

Past financial performance.—Ittner et al. (1997) argue that financial measures may be more informative when the organization has experienced poor performance. The intuition behind this claim is that short-term improvements in cash flow and other financial indicators of organizational viability are required to avoid the costs of financial distress, making financial measures more informative about desired employee actions.

Although we do not have data on actual financial performance, the survey contains information related to the units' performance during the prior 2 years. We use the unit's self-reported performance relative to its market (rated on a five-point scale, with 1 being worse than the market in which they compete and 5 being better than the market) as one indication of past performance (denoted MKTPERF). The average unit reports that its relative market performance is 3.53 on the five-point scale, or slightly better than its competitors. We also use the percentage of employees eligible to participate in the plan who were laid off or terminated during the prior 2 years as an indicator of poor performance (denoted LAYOFFS). On average, the units laid off or terminated 5.5% of their workers.

2. Breadth of Plan Coverage

Related to the issue of informativeness is the breadth of activities covered by the incentive plan. We use three sets of variables to measure this attribute. First, we include indicator variables to capture the highest level in the organization covered by the plan. GROUP refers to all nonmanagement workers within an entire group, subsidiary, division, or strategic business unit; OPER_UNIT refers to workers in a plant, office, operating unit, hospital, branch, or store; DEPT refers to workers in a department; and TEAM refers to workers in a work group or small team.⁸ We assume

⁷ Service operations in manufacturing companies (e.g., marketing and purchasing) are coded zero.

⁸ The omitted category is corporate-level plans covering all nonmanagement workers in the company.

that GROUP, OPER_UNIT, DEPT, and TEAM capture respectively narrower sets of activities within the firm.

Second, we include the number of locations covered by the plan under the assumption that a greater number of locations is associated with a broader set of activities and greater coordination requirements. The average plan covers 29 locations (median = 2). Given the skewness in the data, the variable LOCATIONS is computed using the natural logarithm of the number of locations covered by the plan.

Finally, the variable PCT_TOTAL measures the percentage of the company's employees who are covered by the plan. Keating (1997) argues that aggregated, higher-level performance measures are more likely to be influenced by plan participants' actions when these participants represent a larger proportion of the firm. Thus, these measures should be more informative performance indicators in plans covering a large percentage of employees. The average plan covers 40% of the employees in the organization.

3. Reasons for Adopting Incentive Plans

The survey asked 11 questions on possible reasons for introducing the incentive plan (other than simply motivating employees to achieve some performance objective). Principal component analysis (with oblique rotation) of the 11 survey items reveals three factors with eigenvalues greater than one and retaining 64% of the total variance. Four questions load greater than 0.40 on the first factor. These questions address the importance of the plan in promoting "organizational change" by (1) enhancing communication of unit objectives, (2) encouraging intrapreneurship, (3) fostering teamwork, and (4) improving morale and/or employee relations. The resulting organizational change variable (denoted ORGCHG) is computed using the average standardized response to these questions (Cronbach $\alpha = 0.72$).

The second factor relates to the implementation of a "pay-for-performance" culture. The three questions loading greater than 0.40 on this factor relate to the importance of (1) better pay-for-performance linkage, (2) reducing entitlement mentality, and (3) making labor costs more variable with organization performance. The variable PAYPERF is computed using the average standardized responses to these three questions (Cronbach $\alpha = 0.74$).

The third factor relates to the objective of "improving and upgrading the workforce." Average standardized scores for the four questions loading greater than 0.40 on this factor ([1] importance of the plan in enabling the unit to become more competitive in total compensation, [2] assisting in recruiting, [3] improving employee relations, and [4] upgrading the

quality of the workforce) are used to compute the variable WKFORCE (Cronbach $\alpha = 0.83$).

4. Stakeholder Interests

Finally, we examine the influence of two stakeholder groups on the choice of performance measures. Management involvement in incentive plan design is measured using two items from the survey. The first (denoted MGTDESIGN) is an indicator variable that identifies whether headquarters mandated the design or the plan design task force only included management employees. Sixty-six percent of the plans were designed solely by management. The second (denoted MGTSPECIFY) is an indicator variable identifying whether top management specified some or all of the performance measures use in the plan. Top management specified performance measures in 41% of the plans.

We examine the influence of unions on plan design using a variable (denoted UNION) that is coded one if the plan covers at least some union employees, and zero otherwise. Twenty-six percent of the plans cover union workers.

D. Correlations among Predictor Variables

Correlations among the predictor variables are reported in table 3. The magnitudes are generally small, creating no serious problems with multicollinearity in subsequent tests. Despite the small magnitudes, a number of interesting relations emerge. Plans in manufacturing operations tend to cover workers throughout the operation, rather than just those in departments or teams; tend to cover fewer locations; and are less likely to be implemented as a means to upgrade the workforce. Group-level plans cover more locations, reflecting the wide breadth of activities encompassed by these plans. Plans covering union workers tend to have less top management involvement in specifying the plan's performance measures, are less likely to use the incentive plan to upgrade the workforce, and are more likely to have operating unit-level coverage of workers. Plans designed to drive organizational change are positively associated with workforce involvement in decision-making and pay-for-performance objectives, but they are negatively associated with the number of units covered by the plan.

IV. Results

A. Use of Aggregate Performance Measure Classifications

Table 4 presents logit results for the five aggregate performance measurement classifications (ALL_NF, SOME_NF, WORKER, BUS_UNIT, and PROFIT). The models' pseudo R^2 's range from 0.259 to 0.431 ($p < 0.001$). Consistent with previous CEO and business unit studies, several

Table 3
Pearson Correlations among the Predictor Variables ($n = 607$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. INNOV	1.000																			
2. INVOLVE	.034	1.000																		
3. CONTIMP	-.025	-.004	1.000																	
4. TELECOMM	.054	-.051	.005	1.000																
5. UTILITY	-.134	-.027	-.013	-.038	1.000															
6. DEREG	-.111	-.059	-.073	.010	.338	1.000														
7. MKTPERF	-.021	-.071	.234	-.035	.027	-.071	1.000													
8. LAYOFFS	-.058	-.054	-.076	-.038	-.092	-.014	-.079	1.000												
9. MFG	.083	.185	.124	-.140	-.265	-.152	-.000	-.010	1.000											
10. GROUP	-.004	-.067	.074	.070	-.039	-.022	.007	.051	-.112	1.000										
11. PLANT	.026	.224	.003	-.055	-.144	-.046	-.036	-.003	.370	-.415	1.000									
12. DEPT	-.059	-.067	-.058	.030	.012	-.058	.000	-.032	-.232	-.159	-.270	1.000								
13. TEAM	-.070	.050	-.033	-.024	.004	.048	-.022	.034	-.136	-.079	-.134	-.051	1.000							
14. PERTOT	-.023	-.066	-.114	-.024	.170	.153	-.001	.007	-.148	-.071	-.282	-.183	-.084	1.000						
15. LOCATIONS	-.009	-.176	-.050	.148	.123	.180	.003	-.006	-.301	.198	-.304	-.057	.015	.167	1.000					
16. ORGCHG	.062	.206	.117	-.129	.013	-.029	.035	-.115	.168	-.039	.180	-.099	-.017	-.059	-.201	1.000				
17. PAYPERF	-.166	.021	.066	.016	-.008	-.016	.118	-.036	.013	-.011	-.036	.042	.051	-.045	-.045	.293	1.000			
18. WKFORCE	.011	.015	-.128	-.098	-.087	-.052	-.063	.043	-.210	.011	-.165	.120	.078	.163	.022	.222	.260	1.000		
19. MGTDESIGN	.016	-.131	-.219	.058	-.021	-.021	-.165	.061	-.096	.021	-.154	-.008	.002	.092	.093	-.217	-.204	.126	1.000	
20. MGTSPEC	-.067	.056	-.001	-.053	-.028	.014	-.089	.005	-.001	.057	-.100	.102	-.045	.002	-.025	.109	.090	.083	-.145	1.000
21. UNION	-.150	-.013	.179	-.010	.241	.084	.065	-.068	.215	-.085	.219	-.049	-.094	-.090	-.084	.121	.087	-.293	-.209	-.084

NOTE.—See appendix for variable definitions. Absolute value of correlations > .104 ($p < .01$, two-tail); > .080 ($p < .05$, two-tail); > .067 ($p < .10$, two-tail); and > .058 ($p < .15$, two-tail).

Table 4
Logit Models Examining the Determinants of Performance Measure
Configurations in Worker Incentive Plans

	ALL_NF	SOME_NF	WORKER	BUS_UNIT	PROFIT
Intercept	-.167 (.874)	1.198* (.613)	-.648 (.727)	-2.027*** (.598)	.272 (.583)
Informativeness:					
INNOV	-.126 (.215)	-.124 (.154)	.299* (.169)	-.339** (.157)	.097 (.149)
INVOLVE	-.176 (.225)	.079 (.185)	.095 (.180)	.112 (.164)	-.165 (.174)
CONTIMP	.428 (.364)	.767*** (.252)	-.542** (.276)	1.167*** (.215)	-.865*** (.234)
TELECOMM	-.431 (.986)	.689 (.365)	-.794 (1.124)	-.376 (.718)	.657 (.669)
UTILITY	.485 (.917)	2.033*** (.656)	-.082 (.579)	1.150*** (.451)	-1.111** (.495)
DEREG	-.762 (.599)	-.666 ⁺ (.457)	.299 (.530)	-.532 (.453)	.343 (.427)
MKTPERF	.174 (.177)	.063 (.119)	-.159 (.128)	.225** (.109)	-.148 (.112)
LAYOFFS	.010 (.014)	-.001 (.011)	.010 (.012)	-.003 (.011)	-.006 (.011)
MFG	-1.135*** (-.350)	-.942*** (.248)	-.097 (.299)	-.203 (.246)	.273 (.237)
Breadth of plan coverage:					
PCT TOTAL	-1.539*** (.390)	-1.171*** (.286)	-1.010*** (.353)	-.522* (.291)	1.303*** (.278)
LOCATIONS	-.293*** (.104)	-.195*** (.067)	-.211** (.100)	.097 (.069)	.026 (.067)
GROUP	.235 (.473)	.417 (.297)	-.291 (.473)	.481 ⁺ (.310)	-.175 (.298)
OPER_UNIT	1.888*** (.418)	1.143*** (.290)	.947** (.388)	.381 (.308)	-1.021*** (.285)
DEPT	1.780*** (.561)	.999*** (.447)	1.159** (.492)	.202 (.418)	-.927*** (.410)
TEAM	1.749* (1.074)	1.539* (.872)	.926 (.727)	.547 (.668)	-1.045 ⁺ (.605)
Reasons for adopting:					
ORGCHG	.356* (.203)	.469*** (.161)	.402** (.179)	.325** (.159)	-.668*** (.156)
PAYPERF	-.357* (.198)	.038 (.790)	-.518*** (.163)	.409*** (.139)	-.064 (.139)
WKFORCE	.012 (.195)	-.271* (.148)	.254 ⁺ (.162)	-.613 (.149)	.483*** (.145)
Stakeholder interests:					
MGTDESIGN	-.091 (.317)	-.184 (.240)	-.274 (.254)	-.043 (.221)	.277 (.223)
MGTSPECIFY	-.511* (.293)	-.131 (.214)	-.146 (.236)	.291 ⁺ (.202)	-.100 (.203)
UNION	.385 (.375)	.228 (.280)	.638** (.280)	-.267 (.298)	-.329 (.262)
Pseudo R ²	.431	.311	.264	.259	.342
N	346	607	607	607	607

NOTE.—See appendix for variable definitions. Standard errors are in parentheses.

⁺ $p < .15$ (two-tail).

* $p < .10$ (two-tail).

** $p < .05$ (two-tail).

*** $p < .01$ (two-tail).

of the informativeness variables are significant predictors of performance measurement choices. Manufacturing operations are negatively associated with the use of nonfinancial measures, supporting claims that nonfinancial measures are relatively more informative in service operations (Hayes 1977; Mia and Chenhall 1994). Plans used to support a continuous improvement strategy (CONTIMP) tend to use a mixture of financial and nonfinancial measures, as seen in the significant, positive relations in the SOME_NF and BUS_UNIT models and the negative relations in the WORKER and PROFIT models. Surprisingly, employee involvement in developing work processes (INVOLVE) is not associated with the overall choice of performance measures, at least using the aggregate classifications. This finding contradicts extensive discussions on the influence of worker decision rights on compensation plan design (e.g., Wruck and Jensen 1994; Ittner and Larcker 1995). In contrast to prior studies, our innovation strategy measure is not significant in the two nonfinancial models. However, more innovative units make greater use of worker-related measures and less use of business unit measures, suggesting that these classifications provide better aggregate representations of worker measurement choices in innovation-oriented firms than does the distinction between financial and nonfinancial measures.

The proxies for past performance (MKTPERF and LAYOFFS) are not significant at conventional levels, implying that aggregate measurement choices are not affected by the unit's performance. Deregulation and membership in the telecommunications industry also exhibit little statistical significance. Utilities, on the other hand, tend to choose a mixture of financial and nonfinancial measures, with the coefficient on UTILITY significantly positive in the SOME_NF and BUS_UNIT models and significantly negative in the PROFIT model.

The other sets of predictor variables also explain measurement choices. The strongest results involve variables capturing the breadth of plan implementation. Plans covering a larger percentage of employees use financial, business unit, and profit measures more frequently and worker-level measures less frequently. Those covering more locations also tend to place greater emphasis on financial measures and less emphasis on worker measures. Plans covering workers throughout a group exhibit few differences from those covering the entire corporation (i.e., the omitted category). However, plans covering smaller groups of employees (OPER_UNIT, DEPT, and TEAM) generally make greater use of nonfinancial and worker measures and less use of profit measures than group or corporate plans. Taken together, the plan breadth results are consistent with nonfinancial or worker-related measures being more informative about worker actions in less diverse settings, where it is easier to prespecify the desired actions of all plan participants.

The reasons for adopting the plan also appear to play a significant role

in measurement choices. In particular, using the plan as an instrument for changing organizational communication, teamwork, and morale (ORGCHG) has a strong positive relation with the use of nonfinancial performance measures, worker measures, and business unit measures, and a negative relation with profit-oriented plans. It is interesting that improving and upgrading the workforce (WKFORCE) has a negative relation with the adoption of plans containing at least some nonfinancial performance measures and a positive relation with profit-oriented plans. However, this objective is not statistically related to the adoption of worker-oriented measures (WORKER). Adopting the plan to improve pay-for-performance linkages (PAYPERF) has a negative association with the use of pure nonfinancial plans and worker-related measures and a positive association with business unit measures. These tests provide no support for Heneman et al.'s (1999) claim that accounting measures are preferred when management attempts to link the payment of workers' bonuses to the company's ability to pay.

Finally, the significant coefficients on MGTSPECIFY suggest that top management tends to move the plan away from sole reliance on financial measures, instead emphasizing a combination of financial and nonfinancial business-unit measures. Plans designed by management personnel, on the other hand, have no significant association with these measurement choices. In contrast to management-specified plans, plans implemented in union settings are more likely to include worker-related measures, potentially reflecting the union's desire to have member compensation based on measures that are more controllable and have greater "line of sight" for union workers.⁹

In sum, results using the aggregate measurement classifications support economic theories that the choice of performance measures is influenced by the measures' informativeness. However, the evidence suggests that other factors such as nonmotivational reasons for adopting the plan and alternative stakeholder interests also have a significant impact on measurement choices. As a result, compensation studies that ignore these factors provide an incomplete picture of performance measurement system design and implementation.

⁹ To provide some evidence on the relative explanatory power of the various sets of predictors, we estimated backward stepwise models. In this procedure, the full model is estimated first. Each set of explanatory variables is then removed one at a time, with the other variables remaining in the model. The change in explanatory power (pseudo R^2) relative to the full model, as well as the statistical significance of the change, can then be estimated. The median percentage reduction in the full model's pseudo R^2 is 37.7% when the plan breadth variables were dropped, 14.3% when the informativeness variables were dropped, 11.7% when the reason for adoption variables were dropped, and 2.3% when the stakeholder variables were dropped.

B. Use of Individual Performance Measure Categories

Table 5 presents results when indicators for the individual performance measure categories serve as criterion variables. These tests provide exploratory insight into the extent to which the factors influencing the use of different measures within the five aggregate classifications vary. The organization of table 5 follows the earlier cluster analysis results, with the measures within the PROFIT, BUS_UNIT, and WORKER clusters arranged in adjacent columns. Although many of the results are consistent with those in table 4, some of the predictor variables that were insignificant using the aggregate performance measure classifications are significant determinants of individual performance measures. Furthermore, many of the significant explanatory variables differ within the aggregate categories.

Some of the most striking results are the insignificant relations between the informativeness variables and the use of accounting measures. Instead, the influence of informativeness issues on the adoption of accounting-based measures tends to be driven by the breadth of plan coverage. Accounting measures are used more frequently when the plan covers a larger percentage of employees and more locations. Corporate and group plans also use accounting measures more often than operating unit or departmental plans. Other factors affecting the use of accounting measures include the plans' emphasis on pay-for-performance objectives and stakeholder issues. In particular, management involvement in plan design (MGTDESIGN and MGTDESIGN) is positively associated with the use of accounting measures. These results suggest that managers may impose their own incentives (which frequently are accounting-based) on workers. In contrast, plans in unionized units make less use of accounting measures, which union workers often have little control over.

Informativeness issues have a greater effect on the use of the individual business unit and worker measures. As seen previously, plans that support a continuous improvement strategy use both financial (cost) and nonfinancial (volume, quality, and attendance) measures more frequently. However, these plans use safety measures less frequently. In contrast to results using the aggregate measurement classifications, employee involvement in developing work practices also appears to influence measurement choices, with greater involvement associated with the use of volume, productivity, and safety measures. This evidence provides some support for claims that the allocation of decision rights to workers increases the informativeness of nonfinancial measures (e.g., Wruck and Jensen 1994). Innovation-oriented strategies, on the other hand, are negatively related to the use of volume, safety, and attendance measures.

Utilities are associated with the use of nonfinancial quality, safety, and attendance measures together with cost measures. These results are consistent with the evidence in table 4, which indicated that utilities tend to

Table 5
Logit Models Examining Determinants of the Specific Performance Measures Used in 607 Worker Incentive Plans

	ACCT	COST	VOL	QUAL	PROD	SAFETY	ATTEND
Intercept	-.543 (.615)	-1.589*** (.574)	-.376 (.521)	-.609 (.576)	-.652 (.648)	-2.367*** (.809)	-.837 (.773)
Informativeness:							
INNOV	.071 (.153)	-.206 (.146)	-.566*** (.169)	.118 (.405)	-.032 (.160)	-.421** (.175)	-.318 ⁺ (.209)
INVOLVE	-.113 (.175)	.056 (.158)	.340** (.160)	.198 (.164)	.360** (.163)	.473*** (.177)	.258 (.206)
CONTIMP	-.218 (.234)	.891*** (.210)	.612*** (.215)	.925*** (.221)	-.094 (.241)	-.474* (.283)	.524 ⁺ (.306)
TELECOMM	-.133 (.698)	-.801 (.739)	-.855 (.743)	.430 (.694)	-.961 (1.107)	-.442 (1.144)	.017 (1.100)
UTILITY	.608 (.512)	1.159*** (.445)	.118 (.458)	1.013** (.475)	.107 (.506)	3.912*** (.593)	1.893*** (.521)
Reasons for adopting:							
DEREG	.503 (.474)	-.386 (.429)	-.690 ⁺ (.473)	-.170 (.421)	.000 (.485)	-.993* (.581)	-.416 (.555)
MKTPERF	.115 (.115)	.130 (.106)	.226** (.110)	.077 (.108)	-.165 (.117)	-.336** (.137)	-.387*** (.149)
LAYOFFS	-.003 (.011)	-.007 (.010)	-.019* (.011)	.003 (.010)	.006 (.011)	.003 (.013)	-.003 (.016)
MFG	.169 (.499)	.089 (.237)	-.895*** (.244)	-.776*** (.239)	-.072 (.272)	.897*** (.341)	-.149 (.329)

Breadth of plan coverage:							
PCT TOTAL	1.013*** (.292)	-.151 (.026)	-.990*** (.296)	-.931*** (.277)	-.848*** (.319)	-.575 ⁺ (.370)	.584 ⁺ (.386)
LOCATIONS	.219*** (.071)	.078 (.067)	-.003 (.069)	.015 (.066)	-.045 (.080)	.040 (.091)	-.105 (.103)
GROUP	-.092 (.332)	.531* (.300)	.041 (.311)	.600** (.302)	-.011 (.380)	.996** (.418)	-.522 (.453)
OPER_UNIT	-1.637*** (.299)	.467 ⁺ (.291)	-.029 (.307)	.846*** (.292)	.534 ⁺ (.342)	1.313*** (.415)	.167 (.377)
DEPT	-1.343*** (.409)	.313 (.412)	.435 (.395)	1.049*** (.409)	1.055** (.439)	.171 (.664)	-.545 (.602)
TEAM	-.824 (.623)	.357 (.672)	.305 (.644)	.710 (.628)	.709 (.673)	-.299 (1.335)	-.146 (.897)
Reasons for adopting:							
ORGCHG	-.193 (.159)	.346** (.152)	.083 (.156)	.774*** (.155)	.465*** (.170)	1.007*** (.209)	-.336 ⁺ (.210)
PAYPERF	.345** (.145)	.256* (.133)	.338** (.139)	.243* (.135)	-.215 ⁺ (.149)	-.396** (.167)	-.119 (.189)
WKFORCE	.084 (.146)	.554*** (.142)	-.119 (.141)	-.645*** (.144)	.181 (.150)	-.304* (.185)	.430** (.190)
Stakeholder interests:							
MGTDESIGN	.574** (.232)	-.357* (.210)	-.517** (.218)	.148 (.217)	-.310 (.229)	.592** (.272)	-.228 (.302)
MGTSPEC	.407* (.211)	.262 (.195)	-.046 (.201)	-.012 (.197)	.249 (.214)	.201 (.249)	.048 (.278)
UNION	-.692** (.271)	.148 (.239)	-.042 (.872)	.255 (.247)	.628** (.257)	.463* (.281)	-.309 (.365)
Pseudo R ²	.401	.235	.234	.301	.185	.399	.135

NOTE.—See appendix for variable definitions. Standard errors are in parentheses.

⁺ $p < .15$ (two-tail).

* $p < .10$ (two-tail).

** $p < .05$ (two-tail).

*** $p < .01$ (two-tail).

use some nonfinancial measures in their plans, but are no more likely than other companies to focus exclusively on nonfinancial performance. Recently deregulated units place less emphasis on volume and safety (two measures commonly used by regulators to set prices or profit levels), but a unit's presence in the telecommunications industry has no significant effect on the choice of individual measures.

The results for manufacturing units are mixed and indicate less use of quality and volume measures but more use of safety measures. The quality result is somewhat surprising given extensive discussions on the role of nonfinancial quality measures in evaluating manufacturing performance (e.g., Kaplan 1983; Ittner and Larcker 1995). Although the coefficients on MFG are positive in the ACCT and COST models, we find no significant evidence that manufacturing units use these financial measures more often than service operations.

Finally, units that experienced poor performance in the past tend to use safety and attendance measures less frequently and volume measures more frequently. Layoffs are negatively related to the use of volume measures, but the variable is not significant in the other models. Contrary to our predictions, past performance has no significant association with the use of accounting and cost control measures.

Results for the plan breadth variables suggest that the influence of these variables on the use of business unit and worker-oriented measures is often opposite their influence on the use of accounting measures. Plans covering a greater percentage of employees, which make greater use of accounting measures, make less use of all of the nonfinancial measurement categories. Conversely, group, operating unit, and departmental plans, which tend to make less use of accounting measures than corporate plans, make greater use of many of the business unit and worker measures. Team-based plans and the number of locations have no significant association with the business unit and worker measures.

The choice of individual performance measures is also affected by the reasons for introducing the plan. Plans designed to foster organizational change have a significant influence on the use of most of the nonfinancial worker and business unit measures. Quality, productivity, and safety measures are all used more frequently in these plans, in conjunction with cost control measures. However, use of attendance measures is less frequent when organizational change is a major objective. Along with greater use of accounting measures, plans implemented to improve pay-for-performance linkages use all three categories of business unit measures to a greater extent, but they exhibit lower use of the worker-oriented safety and attendance measures. Thus, even in plans designed to increase pay-for-performance relations, it appears that companies view some types of nonfinancial measures to be useful in promoting this objective. Plans put into

place to upgrade the workforce include attendance measures more frequently, but use quality, cost, and (surprisingly) safety measures less often.

Whereas management participation in plan design is positively associated with the use of accounting measures, it is negatively associated with cost and volume measures. Top management's imposition of some or all of the measures in the plan has little effect on the use of business unit or worker measures. Unionized units, on the other hand, accompany lower use of accounting measures with greater use of two of the worker-oriented measures (productivity and safety), again highlighting the significant role stakeholder interests play in incentive plan design.

Overall, the evidence in table 5 indicates that the use of specific performance measures is a function of the measures' informativeness, the breadth of plan coverage, the reasons for adopting the plan, and stakeholder interests. However, the use of specific measures within the aggregate measurement categories is not necessarily influenced by the same factors, suggesting that the use of these aggregate classifications in research understates the complexity of measurement system design.

C. Level of Performance Measurement

Compensation researchers argue that the effective choice of performance measures depends not only on the type of measures but also on the level of measurement (e.g., Bushman et al. 1995; Keating 1997). We therefore extend the analysis to examine whether the individual performance measures are computed at the level of the unit covered by the plan (e.g., the plant) or at some higher organizational level (e.g., group or corporate). The results are provided in table 6. Due in part to the small number of plans containing attendance measures and the near absence of higher-level measurement of this metric (only 4 of 46 in this subsample), the attendance model is not significant at the 10% level and is not reported in the table. The remaining models explain a significant proportion of the variance in the criterion variables, with pseudo R^2 s ranging from 0.385 to 0.625.

The most consistent determinants of measurement level are the breadth of plan coverage variables. Plans covering a larger percentage of the organization's employees and more locations tend to use higher-level accounting, volume, quality, and productivity measures. The use of higher-level measures also increases when the plan is designed for lower-level organizational units. Relative to plans covering teams (the omitted category), group and operating unit plans make less use of higher-level accounting and business unit measures but use similar measurement levels for the two behavioral metrics (productivity and safety). Department-level plans use higher-level quality and productivity measures marginally less often than team plans, but the measurement level for the other four categories is not significantly different across these two levels.

Table 6
Logit Models Examining the Use of Performance Measures Computed
above the Level of the Participants in Worker Incentive Plans

	ACCT	COST	VOL	QUAL	PROD	SAFETY
Intercept	.948 (1.509)	-1.783 (1.834)	-1.583 (1.848)	-1.046 (1.248)	-.975 (2.213)	-3.759 (164.297)
Informativeness:						
INNOV	.121 (.311)	-.251 (.445)	-.406 (.413)	-.294 (.295)	-.230 (.670)	.304 (.508)
INVOLVE	.007 (.339)	-1.169** (.504)	-.120 (.341)	.049 (.263)	1.197*** (.427)	.014 (.490)
CONTIMP	.105 (.456)	1.051* (.637)	.866 (.703)	.921** (.396)	.719 (.984)	.491 (1.013)
TELECOMM	.275 (1.307)	-10.637 (56.665)	1.996 (1.713)	-5.546 (1.287)	-6.543 (99.640)	-8.400 (164.279)
UTILITY	-1.107 (.946)	-9.103 (33.325)	-7.612 (32.449)	-1.511 ⁺ (.988)	-9.429 (45.053)	-10.400 (52.001)
DEREG	1.018 (.859)	-6.856 (40.873)	-8.416 (38.643)	.352 (.982)	-9.552 (51.074)	19.173 (99.981)
MKTPERF	-.205 (.228)	.875*** (.337)	.371 (.354)	.464** (.216)	.600 (.546)	.322 (.424)
LAYOFFS	.020 (.020)	-.060 ⁺ (.039)	-.001 (.032)	-.002 (.017)	.086*** (.033)	-.140 (.103)
MFG	.583 (.454)	-1.268* (.759)	1.011 (.886)	-.945* (.499)	-2.073* (1.187)	-2.964*** (1.088)
Breadth of plan coverage:						
PCT TOTAL	2.863*** (.514)	-1.415 (1.064)	2.455** (.996)	1.539** (.574)	1.695 ⁺ (1.164)	1.354 (1.107)
LOCATIONS	.287** (.132)	.063 (.147)	.379 ⁺ (.240)	.174 ⁺ (.066)	.459* (.237)	-.229 (.303)
GROUP	-3.987*** (1.212)	-1.829 (1.432)	-4.931*** (1.531)	-3.105*** (.995)	-3.651 (1.999)	2.650 (164.293)
OPER_UNIT	-2.079* (1.190)	-2.168** (1.437)	-2.356* (1.308)	-1.716* (.929)	-3.054 ⁺ (2.111)	3.326 (164.290)
DEPT	-.378 (1.285)	-2.049 (1.654)	-.182 (1.240)	-1.589 ⁺ (.992)	-2.975 ⁺ (1.922)	-6.115 (173.149)
Reasons for adopting:						
ORGCHG	.364 (.359)	.645 (.581)	2.218*** (.693)	.359 (.330)	.745 (.720)	-.753 (.807)
PAYPERF	-.004 (.279)	.277 (.435)	-.016 (.457)	.036 (.293)	-.625 (.715)	-.502 (.648)
WKFORCE	.118 (.287)	-.575 (.457)	-1.019** (.446)	-.673** (.282)	-.438 (.587)	.237 (.702)
Stakeholder interests:						
MGTDESIGN	.638 (.488)	.107 (.648)	-.111 (.699)	-.515 (.423)	-.632 (.840)	-.547 (.938)
MGTSPEC	.409 (.406)	-1.152 (.661)	-2.271*** (.701)	-.104 (.379)	-1.359 (.979)	.223 (.886)
UNION	-1.580** (.628)	.721 (.712)	-.288 (.830)	.670 ⁺ (.431)	-.223 (.906)	.769 (.910)
Pseudo R ²	.478	.609	.625	.385	.536	.485
N	181	184	164	246	134	118

NOTE.—See appendix for variable definitions. The dependent variable is coded one if the measure is used in the plan and is (at least partially) evaluated above the level of the organizational unit covered by the plan, and zero otherwise. Standard errors are in parentheses.

⁺ $p < .15$ (two-tail). * $p < .10$ (two-tail). ** $p < .05$ (two-tail). *** $p < .01$ (two-tail).

The plan breadth results (at least partially) reflect the organizational interdependencies captured by these variables. While groups or business units may operate in a relatively independent fashion, departments and teams must often coordinate their efforts or integrate their output to achieve desired results (Scott and Tiessen 1999), leading to greater use of higher-level measures (which capture these interdependencies) in departmental and team plans. The greater use of higher-level measures in plans covering more locations and a larger percentage of the organization's employees also supports claims that these measures are more informative when the plan covers a larger number of interdependent activities (Beischel and Smith 1991; Bushman et al. 1995; Keating 1997).

Research on quality measurement practices indicates that effective implementation of a continuous improvement strategy requires at least some of the performance measures to be more global in nature, rather than strictly local measures of individual improvement project or team performance, in order to coordinate improvement efforts and promote cross-functional cooperation (Atkinson, Hamburg, and Ittner 1994). Consistent with this claim, plans designed to support continuous improvement strategies tend to use higher-level cost and quality measures. Employee involvement is also associated with greater use of higher-level productivity measures, but it is negatively related to higher-level measurement of costs. Innovation strategies have little influence on the level of measurement.

The other informativeness variables exhibit mixed results. None of the regulation variables is significant at conventional levels. Higher performance than competitors is associated with greater use of higher-level cost and quality measures, and layoffs (an indicator of poor performance) are associated with less use of higher-level cost measures. However, layoffs are positively related to higher-level productivity measurement. Manufacturing units tend to use higher-level cost, quality, productivity, and safety measures less often than service units, suggesting that manufacturing operations may be more self-contained than service operations.

The reasons for plan adoption have little explanatory power. The only significant relations are a positive association between organizational change objectives and the use of higher-level volume measures and negative associations between pay-for-performance linkages and higher-level volume and quality measurement.

Finally, we examine the influence of management participation and unions on this measurement choice. Since upper-level managers are held responsible for total organizational performance, they may attempt to impose similar objectives on workers. If so, we would expect greater use of higher-level measures in plans where management participated in the design or mandated some or all of the performance measures. On the other hand, union preferences for measures that are more controllable by

their members would suggest an inverse relation between UNION and the use of higher-level performance measures.

Contrary to these predictions, management's role in specifying some or all of the plan's measures is negatively related to the use of higher-level volume measures, while management involvement in plan design is not statistically significant in any of the models. As expected, plans covering union employees incorporate higher-level accounting measures (over which workers generally have little control) less frequently than other plans. However, coefficients on this variable in the other models are not significant at the 10% level (two-tail).

In general, the results in table 6 suggest that many of the same factors influencing the types of performance measures in worker incentive plans, especially informativeness issues and breadth of plan coverage, also influence the level of measurement. However, other factors, such as management involvement in plan design and alternative reasons for adopting the plan, have a much greater influence on the types of measures included in the plan than on the level of measurement.

V. Summary and Conclusions

Using a large sample of incentive plans designed for nonmanagement employees, we examined some of the factors influencing the choice of performance measures. We found that variables reflecting the breadth of plan coverage and relative informativeness of the alternative measures are the primary determinants of the measures used in worker incentive plans. However, we also found that the reasons for adopting the plan (i.e., promoting organizational change, improving pay-for-performance linkages, and upgrading the workforce) play a role in performance measure choices, as do unionization and management participation in plan design. Finally, our results indicate that the factors influencing the use of specific measures vary, suggesting that the aggregate performance measure classifications commonly used in compensation research, such as the comparison of financial versus nonfinancial metrics, provide somewhat misleading inferences regarding performance measure choices.

As in all exploratory studies, our results are subject to several limitations. First, some of our variables may have significant measurement error. This is particularly true of our innovation construct, which is based on company-level indicators rather than unit-level indicators and has a relatively low reliability. Second, although we have information on the use or nonuse of different performance measures, we do not have the weights placed on these measures when computing plan payouts. Finally, many of our predictor variables are endogenous choices, which will tend to produce inconsistent parameter estimates. Future studies can attempt to overcome this limitation using simultaneous equations models where the

hypothesized determinants of measurement choices are also endogenous. More important, future studies can build on this research to examine the extent to which performance measurement choices and their determinants affect the performance consequences of worker incentive plans.

Appendix

Variable Definitions

SOME_NF	= one if at least one nonfinancial performance measure is used in the plan, and zero otherwise. Accounting and cost are financial categories and productivity, quality, safety, attendance, and volume are nonfinancial categories.
ALL_NF	= one if only nonfinancial performance measures are used in the plan, and zero if only financial measures are used in the plan (plans with a mixture of financial and nonfinancial performance measures are coded as missing). Accounting and cost are financial categories and productivity, quality, safety, attendance, and volume are nonfinancial categories.
ACCT	= one if accounting measures (e.g., profitability, revenues, earnings, return on assets, etc.) are used for computing plan payouts, and zero otherwise.
COST	= one if cost control measures (e.g., cost relative to plan goal) are used for computing plan payouts, and zero otherwise.
VOL	= one if volume measures (e.g., output relative to plan goal) are used for computing plan payouts, and zero otherwise.
QUAL	= one if quality measures (e.g., internal defect rates and external customer measures) are used for computing plan payouts, and zero otherwise.
PROD	= one if productivity measures (e.g., output per employee) are used for computing plan payouts, and zero otherwise.
SAFETY	= one if safety measures (e.g., number of injuries and safety audit ratings) are used for computing plan payouts, and zero otherwise.
ATTEND	= one if attendance measures (e.g., perfect attendance) are used for computing plan payouts, and zero otherwise.
WORKER	= one if the observation is assigned to the cluster of performance measures that are primarily productivity, safety, and attendance, and zero otherwise.
BUS_UNIT	= one if the observation is assigned to the cluster of performance measures that are primarily cost, volume, and quality, and zero otherwise.

PROFIT	= one if the observation is assigned to the cluster of performance measures that are primarily accounting, and zero otherwise.
INNOV	= average of the standardized scores for the book-to-market ratio (reverse coded), research and development expense to sales ratio, and advertising expense to sales ratio. Each ratio is computed over the 5-year period prior to survey collection. For firms with no Compustat data (either private or unknown name), similar ratios are computed using the median values for the industry of the unit.
INVOLVE	= average of the standardized scores for the percentage of plan participants that are involved in individual suggestion plans, team/group suggestion plans, ad hoc problem solving groups, self-directed work teams, and employee management teams.
CONTIMP	= one if the plan is viewed as an integral part of an established organizational culture of continuous improvement, and zero otherwise.
TELECOMM	= one if the unit is in the telecommunications industry, and zero otherwise.
UTILITY	= one if the unit is in the utility industry, and zero otherwise.
DEREG	= one if the unit experienced deregulation during the past 2 years, and zero otherwise.
MKTPERF	= one (five) if unit performance is worse (better) than the market in which they compete.
LAYOFFS	= percentage of employees eligible to participate in the plan who were laid off or terminated during the past 2 years.
MFG	= one if the unit is best characterized as manufacturing operation, and zero if best characterized as a service operation.
LOCATIONS	= natural logarithm of the number of locations covered by the plan.
GROUP	= one if the unit covered by the plan is an entire group, subsidiary, division, or strategic business unit, and zero otherwise.
PLANT	= one if the unit covered by the plan is a plant, office, operating unit, hospital, branch, or store, and zero otherwise.
DEPT	= one if the unit covered by the plan is a department, and zero otherwise.
TEAM	= one if the unit covered by the plan is a work group or small team, and zero otherwise.
PERTOT	= proportion of workers participating in the unit plan relative to the total number of employees in the entire organization.

- ORGCHG = average of the standardized scores to the following items regarding the reasons for introducing the plan (1 = no importance; 5 = high importance): enhance communication of unit objectives; encourage intrapreneurship; foster teamwork; improve morale and/or employee relations.
- PAYPERF = average of the standardized scores to the following items regarding the reasons for introducing the plan (1 = no importance; 5 = high importance): better pay-performance linkage; reduce entitlement mentality; make labor costs more variable with organizational performance.
- WKFORCE = average of the standardized scores to the following items regarding the reasons for introducing the plan (1 = no importance; 5 = high importance): become more competitive in total compensation; assist in recruiting; improve employee retention; upgrade quality of workforce.
- MGTDESIGN = one if the plan design task force only included management employees or the design was mandated by headquarters, and zero otherwise.
- MGTSPECIFY = one if management specified either some or all of the performance measures used in the plan design, and zero otherwise.
- UNION = one if the unit has any union employees that participate in the plan, and zero otherwise.

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