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An Empirical Investigation of an Incentive Plan that Includes Nonfinancial Performance Measures

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ABSTRACT: Recent studies report an increasing use of nonfinancial measures such as product quality, customer satisfaction, and market share in performance measurement and compensation systems. A growing literature suggests that because current nonfinancial measures are better predictors of long-term financial performance than current financial measures, they help refocus managers on the long-term aspects of their actions. However, little empirical evidence is available on the relation between nonfinancial measures and financial performance, and even less is known about performance impacts of incorporating nonfinancial measures in incentive contracts. Using time-series data for 72 months from 18 hotels managed by a hospitality firm, this study provides empirical evidence on the behavior of nonfinancial measures and their impact on firm performance. The results indicate that nonfinancial measures of customer satisfaction are significantly associated with future financial performance and contain additional information not reflected in the past financial measures. Furthermore, both nonfinancial and financial performance improve

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following the implementation of an incentive plan that includes nonfinancial performance measures.

Key Words: *Nonfinancial performance measures, Performance evaluation, Incentive plans, Customer satisfaction, Executive compensation, Hospitality industry.*

Data Availability: *The confidentiality agreement with the firm that provided data for this study precludes revealing its identity and disseminating data without its written consent.*

I. INTRODUCTION

Many firms now use nonfinancial measures such as product quality, customer satisfaction and market share to evaluate and reward managerial performance (Ittner et al. 1997). The primary reasons suggested for the use of nonfinancial performance measures are that these measures are better indicators of future financial performance than accounting measures, and they are valuable in evaluating and motivating managerial performance.¹ To date, however, there have been very few studies on the relation between nonfinancial measures and financial performance, and the empirical evidence provided by these studies has been mixed (Ittner and Larcker 1998b, 218). In addition, although there have been calls for greater emphasis on nonfinancial measures in internal performance measurement systems (Kaplan and Norton 1996) and firms have implemented such systems, virtually no evidence exists on the impact of including nonfinancial measures in performance evaluation and incentive compensation (Ittner and Larcker 1998b). Using time-series data from a number of lodging properties managed by a firm that implemented an incentive system based on nonfinancial and financial performance measures, this study provides empirical evidence on two research questions: (1) Are (some) nonfinancial performance measures leading indicators of financial performance? (2) Does the adoption of an incentive compensation plan that increases the emphasis on nonfinancial performance measures for key managers of a firm lead to improvements in both financial and nonfinancial performance? The analysis reveals that nonfinancial measures of customer satisfaction are related to future financial performance, and that both financial and nonfinancial performance improve following the implementation of an incentive plan that includes nonfinancial measures of performance.

Traditionally, firms have measured and rewarded managerial performance using financial measures such as earnings, return on investment, or unit costs (Eccles 1991). Recently, there has been an increased emphasis on nonfinancial measures such as customer satisfaction, employee satisfaction, productivity, product quality, and market share in compensating managers. For example, Chrysler Corporation paid bonuses to its 200 top executives based on the attainment of vehicle quality and customer satisfaction targets in addition to measures of profitability (Lavin 1994, A3). Ford Motor Company recently announced an executive

¹ The argument that nonfinancial measures are better indicators of future financial performance is based on cause-and-effect. An implicit assumption is that managerial actions result in outcomes such as innovation, quality, or customer satisfaction which, in turn, drive future financial performance (Kaplan and Norton 1992, 71; Hauser et al. 1994, 330). However, current financial measures do not reflect the value of these long-term-oriented managerial actions. Therefore, nonfinancial measures of performance are useful to help refocus managers on the long-term aspects of their actions (Hemmer 1996, 87–88).

compensation plan, similar to the plans used by General Motors and Chrysler, that includes nonfinancial customer satisfaction and operational measures (*New York Times* 1998).²

Several reasons have been suggested to explain why nonfinancial measures are used to augment financial measures in management control. Nonfinancial measures are believed to complement short-run financial figures as indicators of progress toward a firm's long-term goals (American Accounting Association 1971, 181; Johnson and Kaplan 1987, 259). Current profit and other financial measures only partially reflect the effects of past and current activities, whereas nonfinancial measures of customer satisfaction, internal process improvements, and an organization's innovation and improvement activities reflect the effect of current managerial actions that will not show up in financial performance until later (Kaplan and Norton 1992, 71; Singleton-Green 1993, 52).³ The use of nonfinancial measures for performance evaluation is also consistent with theoretical work on compensation in agency settings. Because financial measures of performance may be imperfect and noisy signals of a manager's effort, nonfinancial measures can add value by inducing long-run focused effort (Feltham and Xie 1994, 442; Hemmer 1996, 97; Joseph et al. 1999).

A principal justification for the use of nonfinancial performance measures is that they are leading indicators of financial performance. Two surveys (Ittner and Larcker 1998b, 218; Arthur Andersen & Co. 1994) suggest that many firms did not find a significant association between customer satisfaction and accounting or market returns. Using cross-sectional annual data from 77 Swedish firms from diverse industries, Anderson et al. (1994, 1997) found that, on average, customer satisfaction is positively associated with contemporaneous ROI, but found weaker or negative associations in service firms. Ittner and Larcker's (1998a) analyses based on customer and business-unit level data for two service firms indicate that customer satisfaction measures are positively related to future financial performance. However, their firm-level analysis of cross-sectional data did not find consistent associations between customer satisfaction and market returns. Time-series data can help overcome some potential shortcomings such as omitted variables, endogeneity and spurious correlation associated with analyses based on cross-sectional data. One possible explanation for the mixed findings in previous research is that these studies have relied on short time series (the number of longitudinal observations is less than or equal to four) to detect a lead-lag relation between customer satisfaction and economic performance. Our research setting with more than 60 time-series observations per business unit provides a greater statistical power to detect such a relation. Moreover, unlike previous studies that assume the lag period (such as a quarter, six months, or a year) because of data limitations, we are able to explore the timing of the lead-lag relation based on a statistical search.

Despite an increasing use of nonfinancial measures in managerial compensation (Ittner et al. 1997), there is little empirical evidence of the performance impacts of such plans. Incentive plans that include nonfinancial measures can affect financial performance either

² Ittner et al. (1997, 238) report that 36 percent of the companies surveyed in their study use nonfinancial measures in executive compensation. For details on the various studies that report increasing use of nonfinancial measures in compensation, the reader is referred to *Journal of Accountancy* (1993, 17), and Hauser et al. (1994, 328). Other studies of Japanese and British companies also indicate increasing use of nonfinancial measures in performance measurement (Hiromoto 1988, 26; Rees and Sutcliffe 1994, 334).

³ Other reasons suggested for the use of nonfinancial measures are that they are less susceptible to manipulation, more timely and more easily understood (Singleton-Green 1993, 52; Rees and Sutcliffe 1994, 332). However, others note that nonfinancial measures are not audited and may be more easily manipulated than financial measures (Ittner et al. 1997, 236). Competitive pressure is another reason why firms have started focusing on quality and customer responsiveness (Eccles 1991, 132; Hall 1993, 3). Our focus is on whether current nonfinancial measures allow prediction of future performance and how incorporating current nonfinancial measures into executive compensation plans impacts a firm's subsequent performance.

directly, or indirectly by improving nonfinancial performance which then impacts financial performance. Although prior empirical studies have documented the performance impact of including financial measures in incentive plans (Wagner et al. 1988; Banker et al. 1996), empirical support for the hypothesized performance impacts of including nonfinancial measures in compensation plans is at best weak (Ittner and Larcker 1998b, 220). Ittner et al. (1997) analyzed the determinants of the use of nonfinancial measures in CEO compensation, but did not examine the performance impacts of such compensation plans. Symons and Jacobs' (1995) study of a TQM-based reward system for production workers found that operational performance improved, but it did not examine the effects on financial performance. Using cross-sectional survey data, two studies found that self-reported use of manufacturing measures by managers had a positive impact on perceived performance in some manufacturing settings but not in others (Ittner and Larcker 1995; Abernethy and Lillis 1995). A similar study found no such evidence (Perera et al. 1997). None of these survey studies report the explicit use of nonfinancial measures in managerial compensation. Our study is the first to analyze longitudinal archival data both before and after a change in an incentive plan using an event-study design to provide empirical evidence on the financial effects of incorporating nonfinancial measures in incentive contracts.

The rest of the paper is organized as follows. The research site and data collection methods are described in Section II. Estimation models are developed in Section III and results are presented in Section IV. Concluding remarks are offered in Section V.

II. RESEARCH SITE, INCENTIVE PLAN, AND DATA COLLECTION

Research Site

The research site for this study is a hotel chain (hereafter referred to as HOTELCORP) operated by the hospitality division of a multi-billion dollar privately held conglomerate providing travel-related and other business services. During the period of this study, the hotel chain franchised more than 200 hotels and directly managed over 20 hotels. The hotels are located all over the world, but the focus of this study is on the managed hotels of HOTELCORP located within the United States. The research site was chosen for access to its senior managers and, more importantly, for availability of comparative data for a control group of franchised hotels and competitors that enables us to estimate the relation between financial and nonfinancial performance and isolate the performance impact of the incentive plan. Senior managers were motivated to participate in the study because they were unsure of how (or if) nonfinancial measures were related to future financial performance and were interested in identifying the impact of the incentive plan based on nonfinancial measures on firm performance.

The managed hotels vary in size, with the number of available rooms ranging from 150 to 450. Many of the hotels are rated as four-star and are classified as lower upscale hotels that include hotels like Crown Plaza, Radisson, Hilton and DoubleTree. The managed hotels offer full service. Most of the managed hotels of HOTELCORP cater largely to business travelers. The managed hotels are homogeneous in many important aspects of their operations like the incentive system, organizational structure, clientele, and infrastructure. Interviews with senior managers suggested little differences in these and other endogenous factors between the managed hotels that may influence financial performance. However, there are differences between the managed hotels in terms of exogenous factors like geographic location and competition.

Incentive Plan

Nearly two-thirds of the hotel industry uses some form of incentive pay for its managers and over one-half uses some kind of bonus program for their hourly employees. The maximum bonus ranges between 30 and 70 percent of the base salaries for managers (Kefgen 1996, 34). A large percentage of the business in the hotel industry is from repeat customers and hence customer service is a very important aspect of this industry. To increase customer loyalty and repeat customer business, hotels have abandoned the price pitch and embraced value through customer satisfaction (Fisher 1993, 26). Reliance on customer satisfaction and related nonfinancial measures in the incentive pay is a recent phenomenon (Schlesinger and Heskett 1991, 72; *Restaurants and Institutions* 1992, 27). An internal survey conducted by the hotel chain indicated that in the early 1990s hotel chains such as Hyatt, Marriott, and Hilton had implemented incentive programs for their senior managers based on profit and nonfinancial measures such as quality of rooms and food, safety, guest satisfaction, employee satisfaction, and other specific objectives. The incentive programs at major hotel chains differed in target setting, maximum bonus as a percentage of salary, and weights placed on financial and nonfinancial performance measures, but all of them emphasized the importance of nonfinancial measures. These practices underscored the belief of senior managers at the research site that, in the long run, a satisfied customer is an asset that makes the firm more profitable. The senior managers also believe that a customer-focused strategy is essential not only for the long-term profitability of an individual hotel, but also for enhancing the hotel chain's brand value. HOTELCORP introduced its new incentive plan for key managers at each managed property in 1993 with the objective of rewarding employees for meeting the key objectives of owners' satisfaction (profitability) and customer satisfaction as outlined in its mission statement.

A detailed review of internal documents at the research site indicated that prior to 1993, individual hotel managers' compensation included a base salary and a bonus based on financial measures such as operating profit, revenues, or costs. The bonus paid to a manager was bounded above by a percentage of the base salary, where the bound depended on rank in the organization and eligibility. The human resource manager at our research site remarked that actual bonus paid as a percentage of salary was below industry standards. For example, the general manager of a hotel could earn up to 20 percent of his base pay as bonus by achieving profit goals. In addition, a portion of the bonuses of key managers within a hotel was based on individual performance measures for his area of responsibility. For example, while operating profit was the basis for a major component of bonus, up to 15 percent of the general manager's bonus was based on subjective evaluation (resulting in a total bonus equal to 35 percent of the base salary), up to 5 percent of the chief engineer's bonus was based on energy costs and up to 10 percent of the sales director's bonus was based on room revenues. Although customer satisfaction measures were tracked, they were not used explicitly for incentive purposes. With the dual objective of keeping in line with competitors in the hotel industry, and focusing and directing the efforts of managers on key company objectives, the hotel chain introduced an incentive plan based on operating profit and nonfinancial measures. A senior manager remarked to us:

Back in the early nineties we were an okay management company but we weren't exactly producing industry-leading results....By instituting (the plan) we actually gave people a reason to worry about the customer satisfaction side and a way to share in the greater portion of whatever they drove to the bottom line....

The new incentive plan was developed by a cross-functional team of regional vice presidents and corporate executives representing functions such as human resources, marketing, planning, and operations. "The Service-Profit Chain" (Heskett et al. 1994), where internal service quality adds to the service value, resulting in loyal and satisfied customers which, in turn, leads to revenue growth and profit, was the guiding principle of the senior management in the development of the new incentive plan. In the words of one of the senior managers:

...well satisfied customers in the end is the only way to realize sustained growth and profitability...you can always attract new customers, but if your old customers are falling out of the bottom because of lax service, you have a problem...you really need to build a base of satisfied and loyal customers, and find new ones along the way....

The team identified both financial and nonfinancial measures of performance based on the strategic objective of satisfying two constituencies—owners and guests of the hotel. The new managerial bonus plan for all managers of individual hotels can be approximated by a linear contract based on hotel profit, revenue contribution from toll-free lines and two nonfinancial measures: likelihood of return and customer complaints. The senior manager in charge of the division indicated that the weights on the financial and nonfinancial measures were chosen based on a consensus agreement among the senior managers. He stated:

I'd like to tell you that we looked at it very statistically but I think what we really did was to sit around as a broad group and came to some type of consensus...we didn't want to skew it to just the operating profit because in essence all things you do to maximize cash flows may damage the future...what we tried was to have a "balanced-scorecard" if you may use the term....

Measurement of the variables and the reasons for their inclusion in the incentive plan are described later. We are unable to disclose the specific details of the new incentive plan because of our confidentiality agreement. Base salaries of managers did not change under the new incentive plan. The new incentive plan differs from the old plan in three aspects: (1) the new plan relies on performance measures (both financial and nonfinancial) common to all managers as opposed to the old plan that relied on individual performance measures (mainly financial), (2) the new plan explicitly incorporates nonfinancial measures with specific weights on each measure, and (3) the new plan increases the maximum eligible bonus for some managers by increasing the bonus rate applied to the base salary,⁴ with a large proportion of eligible bonus based on nonfinancial measures. However, the new incentive plan continues to use current operating profit as the financial performance measure and provides the same (or slightly lower) level of incentives for achieving operating profit goals as the old plan. Managers can earn the maximum eligible bonus only if both financial and nonfinancial targets are attained and can earn only about a third of eligible bonus if only the financial (operating profit) targets are attained.⁵ In summary, the new incentive plan can

⁴ The new incentive plan provides the same maximum bonus eligibility as the old plan for most managers, with the exception of the general manager and controller who have higher maximum bonus than before. The general manager can now earn a maximum bonus of 50 percent of his base salary compared to 35 percent before. The controller can now earn a maximum bonus of 40 percent of his base salary compared to 30 percent before.

⁵ For example, although the general manager can now earn up to 50 percent of his base salary as bonus, achieving only the operating profit goals will earn him one-third of the maximum bonus (or 17 percent of the base salary). The remaining two-thirds of the maximum bonus (or 33 percent of the base salary) is earned only if nonfinancial goals are achieved. Recall that under the old plan, the general manager received 20 percent of the base salary as bonus for achieving operating profit goals and 15 percent of the base salary as bonus based on subjective evaluation. Under the new plan, other hotel managers receive lower bonuses based only on operating profit goals compared to the old plan because the maximum bonus as a percentage of base salary remains the same for these managers.

be best described as a reward system that maintained the same (or less) emphasis on current financial performance as the old plan, but one that encouraged attainment of nonfinancial objectives by providing specific, higher incentives based on those measures.

Documents detailing the guiding principles, design framework, and incentive plan structure were circulated to all managers. In addition, meetings were conducted to explain the objective of the incentive plan and details such as target setting and payouts of the incentive plan. General managers of the hotel were asked to submit their target goals that required approval by the senior management. A senior manager in charge of the division indicated that goals were benchmarked based on the performance of the best hotels in the chain and on the performance of competitors. The new incentive plan was introduced at all managed hotels of the chain. The hotel chain does not control the human resource management function at franchised hotels, and, hence, the franchised hotels were not affected by the changes in the incentive plan. The incentive plan was implemented in July 1993 for all managed hotels. Hotel managers were informed in April 1993 that a proposal to introduce an incentive plan was being considered by senior management. However, the details of the plan were revealed to hotel managers only in June 1993. Therefore, in testing the impact of the incentive plan, alternative event dates, April and July 1993, are considered for the start of the incentive plan.

Data Collection

Monthly data were obtained for a period of up to 72 months (beginning with January 1991) for the 18 hotels managed by HOTELCORP. Sales, expense, and profit data for the individual hotels were electronically collected from the general ledgers maintained at its corporate headquarters. These and hand-collected data on nonfinancial measures and competitors' comparative data were cross-checked with aggregate financial and summary statements, and later verified by company staff to eliminate any data entry errors. Company documents and interviews with senior managers and corporate staff provided qualitative data on their beliefs and expectations about the incentive plan. In addition, general managers of two hotels were interviewed to understand hotel operations and obtain their views about effort reallocation in response to the new incentive plan.

Financial Performance Measures

Operating profit is the financial performance measure included in the plan to motivate managers to improve owners' satisfaction. Similar to other hotel companies, HOTELCORP allows bonuses only when a threshold level of operating profit is achieved. Operating profit per available room (PROFIT) is computed as revenues per available room (REVENUE) from rooms, food, beverage, and other activities like telephone and movies, less expenses per available room (COST) for these activities and other overhead expenses such as energy, operations and maintenance, human resources, and marketing. Hotel managers are not held responsible for capital investment decisions and fixed expenses like insurance, lease rental, and property taxes. The use of this measure of operating profit reflects HOTELCORP's philosophy that "measurements must reflect the manager's effectiveness." Each hotel's operating profit is measured and reported using a uniform system of accounts for the hotel industry (Hotel Association of New York, Inc. 1986). Individual hotel revenues and operating costs are the other financial performance measures considered in our analysis. Revenue per available room (REVENUE) is a widely used benchmark in the hotel industry. This measure can be partitioned multiplicatively into a rate (price) component, Average Rate (AVGRATE), measured as revenues divided by the number of occupied rooms, and a volume component, Occupancy Rate (OCCRATE), measured as the number of occupied rooms

divided by the number of available rooms. Availability of data on available and occupied rooms of all individual hotels enables the use of these component measures in our analysis.

Contribution from Toll-Free Lines (TOLLRES). Another financial measure used in the incentive plan is based on the revenue contribution from toll-free lines. The hotel chain operates a centralized reservation system for its franchised and managed hotels. Customers and travel agents can call the reservation center through toll-free lines. Hotel managers influence the occupancy rates and room revenues by setting room prices and making rooms available for the reservation center, direct bookings, and walk-ins. Past experience at HOTELCORP indicated that net room rates were higher for direct toll-free reservations. Increasing direct reservations through toll-free lines also means employing fewer sales and reservation agents at the individual hotels, and, hence, is expected to lead to lower operating costs. HOTELCORP management included this measure in the incentive plan also because the percentage of reservations through the center is used as a signal to attract prospective franchisees. Although HOTELCORP labels TOLLRES as a nonfinancial measure, it is computed as a ratio of two current financial measures: the room revenues booked in a month through the reservation center and the total room revenues realized in that month. Based on the beliefs of the senior management, we expect this measure to be contemporaneously associated with revenues, operating costs, and profit.

Nonfinancial Performance Measures

Likelihood of Return (LRETURN). Customer satisfaction is considered a key short-term measure that is a lead indicator of long-term performance (Anderson and Sullivan 1993, 125; Hauser et al. 1994, 330). In evaluating customer satisfaction, many hotels employ a weighted index of customer satisfaction based on a number of questions.⁶ The incentive plan at HOTELCORP uses a measure based only on the response to one key question on the comment cards filled out by hotel guests which asks how likely it is that a guest will return. Senior managers believe that this question best captures the intent of customers to provide repeat business. Likelihood of return (LRETURN) is computed as the percentage of customer responses with the two highest (out of five) ratings. Hotel managers can take a number of actions pertaining to the operations of the hotel to improve this measure including price concessions and delivering amenities to the rooms. However, such extra steps may lead to an increase in operating costs.

Customer Complaints (COMPLNTS). The number of customer complaints is another measure of customer satisfaction. Billing errors, service catastrophes, and problems with service personnel are some of the prime reasons for customer switching behavior (Keaveney

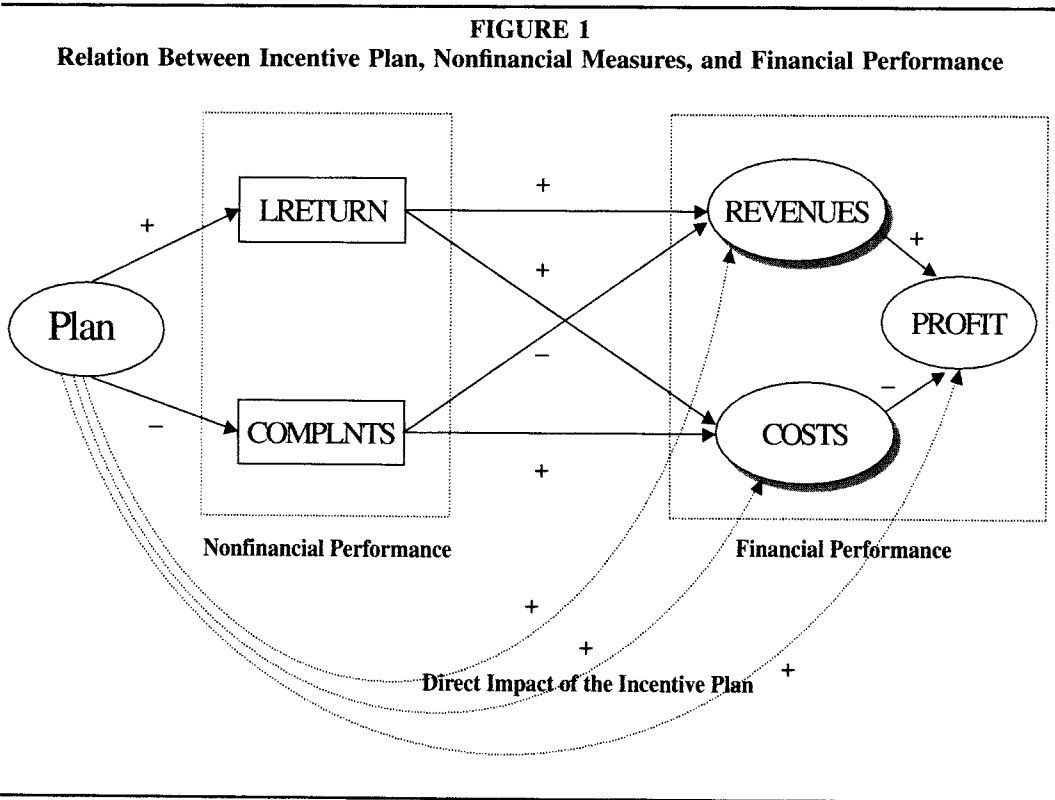
⁶ HOTELCORP also computes for each hotel a monthly composite index of customer satisfaction (CSINDEX) based on customer responses to a number of questions that cover various aspects of customer service such as front desk encounters, cleanliness of rooms, quality of food and beverage services, and general upkeep of the hotel. However, this measure is not used for incentive purposes because the senior management wanted to use a simple measure of customer satisfaction in the incentive plan and they were also uncertain about how customer satisfaction measured on these dimensions translates into repeat business. Although not reported in the paper, the regression results based on CSINDEX indicate that the relationship between this alternative measure of customer satisfaction and financial performance is very similar to the relationship between LRETURN and financial performance. The R^2 values for the two sets of regressions are very similar, suggesting that the explanatory power of the two different measures of customer satisfaction is nearly the same. In addition, the regression results of the models using both these measures as independent variables suggest that CSINDEX does not have any explanatory power over and above LRETURN. The use of CSINDEX measure as an independent variable alone or with LRETURN does not change the coefficients of other variables of interest. Overall, it appears that the simple measure used at HOTELCORP captures the information content of a complex measure of customer satisfaction.

1995, 76). Analogous to defect rates in a manufacturing setting, customer complaints provide direct feedback on the hotel's operating processes and are useful for taking corrective actions. Thus, customer complaints can also be viewed as an internal business process measure (Kaplan and Norton 1996, 110–112; Ittner and Larcker 1998b, 208) that reflects the effectiveness of the operations at a hotel. Focusing on potential problem areas, responding quickly to and resolving customer concerns are examples of managerial actions that can reduce the number of complaints and sustain customer loyalty (Jones and Sasser 1995, 98). The customer complaints variable (COMPLNTS) is measured as the number of customer complaints per one thousand occupied rooms. HOTELCORP included this measure also because it provides an independent measure of customer satisfaction. Customers register their complaints either by calling the customer service center directly or by writing, and hence this measure cannot be manipulated easily. A high score on the likelihood of return measure with a high number of customer complaints suggests possible manipulation of the former measure. Cross-sectional correlation between these two measures ranged between -0.27 and -0.39 over the 72-month sample period.

III. ESTIMATION MODELS AND TESTS

Are Nonfinancial Measures Lead Indicators of Financial Performance?

Figure 1 summarizes the relation between the incentive plan, managerial effort, nonfinancial measures, and financial performance. Our first research question focuses on the predictive ability of nonfinancial measures. The predictive ability of nonfinancial measures is evaluated by estimating the relation between nonfinancial performance measures and



various measures of financial performance: operating profit and its two components, revenues and operating costs. Estimation of the individual relationships provides richer insights into how nonfinancial measures are associated with each component of profit. The following models are specified for estimation using pooled time-series data for 18 hotels:

$$\begin{aligned} \text{REVENUE}_{it} = & \alpha_0^R + \sum_{i=1}^{17} \beta_i^R \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^R \text{HOTEL}_i \text{COMPREV}_{it} \\ & + \lambda^R \text{REVENUE}_{i,t-1} + \eta_1^R \text{AVGLRETURN}_{i,t6} \\ & + \eta_2^R \text{AVGCOMPLNTS}_{i,t6} + \eta_3^R \text{TOLLRES}_{it} + \varepsilon_{it}^R \end{aligned} \quad (\text{M1})$$

$$\begin{aligned} \text{COST}_{it} = & \alpha_0^C + \sum_{i=1}^{17} \beta_i^C \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^C \text{HOTEL}_i \text{OCCRATE}_{it} + \lambda^C \text{COST}_{i,t-1} \\ & + \eta_1^C \text{ECI}_t + \eta_1^C \text{AVGLRETURN}_{i,t6} + \eta_2^C \text{AVGCOMPLNTS}_{i,t6} \\ & + \eta_3^C \text{TOLLRES}_{it} + \varepsilon_{it}^C \end{aligned} \quad (\text{M2})$$

$$\begin{aligned} \text{PROFIT}_{it} = & \alpha_0^P + \sum_{i=1}^{17} \beta_i^P \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^P \text{HOTEL}_i \text{COMPREV}_{it} + \lambda^P \text{PROFIT}_{i,t-1} \\ & + \eta_1^P \text{AVGLRETURN}_{i,t6} + \eta_2^P \text{AVGCOMPLNTS}_{i,t6} \\ & + \eta_3^P \text{TOLLRES}_{it} + \varepsilon_{it}^P \end{aligned} \quad (\text{M3})$$

where:

- $i = 1, \dots, 18$ represents the individual hotels,
- $t = 1, \dots, 72$ represents the months in our sample period
- REVENUE_{it} = Total revenues per available room of hotel i in month t ,
- COST_{it} = Total operating cost per available room of hotel i in month t ,
- PROFIT_{it} = Operating profit per available room of hotel i in month t ,
- COMPREV_{it} = Average revenue per available room of competitors of hotel i in month t ,
- HOTEL_i = A dummy variable = 1 if hotel i , = 0 otherwise,
- ECI_t = Employment Cost Index in month t ,
- LRETURN_{it} = Likelihood of return index for hotel i in month t ,
- $\text{AVGLRETURN}_{i,t6}$ = Average likelihood of return for hotel i over the previous six months (i.e., $t-1$ to $t-6$),
- COMPLNTS_{it} = Number of complaints per one thousand occupied rooms for hotel i in month t ,
- $\text{AVGCOMPLNTS}_{i,t6}$ = Average number of complaints for hotel i over the previous six months (i.e., $t-1$ to $t-6$),
- TOLLRES_{it} = Percentage of revenues through toll free lines for hotel i in month t ,
- ε_{it}^R , ε_{it}^C , and ε_{it}^P = random error terms.

The above models specify operating profit per available room and its components as

functions of exogenous parameters, past financial performance, and lagged values⁷ of non-financial measures. The exogenous variables that affect financial performance in the hotel industry include hotel-specific factors, seasonality, local, regional, and other economy-wide factors like inflation (Arthur Andersen & Co. 1993, 14; PKF Consulting 1994, 11). Therefore, to control for specific characteristics of individual hotels that may result in correlated residuals over time, we include intercept dummies for individual hotels in these fixed-effects models (Greene 1994). To control for other exogenous factors that affect revenues, we include an index (labeled COMPREV) measuring the average revenues per available room of competitors in the same location as the hotel. This measure (COMPREV) is the most widely used benchmark in the hotel industry and best captures the exogenous shocks that affect revenues such as seasonality and inflation experienced by the local hotel industry. COMPREV is computed by an independent agency that collects the relevant confidential information from participating hotels.

Unlike the revenue model, cost data for competitors that may control for seasonality and other factors are not available. Seasonal and trend variations in operating costs of individual hotels are primarily driven by volume. Therefore, we include occupancy rate (OCCRATE) to control for exogenous variations in operating costs. Including dummy variables for the 12 calendar months to control for any residual seasonal variations in operating costs does not alter the results. Operating costs may also increase over time because of inflation. While CPI is commonly used as a measure of inflation, in the specific context of the hotel industry, payroll costs can constitute more than half of the operating costs. Therefore, to control for changes in operating costs due to inflation, we include the Employment Cost Index (ECI) which measures the average total wages and benefits paid to employees. Because of lack of competitor data, for the PROFIT model we control for seasonal and other variations by including COMPREV as a control variable.⁸ We include current TOLLRES as an independent variable because this financial measure is expected to be associated with contemporaneous financial performance, but the results are similar without this variable. We also include the previous period's financial performance to control for hotel-specific time trends and to examine whether nonfinancial measures provide additional information on future financial performance that is not reflected in current financial measures.

While earlier studies recognize that nonfinancial measures may have long-term impacts, there is no formal theory to identify the specific number of lags for nonfinancial measures. Anderson et al. (1994) use a half-year lag model, but do not present a theoretical justification. Therefore, it is necessary to undertake a specification search to determine the appropriate lag length. Specifically, Akaike's Information Criterion (AIC) is used to determine the lag length (Greene 1994, 515–517). AIC is similar in spirit to adjusted R^2 in that it rewards good fit but penalizes the loss of degrees of freedom. A search over a maximum length of 12 lags indicated that the model with a lag length of six resulted in the minimum AIC and hence was chosen as the most appropriate model. However, severe multicollinearity between the six lags (Condition Index > 300) makes the results difficult to interpret.

A common solution for multicollinearity problems is principal component analysis (Greene 1994). The first principal component of the lagged nonfinancial measures accounts

⁷ It is possible that nonfinancial measures may impact both current and future financial performance. However, current values of LRETURN and COMPLNTS, when included in the regressions, do not have any significant association with financial performance.

⁸ Since COMPREV is highly correlated with OCCRATE, the inclusion of COMPREV is likely to capture volume-driven changes in both revenues and costs. The inclusion of OCCRATE as an additional control variable results in severe multicollinearity, but the principal results do not change appreciably.

for more than 55 percent of the variation and is given by an almost equally weighted average of the past six lags. Therefore, in order to mitigate the collinearity problem, we use AVGLRETURN and AVGCOMPLNTS, the moving average of the past six lags of the nonfinancial measures, as independent variables instead of six different lags.⁹ Using the average of the lags implies a restriction that all lag coefficients are equal. We test the predictive ability of each nonfinancial measure by examining the coefficient of its average past realizations. The coefficient η of a nonfinancial measure is interpreted as its average long-run impact (Greene 1994, 512–513).

Performance Impact of Incentive Plan

Impact of Incentive Plan on Nonfinancial Performance

Our second research question focuses on the performance impacts of including nonfinancial measures in incentive plans. Intuitively, one expects improvements in a performance measure when it is positively linked to monetary incentives. Agency theoretic research also supports the view that including a performance measure in an incentive plan that reports more precisely on one dimension of effort results in a reallocation of effort by managers leading to an improvement along the measured dimension (Feltham and Xie 1994; Banker and Thevaranjan 1997, 1999). As discussed earlier, at our research site, nonfinancial measures were reported, but not used, for incentive purposes prior to the implementation of the new plan. When nonfinancial measures are included in the incentive plan, managers reallocate their effort along the dimensions emphasized by those measures resulting in improvements in those measures.¹⁰

Ascertaining whether the new incentive plan resulted in a change in nonfinancial performance requires a model of the behavior of nonfinancial measures. It is difficult to specify a model of customer satisfaction measures (LRETURN and COMPLNTS). Data on likelihood of return are available for HOTELCORP's franchised hotels that did not implement the new incentive plan and thus serve as a control for exogenous factors affecting this performance measure. HOTELCORP's franchised hotels form a natural control group because they follow the same operational rules and guidelines, but they did not implement the incentive plan or make any major organizational changes that affect performance. Therefore, we specify:

$$\text{LRETURN}_{it} = \alpha_0^L + \sum_{i=1}^{17} \beta_i^L \text{HOTEL}_{it} + \gamma^L \text{LRETURNF}_t + \delta^L \text{PLAN}_t + \varepsilon_t^L \quad (\text{M4})$$

where:

LRETURNF_t = Average likelihood of return index for franchised hotels in month t ,
 PLAN_t = A dummy variable representing time periods following new incentive plan implementation, taking the value 1 for July 1993 and later, and 0 before July 1993.

No such comparative data are available for COMPLNTS that can serve as a control

⁹ In the hotel industry, a lag of six months seems to capture the repeat visits of customers and the economic consequences of their purchase behavior. This is especially true for business travelers who are the main guests of HOTELCORP.

¹⁰ We do not claim that the old incentive plan was suboptimal or that the new incentive plan is optimal under the realized conditions. Our objective instead is to examine whether the performance of hotel managers changed on the implementation of the new incentive plan as if they were optimizing their effort choices given the contract.

for exogenous factors affecting this nonfinancial measure. Therefore, we employ a commonly used impact assessment method in time-series analysis known as intervention or the transfer-function model. We specify each nonfinancial measure for a hotel as a function of a hotel-specific constant and its value in the previous period (McCleary and Hay 1980, 141–171; Pearce et al. 1985; Anderson et al. 1994). Transfer-function models first identify each dependent variable as a time series with systematic moving average or autoregressive components, and then estimate the effect of an event by introducing the event time as an intervention dummy variable. A significant change in the slope or level predictable from the model describing the time-series indicates that the intervention event had an effect on the dependent variables. Nonfinancial variables are modeled separately for each hotel as an ARMA process to identify the time-series parameter values that produce white noise. For most models with COMPLNTS as the dependent variable an AR(1) process with a constant parameter, resulted in residuals that are white noise, justifying the use of lagged values as independent variables.¹¹ Therefore, we specify:

$$\begin{aligned} \text{COMPLNTS}_{it} = & \alpha_0^M + \sum_{i=1}^{17} \beta_i^M \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^M \text{HOTEL}_i \text{COMPLNTS}_{i,t-1} \\ & + \delta^M \text{PLAN}_t + \varepsilon_t^M \end{aligned} \quad (\text{M5})$$

The impact of the incentive plan on nonfinancial performance is tested by examining whether the δ coefficients of the PLAN variable for these two models (M4 and M5) are significant.

Impact of Incentive Plan on Financial Performance

As shown in Figure 1, the implementation of the incentive plan can affect financial performance either indirectly by improving nonfinancial performance which then impacts financial performance, or by directly improving cost efficiency. Predicting the impact of the implementation of the plan on the components of income requires an understanding of the preexisting incentive plan. Recall that the company's prior plan was based mainly on operating profit. The new incentive plan provided slightly lower levels of incentives for achieving operating profit goals. Given overall effort aversion, this leads to a reallocation of some cost control effort at the margin to customer service effort. In our context, a reduction in cost control effort implies an increase in costs following the implementation of the new incentive plan. In addition, we expect that customer-satisfaction-oriented effort will increase. An increase in operating costs may also result from increased customer satisfaction effort. For example, managers may have to train their employees in customer service. Finally, the new incentive plan provides higher bonus potential for some managers and therefore, bonus costs are likely to increase following the implementation of the plan. Therefore, operating costs (both inclusive and exclusive of bonus costs) are likely to increase following the implementation of the new incentive plan.

Improvement in customer-satisfaction-oriented nonfinancial measures such as likelihood of return and complaints is expected to result in increased revenues. High customer satisfaction implies high loyalty of current customers, low price elasticities, insulation of current customers from competitive efforts, and the potential to attract new customers because of

¹¹ For the model with LRETURN as the dependent variable, an AR(1) process with a constant parameter resulted in residuals that are white noise. We estimated an intervention model similar to model (M5) for the LRETURN variable and the results were qualitatively similar to those obtained based on model (M4).

enhanced reputation and, therefore, a high revenue potential (Fornell 1992, 6, 11; Hauser et al. 1994, 330; Zeithmal et al. 1990, 9). Implementation of an incentive plan based on customer-satisfaction-oriented nonfinancial measures increases customer service effort and, consequently, it is likely to increase customer satisfaction. If customer satisfaction measures are lead indicators of future revenues, then we expect revenues to increase. While it is possible that costs may increase as discussed earlier, we expect that any cost increase would be lower than the corresponding revenue increase so that profits are expected to increase as a consequence of an increased emphasis on customer satisfaction.

Because of TOLLRES variable's construction as a ratio measure, the impact of the incentive plan change on TOLLRES will depend on the magnitude of the numerator and denominator effects. For example, an increase in revenue contribution from toll-free reservations (numerator) without a significant increase in total room revenues (denominator) will increase TOLLRES. Alternatively, an increase in revenue contribution from toll-free reservations (numerator) accompanied by an increase in total room revenues (denominator) due to other factors such as increased customer satisfaction may result in a decrease, no change, or an increase in TOLLRES. Overall, we expect that managers will respond to the incentive weight placed on TOLLRES and will take steps to increase this measure.¹² To estimate the impact of the incentive plan on TOLLRES, we specify an intervention model similar to model (M5). For most models with TOLLRES as the dependent variable an AR(12) process with a constant parameter resulted in residuals that are white noise, justifying the use of 12-month lagged value as the control variable.

A direct test of the impact of the new incentive plan on financial performance is conducted by estimating the following intervention models:

$$\begin{aligned} \text{COST}_{it} = & \alpha_0^{C'} + \sum_{i=1}^{17} \beta_i^{C'} \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^{C'} \text{HOTEL}_i \text{OCCRATE}_{it} + \eta^{C'} \text{ECI}_t \\ & + \delta^{C'} \text{PLAN}_t + \varepsilon_{it}^{C'} \end{aligned} \quad (\text{M6})$$

$$\begin{aligned} \text{REVENUE}_{it} = & \alpha_0^{R'} + \sum_{i=1}^{17} \beta_i^{R'} \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^{R'} \text{HOTEL}_i \text{COMPREV}_{it} \\ & + \delta^{R'} \text{PLAN}_t + \varepsilon_{it}^{R'} \end{aligned} \quad (\text{M7})$$

$$\begin{aligned} \text{PROFIT}_{it} = & \alpha_0^{P'} + \sum_{i=1}^{17} \beta_i^{P'} \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^{P'} \text{HOTEL}_i \text{PROFIT}_{i,t-12} + \delta^{P'} \text{PLAN}_t \\ & + \varepsilon_{it}^{P'} \end{aligned} \quad (\text{M8})$$

$$\begin{aligned} \text{TOLLRES}_{it} = & \alpha_0^T + \sum_{i=1}^{17} \beta_i^T \text{HOTEL}_i + \sum_{i=1}^{18} \gamma_i^T \text{HOTEL}_i \text{TOLLRES}_{i,t-12} \\ & + \delta^T \text{PLAN}_t + \varepsilon_t^T \end{aligned} \quad (\text{M9})$$

Econometric Considerations

Because we use time-series data in our regression models, serial correlation may bias the standard errors of the estimated coefficients. We control for serial correlation by using

¹² We constructed an alternative measure of TOLLRES as the revenues booked through the central reservation system. The intervention model (M9) based on this measure also shows a positive impact on TOLLRES.

the Prais and Winsten (1954) estimator to make first-order autocorrelation adjustments to the variables. This estimator is consistent and performs especially well for short time series with a trend by ensuring that the initial observation is not discarded (Greene 1994, 432). All regression estimates reported here are based on the transformed variables. We tested for heteroskedasticity using White's (1980) test. Whenever appropriate, we used White's adjusted asymptotic standard errors to test the significance of the estimated coefficients. There were no appreciable differences between the F-tests and tests using asymptotic Chi-square.

A common problem in studies that use lagged independent variables is that the independent variables tend to be highly correlated. When multicollinearity was detected using the Belsley et al. (1980) collinearity diagnostics, the variables causing the problem were dropped and models were re-estimated to ensure robustness of the results. Individual observations were considered influential if the studentized residuals were greater than an absolute value of three (Belsley et al. 1980, 27–29; Ittner and Larcker 1998a, 14). The number of outliers identified and deleted in the regression models shown in Tables 1–6 ranged between 1 and 16. The re-estimated parameters after omitting the influential observations have higher significance and exhibit robustness of the results.

IV. RESULTS

Descriptive Statistics

Panel A of Table 1 presents descriptive statistics for the 18 managed hotels (all numbers have been disguised by a scaling factor to maintain confidentiality). The overall dispersions shown in Table 1 reflect seasonal variations, differences in the size and type of hotels, and their geographic locations. Revenues per available room for individual hotels vary considerably over the 12 months. Revenues per available room in the peak months are on average 89 percent more than the revenues per available room in the lean months of a year for individual hotels. Competitors' revenues per available room (COMPREV) exhibit patterns similar to those of the revenue measure of the sample hotels, and suggest that COMPREV measure is an appropriate control for regional factors and seasonality that affect revenues. It also suggests that the sample hotels are typical of hotels in the industry and provides support for generalizing our firm-specific findings. Costs per available room for individual hotels also vary considerably over the 12 months but with a lower range of dispersion when compared to revenues. The highest cost per available room is on average between 20 percent and 40 percent more than the lowest cost per available room in a year for individual hotels. Nonfinancial measures (LRETURN and COMPLNTS) for the entire sample exhibit considerable variation, but the dispersion in these measures for individual hotels does not suggest any seasonal patterns as in the case of financial measures. The 6-month moving averages of these measures (AVGLRETURN and AVGCOMPLNTS) show even less dispersion. The TOLLRES measure exhibits a pattern similar to that of revenues per available room (REVENUE).

Panel B of Table 1 provides a comparison between the nonfinancial performance measures for the managed hotels and the franchised hotels. Overall, the managed hotels exhibit a higher level of customer satisfaction as measured by LRETURN and COMPLNTS than the franchised hotels. Panel B also suggests that while occupancy rate, TOLLRES, and nonfinancial performance as measured by LRETURN and COMPLNTS improved for both types of hotels after the implementation of the new incentive plan, the improvement was greater for the managed hotels than for the franchised hotels.

Table 2 presents the matrix of correlations between various variables of interest. Revenues per available room are positively and significantly correlated with LRETURN and

TABLE 1
Descriptive Statistics and Comparison between Franchised and Managed Hotels

Panel A: Descriptive Statistics for Managed Hotels

<i>Variable</i>	<i>n</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>First Quartile</i>	<i>Median</i>	<i>Third Quartile</i>
REVENUE	1079	86.96	25.56	68.41	86.26	103.89
COST	1079	66.50	16.55	56.24	65.88	76.03
AVGRATE	1079	126.20	27.01	111.19	126.71	143.30
OCCRATE	1079	0.69	0.15	0.60	0.71	0.80
LRETURN	1079	0.91	0.08	0.88	0.93	0.96
COMPLNTS	1079	0.92	0.65	0.45	0.80	1.22
TOLLRES	1079	37.58	17.14	25.88	34.57	45.94
AVGLRETURN	957	0.91	0.06	0.87	0.92	0.95
AVGCOMPLNTS	957	0.93	0.44	0.62	0.89	1.16
COMPREV	1079	52.01	16.74	39.40	49.56	63.20
CAVGRATE	1079	75.19	16.03	62.04	73.98	85.76
COCCRATE	1079	0.69	0.12	0.61	0.70	0.78

Panel B: Comparison between Franchised and Managed Hotels
(Standard deviation in parentheses)

<i>Variable</i>	<i>Franchised Hotels</i>		<i>Managed Hotels</i>	
	<i>Jan. 1993–July 1993</i>	<i>July 1993–Dec. 1996</i>	<i>Jan. 1991–June 1993</i>	<i>July 1993–Dec. 1996</i>
LRETURN	0.83 (0.16)	0.85 (0.15)	0.89 (0.07)	0.93 (0.08)
COMPLNTS	1.26 (1.51)	1.15 (1.44)	1.06 (0.64)	0.82 (0.64)
TOLLRES	36.00 (30.26)	38.99 (25.16)	33.26 (16.35)	40.49 (17.24)
OCCRATE	0.64 (0.18)	0.67 (0.18)	0.67 (0.15)	0.71 (0.15)

REVENUE = Revenue per available room of a hotel,

COST = Operating cost per available room of a hotel,

AVGRATE = Average rate for a hotel measured as total revenues divided by number of occupied rooms in a month,

OCCRATE = Occupancy rate for a hotel measured as number of occupied rooms divided by number of available rooms in a month,

LRETURN = Likelihood of return index for a hotel in a month,

COMPLNTS = Number of complaints per one thousand occupied rooms for a hotel in a month,

TOLLRES = Room revenues booked through toll free lines as a percentage of total room revenues for a hotel in a month,

AVGLRETURN = Average likelihood of return for a hotel over the previous six months (i.e. $t-1$ to $t-6$),

AVGCOMPLNTS = Average number of complaints for a hotel over the previous six months,

COMPREV = Average revenue per available room of competitors of a hotel in a month,

CAVGRATE = Average rate of competitors of a hotel in a month, and

COCCRATE = Average occupancy rate of competitors of a hotel in a month.

All numbers are disguised by multiplying by a scalar.

TABLE 2
Correlation Matrix
(Spearman coefficients in the upper triangle; Pearson coefficients in the lower triangle)

	REVENUE	COST	AVGRATE	OCCRATE	LRETURN	COMPLNTS	TOLLRES	AVG LRETURN	AVG COMPLNTS	COMPREV	CAVG RATE	COCC RATE
REVENUE	1.00	0.84	0.63	0.70	0.23	-0.25	-0.28	0.30	-0.33	0.69	0.52	0.59
COST	0.86	1.00	0.70	0.44	0.36	-0.30	-0.23	0.42	-0.39	0.43	0.37	0.33
AVGRATE	0.63	0.73	1.00	-0.02 ^{NS}	0.25	-0.17	-0.19	0.30	-0.23	0.35	0.53	0.04 ^{NS}
OCCRATE	0.70	0.43	-0.09	1.00	0.02 ^{NS}	-0.12	-0.15	0.07	-0.21	0.59	0.21	0.78
LRETURN	0.24	0.31	0.18	0.11	1.00	-0.39	-0.01 ^{NS}	0.69	-0.43	-0.01 ^{NS}	0.00 ^{NS}	-0.05*
COMPLNTS	-0.25	-0.26	-0.14	-0.18	-0.27	1.00	0.12	-0.42	0.49	-0.07**	0.01 ^{NS}	-0.07**
TOLLRES	-0.33	-0.26	-0.26	-0.19	-0.04 ^{NS}	0.22	1.00	0.02 ^{NS}	0.15	-0.07**	0.03 ^{NS}	-0.14
AVGLRETURN	0.32	0.38	0.24	0.15	0.64	-0.31	-0.05*	1.00	-0.43	0.01 ^{NS}	0.01 ^{NS}	0.01 ^{NS}
AVGCOMPLNTS	-0.29	-0.34	-0.21	-0.18	-0.28	0.46	0.21	-0.43	1.00	-0.08	0.04*	-0.13
COMPREV	0.71	0.46	0.33	0.59	0.03 ^{NS}	-0.09	-0.11	0.03 ^{NS}	-0.05*	1.00	0.52	0.59
CAVGRATE	0.54	0.40	0.51	0.21	0.00 ^{NS}	-0.01 ^{NS}	-0.01 ^{NS}	-0.01 ^{NS}	0.04*	0.85	1.00	0.33
COCCRATE	0.58	0.32	-0.04 ^{NS}	0.78	0.01 ^{NS}	-0.12	-0.17	0.03 ^{NS}	-0.11	0.75	0.33	1.00

*, ** Indicates that the correlation coefficient is significantly different from zero at the 10 percent, 5 percent level (two-tailed test), respectively.

^{NS} Indicates that the correlation coefficient is not significantly different from zero at the 10 percent level (two-tailed test).

All correlations are based on pooled data and should be interpreted with caution.

See Table 1 for definitions of variables.

AVGLRETURN ($\rho = 0.23$ and 0.30 , $p = 0.0001$) and negatively correlated with COMPLNTS and AVGCOMPLNTS ($\rho = -0.25$ and -0.33 , $p = 0.0001$), consistent with the literature on customer satisfaction and the expectations of the senior management. COMPLNTS and LRETURN are negatively and significantly correlated ($\rho = -0.39$, $p = 0.0001$), but the magnitude is not so high as to suggest that these two measures are capturing the same aspect of customer satisfaction. TOLLRES is positively correlated with COMPLNTS and negatively correlated with LRETURN, revenues, and cost per available room. Although the negative correlation of TOLLRES with revenues appears contrary to the expectations of the senior management that an increase in this measure leads to increased revenues for the individual hotel, it is probably the result of the way TOLLRES is measured.¹³ Occupancy rate (OCCRATE) is highly correlated with COMPREV ($\rho = 0.59$, $p = 0.0001$), suggesting that COMPREV is a good control for seasonal and regional variations. COMPREV is also highly correlated with revenues and costs. Although not shown in the table, CSINDEX is highly correlated with LRETURN ($\rho = 0.63$, $p = 0.0001$) suggesting that a simple measure of customer satisfaction reflects many aspects of customer service experience captured in a comprehensive measure.

Are Nonfinancial Measures Lead Indicators of Financial Performance?

Panel A of Table 3 presents OLS estimates of the relation between nonfinancial measures and financial performance as measured by the levels of revenues, operating cost and profit per available room. The overall regressions are significant ($p = 0.0001$) with adjusted R^2 ranging from 0.80 to 0.90. The coefficient (η_1) of AVGLRETURN is positively and significantly associated with revenues ($p = 0.0001$, one-tail) and profit per available room ($p = 0.0005$, one-tail). Although the coefficient (η_2) of AVGCOMPLNTS is negative, it is not significant ($p = 0.1868$ and 0.2989 , one-tail, respectively) in the revenue and profit models. None of the nonfinancial measures are significantly ($p > 0.11$, one-tail) associated with operating cost per available room. This observation is consistent with the remarks of some hotel managers and corporate managers that after the change in the incentive plan, hotel managers initially changed their nonpecuniary personal effort but did not increase spending on activities that impact customer satisfaction. Although not included in the regression models reported above, the coefficients of current period customer satisfaction, LRETURN and COMPLNTS, are not significantly associated with current revenues and profit per available room. This result suggests that customer satisfaction impacts the future rather than the current financial performance. However, this must be interpreted with caution because of the high correlation between the lagged and current nonfinancial measures.¹⁴

Traditional accounting research relies on returns or changes models to assess the association between variables of interest and financial performance. The argument in favor of the returns or changes models is that these models reduce the bias in estimates resulting from spurious correlations and omitted variables. However, some studies dispute this claim and provide support in favor of the levels models (Kothari and Zimmerman 1995; Boschen

¹³ Recall that TOLLRES is measured in the incentive plan as a ratio of revenues booked through the central reservation system to the revenues realized in a month. Because revenues appear in the denominator, TOLLRES is negatively correlated ($\rho = -0.33$) with revenues. When TOLLRES is measured simply as the monthly revenues booked through the central reservation system, it is positively correlated with revenues ($\rho = 0.22$).

¹⁴ One of the main reasons for the high levels of condition indices reported in Panel A of Tables 3 and 4 is the number of intercept terms in the fixed effects model. As can be seen from Panel B of these tables, when a single intercept is used, the condition indices are well below the cutoffs suggested by Belsley et al. (1980). AVGLRETURN for individual hotels is significantly correlated with the intercepts resulting in severe variance inflation. When the AVGLRETURN variable is dropped and the parameters reestimated, the resulting coefficient of AVGCOMPLNTS is qualitatively similar.

TABLE 3
Are Nonfinancial Measures Lead Indicators of Financial Performance?
(t-statistics in parentheses)

$$\begin{aligned} REVENUE_{it} &= \alpha_0^R + \sum_{i=1}^{17} \beta_i^R HOTEL_i + \sum_{i=1}^{18} \gamma_i^R HOTEL_i COMPREV_{it} + \lambda^R REVENUE_{i,t-1} \\ &\quad + \eta_1^R AVGLRETURN_{i,t6} + \eta_2^R AVGCOMPLNTS_{i,t6} + \eta_3^R TOLLRES_{it} + \varepsilon_{it}^R \\ COST_{it} &= \alpha_0^C + \sum_{i=1}^{17} \beta_i^C HOTEL_i + \sum_{i=1}^{18} \gamma_i^C HOTEL_i OCCRATE_{it} + \lambda^C COST_{i,t-1} + \eta^C ECI_t \\ &\quad + \eta_1^C AVGLRETURN_{i,t6} + \eta_2^C AVGCOMPLNTS_{i,t6} + \eta_3^C TOLLRES_{it} + \varepsilon_{it}^C \\ PROFIT_{it} &= \alpha_0^P + \sum_{i=1}^{17} \beta_i^P HOTEL_i + \sum_{i=1}^{18} \gamma_i^P HOTEL_i COMPREV_{it} + \lambda^P PROFIT_{i,t-1} \\ &\quad + \eta_1^P AVGLRETURN_{i,t6} + \eta_2^P AVGCOMPLNTS_{i,t6} + \eta_3^P TOLLRES_{it} + \varepsilon_{it}^P \end{aligned}$$

Panel A: Levels Model (n = 957)

Variable	REVENUE	COST	PROFIT
Intercept	-5.79 (-0.573)	19.41*** (2.587)	-40.19*** (-5.536)
AVGLRETURN	35.71*** (4.37)	5.39 (1.005)	19.51*** (3.307)
AVGCOMPLNTS	-0.94 (-0.89)	-0.73 (-1.210)	-0.40 (-0.528)
PAST DEP. VARIABLE (LAG 1)	0.15*** (7.34)	0.33*** (11.767)	0.12*** (6.172)
ECI	—	9.17** (1.979)	—
Adj. R ²	0.9019	0.8995	0.8051
Condition Index	108.95	142.84	109.04

Panel B: Percent Change Model (n = 939)

Variable	%Δ REVENUE	%Δ COST	%Δ PROFIT
Intercept	2.57*** (6.113)	2.34*** (7.356)	79.02 (0.457)
%Δ AVGLRETURN	0.44** (1.665)	-0.003 (-0.017)	153.22* (1.382)
%Δ AVGCOMPLNTS	-0.04* (-1.419)	-0.03** (-1.865)	6.85 (0.629)
%Δ PAST DEP. VARIABLE (LAG 1)	-0.14*** (-6.506)	-0.33*** (-12.82)	0.02 (0.645)
%Δ ECI	—	-6.49*** (-9.036)	—
Adj. R ²	0.6099	0.4025	0.1980
Condition Index	1.51	2.02	1.51

(Continued on next page)

TABLE 3 (Continued)

*, **, and *** Indicate that the estimated coefficient is significantly different from zero at the 10 percent, 5 percent, and 1 percent levels (one-tailed test), respectively.

PAST DEP. VARIABLE (LAG 1) = Lagged dependent variable of the respective models.

HOTEL_{*i*} = A dummy variable = 1 if hotel *i*, = 0 otherwise.

See Table 1 for other variable definitions.

and Smith 1995). Specifically, in the context of compensation research, Boschen and Smith (1995, 579, 584) assert that the use of differenced empirical models can be supported only if performance has a permanent impact on pay (autocorrelation $\rho = 1$). In our context, where multiperiod effects of nonfinancial measures on financial performance are considered, the impact of nonfinancial measures is expected to have a decaying effect over time, and hence, the assumption of permanent impact is violated. Residuals from the levels model exhibit a low autocorrelation (ρ ranges between 0.1 and 0.4). Therefore, the levels model with a lagged dependent variable is more suitable for analyzing the lead-lag relationship between financial performance and nonfinancial measures. Nevertheless, we present the results of a percentage change model (Ittner and Larcker 1998a) in Panel B of Table 3. This model can be interpreted as testing whether changes in nonfinancial measures are associated with changes in financial measures. The results suggest that AVGLRETURN is positively associated with future revenues and profit per available room, although the significance is lower than its significance in the levels model. AVGCOMPLNTS exhibits stronger association with operating cost per available room, but is not significantly associated with revenues and profit per available room. Overall, the results indicate that one nonfinancial measure of customer satisfaction provides additional information about future financial performance that is not reflected in the past financial performance in this industry.

The marketing literature suggests that increased customer satisfaction can lead to an increase in revenues either because of increased price premiums that firms can charge and/or because of repeat business (Fornell 1992, 11; Zeithmal et al. 1990, 9). In the specific context of the hotel industry, an increase in revenues can result either because of increased rates (price effect), or an increase in occupancy (volume effect), or both. It is a common practice in the hotel industry to partition revenues into an average rate (AVGRATE, revenues divided by the number of occupied rooms) and occupancy rate (OCCRATE, occupied rooms divided by the number of available rooms). Therefore, we explore the relation between nonfinancial measures and these component measures of revenues. Panel A of Table 4 presents the levels regression estimates of the relation between the nonfinancial measures and occupancy rate and average rate. These models are similar to model (M1) except that AVGRATE and OCCRATE are the dependent variables with appropriate control variables based on competitor data. All the regressions are significant ($p = 0.0001$) with adjusted R^2 ranging from 0.82 to 0.89. The coefficient (η_1) of AVGLRETURN in the levels regressions is positively but not significantly ($p = 0.1578$, one-tail) associated with average rate. However, it is positively and significantly ($p = 0.0001$, one-tail) associated with occupancy rate. The results based on the percentage change model in Panel B are also consistent with these observations. This suggests that increased customer satisfaction as measured by LRETURN leads to increased revenues through its impact on occupancy. The coefficient (η_2) of AVGCOMPLNTS is negatively and significantly associated with average rate ($p = 0.0217$, one-tail) in the levels model suggesting that a decrease in customer complaints leads to an increase in average rate.

TABLE 4
Relation Between Nonfinancial Measures and Components of Revenues:
Average Rate and Occupancy Rate
(t-statistics in parentheses)

$$\begin{aligned}
 AVGRATE_{it} &= \alpha_0^A + \sum_{i=1}^{17} \beta_i^A HOTEL_i + \sum_{i=1}^{18} \gamma_i^A HOTEL_i CAVGRATE_{it} + \lambda^A AVGRATE_{i,t-1} \\
 &\quad + \eta_1^A AVGLRETURN_{i,t6} + \eta_2^A AVGCOMPLNTS_{i,t6} + \varepsilon_{it}^A \\
 OCCRATE_{it} &= \alpha_0^O + \sum_{i=1}^{17} \beta_i^O HOTEL_i + \sum_{i=1}^{18} \gamma_i^O HOTEL_i COCCRATE_{it} + \lambda^O OCCRATE_{i,t-1} \\
 &\quad + \eta_1^O AVGLRETURN_{i,t6} + \eta_2^O AVGCOMPLNTS_{i,t6} + \varepsilon_{it}^O
 \end{aligned}$$

Panel A: Levels Model (n = 957)

<i>Variable</i>	<i>AVGRATE</i>	<i>OCCRATE</i>
Intercept	41.27** (1.847)	-0.39*** (-5.830)
AVGLRETURN	12.88 (1.004)	0.37*** (7.231)
AVGCOMPLNTS	-3.20** (-2.023)	-0.01 (-1.307)
PAST DEP. VARIABLE (LAG 1)	0.27*** (8.177)	0.14*** (7.545)
Adj. R ²	0.8244	0.8836
Condition Index	162.50	104.04

Panel B: Percent Change Model (n = 939)

<i>Variable</i>	<i>%Δ AVGRATE</i>	<i>%Δ OCCRATE</i>
Intercept	1.48*** (4.189)	0.76** (2.107)
%Δ AVGLRETURN	0.02 (0.100)	0.45** (1.923)
%Δ AVGCOMPLNTS	-0.02 (-0.978)	0.004 (0.152)
%Δ PAST DEP. VARIABLE (LAG 1)	-0.33*** (-10.907)	-0.09*** (-4.426)
Adj. R ²	0.2008	0.6510
Condition Index	1.66	1.50

*, **, and *** Indicate that the estimated coefficient is significantly different from zero at the 10 percent, 5 percent, and 1 percent levels (one-tailed test), respectively.

PAST DEP. VARIABLE (LAG 1) = Lagged dependent variable of the respective models.

HOTEL_i = A dummy variable = 1 if hotel i, = 0 otherwise.

See Table 1 for other variable definitions.

In summary, the analyses of the lead-lag relationship between the nonfinancial performance measures used at our research site and financial performance as measured by operating profit and its various components suggest that nonfinancial measures of customer satisfaction help predict future financial performance. Our results also suggest that the association between financial and nonfinancial performance may be a result of repeat purchase as opposed to increased price premiums charged to customers. This finding is similar to that of Ittner and Larcker (1998a) who report that customer satisfaction measures are associated with growth in new customers but not with increased profit from existing customers. We find no evidence that increased customer satisfaction is associated with increased operating costs, although it is possible that expenditures on capital investments may have increased to support a customer-satisfaction strategy.

Performance Impact of Incentive Plan Change

Impact of Incentive Plan Change on Nonfinancial Performance

We now discuss the performance impacts of the new plan. Estimates of the impact of the change in the incentive plan on nonfinancial measures are presented in Table 5. Consistent with the pre-post comparisons shown in Panel B of Table 1, the regression estimates based on models (M4) and (M5) show that the change in the incentive plan has a moderate impact on LRETURN and COMPLNTS. The intercept hotel dummies are significant and explain about 30 percent of the variation in the dependent variable. The LRETURN model is significant ($p = 0.0001$, adjusted $R^2 = 0.9292$) with the coefficient δ^L positive and

TABLE 5
Impact of Incentive Plan Change on Nonfinancial Performance
(t-statistics in parentheses)

$$LRETURN_{it} = \alpha_0^L + \sum_{i=1}^{17} \beta_i^L HOTEL_i + \gamma^L LRETURNF_t + \delta^L PLAN_t + \varepsilon_t^L$$

$$COMPLNTS_{it} = \alpha_0^M + \sum_{i=1}^{17} \beta_i^M HOTEL_i + \sum_{i=1}^{18} \gamma_i^M HOTEL_i COMPLNTS_{i,t-1} + \delta^M PLAN_t + \varepsilon_t^M$$

<i>Variable</i>	<i>Coefficient</i>	<i>Predicted Sign</i>	<i>LRETURN Model (n = 1079)</i>	<i>COMPLNTS Model (n = 1061)</i>
Intercept	α_0	?	0.16*** (5.852)	0.71*** (5.198)
PLAN	δ	+ for LRETURN - for COMPLNTS	0.01*** (3.128)	-0.09*** (-2.503)
Adj. R^2			0.9292	0.3321

*** Indicates that the estimated coefficient is significantly different from zero at the 1 percent level (one-tailed test).

LRETURN_F = Average likelihood of return index for franchised hotels in month t.

HOTEL_i = A dummy variable = 1 if hotel i, = 0 otherwise.

PLAN_t = A dummy variable representing time periods following new plan implementation, taking the value 1 for July 1993 and later, and 0 before July 1993.

See Table 1 for other variable definitions.

significant ($p = 0.0009$, one-tail). This suggests that the incentive plan resulted in an increase in customer satisfaction as measured by the likelihood of return (LRETURN) measure. The COMPLNTS model ($p = 0.0001$, adjusted $R^2 = 0.3321$) reveals that the δ^M coefficient is negative and significant ($p = 0.0063$, one-tail) indicating a favorable impact of the incentive plan on customer complaints. The models (M4 and M5) reestimated together using the Seemingly Unrelated Regression (SUR) method yielded similar results. Overall, these results support the assertion that “what you measure is what you get” (Singleton-Green 1993, 52).

Impact of Incentive Plan Change on Financial Performance

Table 6 presents the estimation results of the impact of the incentive plan on the three measures of financial performance. The results of model (M6) in which COST is the dependent variable reveal that the overall regression is significant with an adjusted R^2 of 0.8933. The coefficient of the PLAN variable is negative and significant ($p = 0.0027$, one-tail). Contrary to our expectations that were discussed earlier, this result indicates that hotel

TABLE 6
Impact of Incentive Plan Change on Financial Performance
(t-statistics in parentheses)

$$COST_{it} = \alpha_0^{C'} + \sum_{i=1}^{17} \beta_i^{C'}HOTEL_i + \sum_{i=1}^{18} \gamma_i^{C'}HOTEL_iOCCRATE_{it} + \eta^{C'}ECI_t + \delta^{C'}PLAN_t + \varepsilon_{it}^{C'}$$

$$REVENUE_{it} = \alpha_0^{R'} + \sum_{i=1}^{17} \beta_i^{R'}HOTEL_i + \sum_{i=1}^{18} \gamma_i^{R'}HOTEL_iCOMPREV_{it} + \delta^{R'}PLAN_t + \varepsilon_{it}^{R'}$$

$$PROFIT_{it} = \alpha_0^{P'} + \sum_{i=1}^{17} \beta_i^{P'}HOTEL_i + \sum_{i=1}^{18} \gamma_i^{P'}HOTEL_iPROFIT_{i,t-12} + \delta^{P'}PLAN_t + \varepsilon_{it}^{P'}$$

$$TOLLRES_{it} = \alpha_0^T + \sum_{i=1}^{17} \beta_i^THOTEL_i + \sum_{i=1}^{18} \gamma_i^THOTEL_iTOLLRES_{i,t-12} + \delta^TPLAN_t + \varepsilon_{it}^T$$

<i>Variable</i>	<i>Coefficient</i>	<i>Predicted Sign</i>	<i>COST Model (n = 1079)</i>	<i>REVENUE Model (n = 1079)</i>	<i>PROFIT Model (n = 863)</i>	<i>TOLLRES Model (n = 863)</i>
Intercept	α_0	?	0.88 (0.351)	33.33*** (5.212)	8.32*** (3.63)	10.96*** (2.732)
PLAN	δ	+	-1.12*** (-2.794)	1.56*** (2.425)	1.00* (1.585)	5.31*** (5.832)
Adj. R^2			0.8933	0.8708	0.6697	0.5724

***, * Indicate that the estimated coefficient is significantly different from zero at the 1 percent and 10 percent levels (one-tailed test), respectively.

PLAN_t = A dummy variable representing time periods following new plan implementation, taking the value 1 for July 1993 and later, and 0 before July 1993.

HOTEL_i = A dummy variable = 1 if hotel i, = 0 otherwise.

ECI_t = Employment Cost Index in month t.

See Table 1 for other variable definitions.

managers did not reduce cost reduction efforts or increase spending to improve customer satisfaction.¹⁵

Table 6 also presents an estimate of the impact of the incentive plan change on revenues per available room. The overall regression is significant with an adjusted R^2 of 0.8708. The coefficient δ^R for PLAN is positive and significant ($p = 0.0078$) supporting the hypothesis that an increased emphasis on customer satisfaction leads to increased revenues. This result is consistent with the earlier results that customer-satisfaction measures are positively associated with revenues and customer-satisfaction measures improved following the change in the incentive plan. Overall, the results indicate that the incentive plan change has a positive and significant effect on revenues after controlling for inflation and competitors' performance.

The impact of incentive plan change on profit per available room is shown in the third column of Table 6. The overall regression is significant ($p = 0.0001$), and δ^P is positive and significant ($p = 0.0567$, one-tail) suggesting that the incentive plan change resulted in increased operating profit per available room. Following the incentive plan change, revenues increased whereas costs decreased significantly, resulting in a net favorable impact on profit. The impact of incentive plan change on TOLLRES is shown in the last column of Table 6. The regression estimates based on model (M9) show that the change in the incentive plan has a considerable impact on TOLLRES. The model is significant ($p = 0.0001$) with a positive and significant δ^T ($p = 0.0001$). This indicates that the change in the incentive plan resulted in a greater emphasis on reservations booked through the reservation center.

Overall, these results suggest that both nonfinancial and financial performance improved following the implementation of an incentive plan that includes nonfinancial performance measures.^{16,17} While it is tempting to attribute this improvement solely to the inclusion of nonfinancial measures in the incentive compensation plan, caution needs to be exercised because of the nature of the incentive plan implementation. Recall that although the new incentive plan did not change its emphasis on operating profit, it differed from the earlier plan by including nonfinancial measures, changing from individual performance measures (mainly financial) to common performance measures (nonfinancial), and increasing the

¹⁵ Our cost data include the cost of bonuses paid to managers on an accrual basis. We do not have access to HOTELCORP's confidential compensation data. Our results indicate that operating costs (including bonus costs) decreased significantly after the implementation of the incentive plan, suggesting that operating costs (exclusive of bonus costs) also decreased following the implementation. Model (M6) was estimated with the Consumer Price Index (CPI), and different indices for employment cost such as ECI for blue-collar employees, ECI for retail industry and ECI for service industries. The results are robust to these alternative measures of inflation. However, when costs are not controlled for inflation, the results indicate an increase in operating costs per available room following the implementation of the incentive plan.

¹⁶ We also conducted random subsample analysis using bootstrapping methods (Efron and Tibshirani 1993). Specifically, based on the bootstrap macro routine supplied by the SAS Institute, we generated 200 random subsamples for each regression model shown in the tables and computed the bootstrapped standard errors for each parameter. On average, OLS standard errors are comparable to the bootstrapped standard errors, and our results are robust to these random subsample selections.

¹⁷ Results of our analyses are robust to the presumed month of implementation. Managers of individual hotels were aware of the proposed incentive plan three months before the actual implementation. If the managers had already started making changes in their customer-service efforts starting in April 1993, then the estimates of the impact of incentive plan on all measures of performance described above would be downward-biased. To test the sensitivity of those results to the possibility of different "event dates," the models were re-estimated using April 1993 as the start of the incentive plan. The results (not shown here) are very similar to the results using July 1993 as the start of the incentive plan.

maximum bonus payments for some managers. Therefore, the improvement in financial performance can not be entirely ascribed to the inclusion of nonfinancial measures.¹⁸

V. CONCLUDING REMARKS

In this study, we analyzed field-based data from 18 managed properties of a hotel chain that revised its old managerial incentive compensation plan based mainly on financial measures to a new plan that includes nonfinancial performance measures. We documented that customer-satisfaction measures at our research site are significantly associated with future financial performance as measured by individual business unit revenues and operating profit, but not with operating costs. Moreover, our analysis provided some qualified support for the argument that customer satisfaction is associated more with long-term rather than immediate financial performance. At our research site, a simple measure of customer satisfaction was just as effective as a complex measure in predicting financial performance. The positive association between future revenues and current nonfinancial performance is mainly driven by occupancy (volume effect) as opposed to room rates (price effect). Our analysis also documented that nonfinancial performance improves following the implementation of the incentive plan that included nonfinancial measures. Financial performance as measured by operating profit also improves both in terms of long-term increases in revenues associated with current improvement in customer satisfaction and reduction in operating costs.

There are several limitations to this study. Because the research site is representative of other hotel chains in the industry, the findings of this study based on firm-specific data may be generalized to the hospitality industry, albeit with some caution. However, generalization to other industries is not possible. For example, our analysis indicates that there is an average lag of six months between customer satisfaction and future financial performance in the hotel industry. The short lag in this service industry is similar to retail banking (Ittner and Larcker 1998a) and seems to capture the economic consequences of the frequent visits of customers. However, it is possible that there are longer lags in manufacturing industries with less frequent customer purchases of products. Another limitation pertains to data availability. The absence of a carefully designed control group necessitates caution in the interpretation of the results of this quasi-experiment. The study relies on alternative control measures in the form of comparative data for competitors or franchised hotels, but such comparable measures were not available for some models. Finally, our findings are also limited by our model specification in the absence of a theoretical functional relation between customer satisfaction and financial performance, and the inherent arbitrariness and errors in the measurement of customer satisfaction.

Our study raises some interesting questions. Hotel managers received a substantial annual bonus based on profit before the change in the incentive plan, and there was only a six-month lag between customer satisfaction and profit. Why then did they not exert the appropriate effort to improve customer satisfaction, and why did the incorporation of the customer-satisfaction measures in compensation lead to improvements in both customer satisfaction and profit? Interviews with senior managers at HOTELCORP and the general manager of a hotel revealed that although hotel managers were aware of the strategic

¹⁸ In our research setting, analysis based on available data shows that total revenues, rooms supplied, and occupancy rate for the franchised hotels of HOTELCORP also show an increase relative to upscale/midscale hotel chains in the U.S. after the implementation of the incentive plan for the managed hotels. This finding suggests one more rationale for the use of customer satisfaction measures in performance evaluation in the hotel industry where such externalities are important. However, the results must be viewed with caution because several other factors such as changes in franchise fee structures, market niche, promotional efforts, contractual obligations, and other macroeconomic factors may influence growth in franchised hotels and revenues.

importance of customer satisfaction for financial performance, they did not know either the timing or the magnitude of this relation. Without such knowledge, managers did not recognize the true benefit of allocating more effort and resources to improve customer satisfaction, and did not do so until the change in the compensation plan that focused their attention on improving the customer-satisfaction measures. This explanation is consistent with Kaplan and Norton's (1996, 17) assertion that an essential benefit from the implementation of a balanced scorecard is the understanding of the timing and magnitude of the link between the levers managers control and future financial performance. When managers become better informed about how and when the levers they control impact financial performance, formal incentives based on nonfinancial measures related to these levers may not be essential to augment financial measures, provided the lag between managerial action and financial performance is not longer than the manager's decision horizon. We believe it will be fruitful to direct future research to enhancing our understanding of this complex interplay between knowledge of links between nonfinancial and financial measures, structure of incentive plans, and performance along those different dimensions.

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