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ORIGINAL EMPIRICAL RESEARCH

The impact of customer satisfaction on CEO bonuses

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Abstract In this study, we build on prior research in marketing and executive compensation to show that customer satisfaction is a significant determinant of CEO bonuses. Findings demonstrate that the success of CEOs in managing customer satisfaction has a direct, personal, and economic impact in the form of their annual bonus awards. Our study contributes to research on the use of customer satisfaction information, marketing accountability, and marketing's board level relevance. Our research also extends marketing theory by pointing to a previously unexamined role for marketing performance metrics.

Keywords CEO bonuses · Customer satisfaction · Marketing metrics

Introduction

Motivated by the desire to enhance marketing's accountability to senior management, previous research has demonstrated the positive association between measures of marketing performance—such as customer satisfaction—and firm value (e.g., Anderson et al. 2004; Gruca and Rego 2005; Gupta et al. 2004; Luo and Donthu 2006). Yet, knowledge of this positive relationship may not, on its own, be enough to encourage senior executives to devote the appropriate level of attention to measures of marketing performance (Srinivasan and Hanssens 2009). Due to information asymmetry, investors rely on current earnings to assess firm value. This provides an incentive for CEOs and other senior executives to manage short-term performance—potentially to the detriment of the value of the firm (Jacobson and Aaker 1993). In a recent study of myopic marketing management, Mizik and Jacobson (2007, p. 376) conclude that "managers will be less likely to manage firm resources myopically if they are held accountable and are evaluated based not only on earnings, but also on the health of the marketing assets (brand equity, customer satisfaction, etc.)." Similarly, researchers have pointed to the need for an examination of the extent to which marketing metrics, such as customer satisfaction, are used to incentivize senior executives (Luo and Homburg 2007; Sorescu and Spanjol 2008). Here, we integrate advances in marketing theory and the compensation literature to examine whether firms' executive compensation packages align managerial and firm interests in the promotion of customer satisfaction.

We build on prior studies in the compensation literature that look at executive pay-performance sensitivity. We extend this research stream to examine the sensitivity of CEO bonus compensation to customer satisfaction performance. A common practice in compensation studies is to model the "unexpected" component of CEO compensation as a function of the "unexpected" components of performance (Lambert and Larcker 1987). The compensation literature provides extensive guidance on measuring the unexpected component of both CEO compensation and

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financial performance measures. In measuring the unexpected component of customer satisfaction, we draw on insights from marketing (e.g., Fornell et al. 1996; Hauser et al. 1994) by focusing on satisfaction relative to peer group performance. Our empirical findings portray a consistent picture: customer satisfaction is a significant determinant of CEO bonuses after controlling for two financial measures of performance—accounting return on assets (ROA) and stock returns. Our findings are strongly robust to the inclusion of a range of relevant control variables and to a variety of alternative estimation methodologies.

Our study contributes both theoretically and managerially. In particular, we address an important gap in the literature by providing empirical evidence, consistent with the predictions of Hauser et al. (1994), on the incentive use of customer satisfaction relative to peer firms. In doing so, we demonstrate that the success of CEOs in managing customer satisfaction performance also has a direct, personal and economic impact in the form of their annual bonus awards.

We organize the rest of the paper as follows. First, we present our conceptual framework and develop our hypotheses. Next, we describe the models, methods, and data used in our study. Then we present our empirical findings and robustness tests. Finally, we conclude by discussing the theoretical and managerial implications of our findings.

Conceptual framework

Agency theory (Holmstrom 1979) suggests that executive compensation is positively associated with performance relative to expectations. Subsequent studies (e.g., Baber et al. 1998, 1999; Core et al. 2003; Lambert and Larcker 1987) have extended this idea so that, today, compensation studies frequently utilize a conceptual framework whereby the unexpected component of CEO incentives are modeled as a function of the unexpected component of the performance measures under consideration. This basic framework may be expressed mathematically as follows:

$$U(\text{BONUS}) = U(\text{PERFORMANCE}) \quad (1)$$

In practice, a difficult issue facing compensation committees is that of choosing the optimum subset from a myriad of available performance measures. Typically, when making this choice, organizations use one or more accounting-based metrics. For example, Murphy (2000) suggests that over 90% of his sample companies use at least one measure of earnings in their annual bonus plan. Firms also link cash bonus awards to stock price performance (Leone et al. 2006). Reflecting this, the unexpected component of stock returns U(RET) and the unexpected component of return on assets U(ROA) are typically included in empirical compensation studies. Accordingly, we extend Eq. 1 so that:

$$U(\text{BONUS}) = U(\text{RET}) + U(\text{ROA}) \quad (2)$$

Notwithstanding their widespread use, both earnings and stock prices have deficiencies as incentive mechanisms. Earnings, for example, are a weak measure of current-term actions that influence future financial performance (Srivastava et al. 1998). Thus, an exclusive focus on accounting performance measures can lead to myopic managerial decisions (Mizik 2010; Mizik and Jacobson 2007). Furthermore, accounting data are easily manipulated, and earnings management appears to be endemic (Healy and Wahlen 1999). There are also weaknesses inherent in the use of stock prices as an incentive measure (Feltham and Xie 1994). In particular, stock prices are subject to a range of factors beyond executive control (Gruca and Rego 2005; Lehmann 2004). Given the limitations of both earnings and stock prices for the purposes of CEO incentivization, compensation committees frequently include nonfinancial metrics in conjunction with financial measures (Ittner et al. 1997). Surveys of CEO bonus plans (Epstein and Roy 2005; Ittner et al. 1997) indicate that customer satisfaction is the most widely used nonfinancial metric for incentive contracting purposes. By way of illustration, we present extracts from an informal review of firm proxy statements in Table 1. The prevalence with which customer satisfaction is included in compensation schemes is, however, at odds with existing empirical evidence—no prior studies have found that customer satisfaction is incrementally informative over financial metrics in explaining CEO compensation.[1] Incremental informativeness is a critical issue: a measure is only beneficial as an incentive device if it is incrementally informative over existing measures with respect to the agent's effort (Holmstrom 1979). That is, the inclusion of a measure—such as customer satisfaction—in a compensation scheme is unlikely to alter managerial behavior if it is not incrementally informative over existing performance measures in explaining bonus awards. Therefore, we focus our

[1] In an unpublished study, Srinivasan et al. (2003) find that satisfaction—as measured by the American Customer Satisfaction Index—has no incremental explanatory power for CEO compensation in their study of the airline industry. However, their work focuses on a very small sample drawn from a single industry. In another unpublished paper, Chen et al. (2008b) predict and find statistically significant regression coefficients for terms representing the interaction between satisfaction and various proxies for industry competition, but report no significant "main effect" association between CEO bonus and satisfaction. Indeed Davila and Venkatachalam's (2004) study, which demonstrates that passenger load factor is a positive and significant determinant of CEO bonus in the airline industry, is the only evidence showing a direct statistical association between any nonfinancial measure and CEO compensation in any sector.

Table 1 Sample extracts from proxy statements

Firm	Extracts from proxy statement
Adobe	"[T]he Committee, in its discretion, may base performance goals on one or more of the following measures: growth in revenue; growth in market price of the common stock; operating margin; gross margin … customer satisfaction; … and other measures of performance selected by the committee." 2008 Proxy Statement.
American Express	"This [Named Executive Officer] compensation philosophy is characterized by the following principal elements: 1. Measurable goals that promote the interests of our three key constituencies: • Shareholders: aligning our compensation programs with our announced on-average and over-time financial objectives of earnings per share (EPS) …• Customers: increasing customer satisfaction, improving customer service and developing new and innovative products,...." 2007 Proxy Statement.
Broadcom	"For each subsequent year during the term of the Performance Bonus Plan, the performance objectives may include one or more of the measures used as the 2007 performance objectives as well as one or more of the following: (i) return on total shareholder equity; (ii) net income or operating income; (iii) earnings … (ix) measures of customer satisfaction; …." 2007 Proxy Statement.
Dun & Bradstreet	"Customer satisfaction—each year progress towards our aspiration to be 'most trusted' is measured through improvements in the customer satisfaction index determined by the Voice of the Customer survey." 2008 Proxy Statement.
Exelon	"Annual incentive payments were also based on customer satisfaction as measured by performance on the American Customer Satisfaction Index (ACSI) Proxy objective.…" 2007 Proxy Statement.
Intel	"Annual incentive cash payments are based on a formula that includes relative and absolute net income growth, company performance to operational goals, and an individual performance adjustment. Semiannual incentive cash payments are based on pretax margin or net income, plus customer satisfaction goals." 2008 Proxy Statement.
Microsoft	"The commitments used to determine bonuses vary for each executive based on his responsibilities and may include financial or strategic measures, including: revenue, profitability, innovation, product development and implementation, quality, customer satisfaction, …."2007 Proxy Statement.
Nortel	"The corporate performance factor [in executive bonus compensation] is based on certain corporate business and financial goals established at the beginning of the performance period and approved by the CHRC and the Nortel boards. The metrics may have different weightings applied to them and in addition, there may also be certain qualitative factors such as quality and customer satisfaction …." 2007 Proxy Statement.
Novell	"Each Named Executive Officer has been assigned qualitative performance … external customer satisfaction and customer references; employee engagement; …." 2008 Proxy Statement.
Verizon	The Committee approved the following 2007 Verizon Wireless performance measures [for determining executive—including CEO bonus compensation]: $37.6 billion for wireless service revenue, $16.9 billion for wireless EBITDA, A composite customer service/network performance measure of 100, based on internal baseline testing and third-party wins, and overall customer satisfaction and loyalty, weighted at 15% of the total award. 2008 Proxy Statement.

attention on examining whether customer satisfaction is incrementally informative over commonly used financial measures in explaining CEO bonus compensation.

Motivations for linking CEO bonuses to customer satisfaction

Recent studies suggest that earnings and stock price performance may not capture the longer-term value implications of managerial actions (e.g., Pauwels et al. 2004; Sorescu et al. 2007). Consequently, marketing scholars have argued that firms need a broader set of performance metrics than earnings and share price performance in assessing and incentivizing managers (Mizik and Jacobson 2007). There are a number of reasons customer satisfaction may be a useful additional measure for evaluating and incentivizing senior executives. First, customer satisfaction may have "value relevant" information that is incremental to accounting performance measures (Aksoy et al. 2008; Fornell et al. 2006). Second, Hauser et al. (1994) present an analytical agency model demonstrating that, as a forward-looking measure, the incentive use of customer satisfaction in conjunction with financial measures allows the firm to achieve an improved balance between short-term and long-term incentives. While Hauser et al. (1994) look at the incentive use of customer satisfaction throughout the organization, subsequent analytical work in accounting (Dikolli and Vaysman 2006) makes a similar argument for the use of customer satisfaction in executive compensation. Similarly, Fornell et al. (1996) argue that the inclusion of customer satisfaction information in the assessment of firm performance and the compensation of executives benefits shareholders and enhances corporate governance. Third, linking marketing performance indicators to executive compensation is a means of instilling a greater commitment to marketing (Jaworski 1988; Webster

1988). Fourth, customer satisfaction may provide information about the health of a firm's human capital not contained in financial metrics (Luo and Homburg 2007). Finally, firms often use measures of customer satisfaction to incentivize lower level employees (Hauser et al. 1994); consequently, to encourage goal congruity across all levels of the organization (Murphy 2000), customer satisfaction may also be useful when incentivizing the CEO. This discussion leads to the following research hypothesis:

H1: Customer satisfaction is incrementally informative over financial performance measures and control variables in explaining CEO bonus compensation.

To test our hypothesis, we draw executive compensation data from ExecuComp, financial data from COMPUSTAT and customer satisfaction data from the American Customer Satisfaction Index (ACSI). Our objective is to test whether the unexpected component of customer satisfaction, as measured by ACSI [U(ACSI)], is incrementally informative over stock returns and unexpected return on assets in explaining unexpected CEO bonus compensation. To do so, we extend Eq. 2 so that:

$$U(BONUS) = U(RET) + U(ROA) + U(ACSI) \qquad (3)^2$$

Next, we outline our approach to measuring the individual elements of Eq. 3.

Unexpected bonus CEO cash compensation comes in two forms: bonus and salary. Ezzamel and Watson (1998) and others have found that there is an industry "bidding up" effect in the determination of CEO salaries whereby salaries converge to the "going rate" for peer firms. In contrast, bonus compensation is usually determined by firm performance (Murphy 2000). Reflecting this, we focus primarily on the relationship between customer satisfaction and CEO bonuses. However, we also report our results using total CEO cash compensation (salary plus bonus) as the dependent variable.

There is extensive evidence of a nonlinear relationship between firm performance and CEO compensation. For example, most bonus plans contain minimum performance thresholds and upper bounds (Healy 1985). Prior studies also indicate that the relationship between customer satisfaction and business performance is also nonlinear (Anderson and Mittal 2000; Cooil et al. 2007; Oliva et al. 1992). Reflecting this, we transform the compensation variables into their natural log equivalents in order to control for non-linearity. Thus, our key measures of unexpected CEO compensation are the growth rate in bonus and the growth rate in total CEO cash compensation: $U(BONUS)=\ln BONUS_t - \ln BONUS_{t-1}$ and $U(TOTACASH)=\ln TOTALCASH_t - \ln TOTALCASH_{t-1}$ respectively.

Unexpected customer satisfaction While the inclusion of customer satisfaction in compensation schemes has the potential to improve the alignment of CEO incentives, the choice of benchmark against which customer satisfaction performance is assessed is a critical one (Hauser et al. 1994).[3] A poorly constructed customer satisfaction measure may provide dysfunctional incentives and reduce the quality of managerial decision making (Chen et al. 2008a). Although the unexpected component of marketing variables is commonly determined with reference to previous year performance, Jacobson and Mizik (2009) caution against using a comparison with previous year's ACSI as a proxy for the unexpected component of customer satisfaction in stock response models. Prior year may also be a weak proxy for the unexpected component of customer satisfaction in a compensation setting. Researchers in marketing, concerned with the ways in which customer satisfaction data are used by boards and senior management, stress the need to assess performance in comparison with the standard achieved by peer firms (Fornell et al. 1996; Morgan et al. 2005). More specifically, Hauser et al. (1994) contend that, when used as an incentive measure, a firm's customer satisfaction compared with that of peer firms provides an appropriate standard for assessing managerial effort. A peer-group-based metric also controls for industry-wide factors that influence customer satisfaction, but are beyond the control of the CEO, thereby isolating the impact of "firm conduct" on satisfaction (Fornell et al. 1996). The use of peer-group-based performance standards is also advocated in the compensation literature (e.g., Casas-Arce and Martinez-Jerez 2009). Murphy (2000) recommends the use of such standards, as opposed to internal (i.e., performance against the prior year or budget) standards, when: (1) peer group performance can be accessed at a low cost, (2) the resultant performance measure has lower noise than the internal measure, and (3) incentives caused by prior year standards are problematic. Notwithstanding the theoretical merits of relative financial performance measures, empirical support for their use in practice is mixed (e.g., Aggarwal and Samwick 1999;

[2] Customer satisfaction impacts each of the financial metrics (Anderson et al. 2004; Gruca and Rego 2005). Therefore, testing the incremental independent impact of U(ACSI) provides a conservative estimate of the relationship between customer satisfaction and compensation. Similarly, studies by Jacobson and colleagues investigating the incremental information content of marketing metrics with respect to firm value (e.g., Aaker and Jacobson 1994; Mizik and Jacobson 2008) provide a conservative estimate of value relevance.

[3] Separately, Dikolli and Sedatole (2007) and Chen (2009) demonstrate that the benchmark against which satisfaction is measured influences its information content.

Albuquerque 2009; Antle and Smith 1986; Janakiraman et al. 1992). One commonly cited explanation for the limited use of relative financial performance measures is that CEO reservation wages from outside employment opportunities vary with the fortunes of the wider economy (Oyer 2004; Rajgopal et al. 2006). Thus, while relative financial performance may provide a clearer indication of managerial effort, the desire to retain talented executives appears to lead away from using such measures. A concern with variation in outside employment opportunities is, however, unlikely to limit the usefulness of nonfinancial relative performance indicators such as customer satisfaction.

Considering each of the criteria set out by Murphy (2000), firm relative to mean industry ACSI score appears to be a useful basis for setting performance expectations. First, ACSI is a highly credible and freely available measure of both firm and industry satisfaction. Therefore, the cost of using the measure approaches zero. Second, satisfaction relative to peer firms is approximately 50% less noisy (where noise is defined in terms of the mean time-series variance) than year-on-year change in the internal measure. Third, performance standards based on the prior year provide incentives that are less effective and profitable (for the firm) than standards based on peer performance (Hauser et al. 1994). Accordingly, we estimate the unexpected component of customer satisfaction U(ACSI) as the residual (u) from the following model:

$$\mathrm{ACSI}^{\mathrm{FIRM}} = \alpha + \beta_1 \mathrm{ACSI}^{\mathrm{IND}} + \mathrm{u} \tag{4}$$

where $\mathrm{ACSI}^{\mathrm{FIRM}}$ and $\mathrm{ACSI}^{\mathrm{IND}}$ represent the firm and the mean 2-digit SIC industry ACSI scores respectively.

When we estimate Eq. 4 we find that β_1=.997 (as confirmed by a *t*-test with p=.000) is not significantly different from 1. Hence, by re-arranging (4), U(ACSI) = u = $\mathrm{ACSI}^{\mathrm{FIRM}} - \mathrm{ACSI}^{\mathrm{IND}} - \alpha$. As adding/deducting a constant sum to/from a variable has no impact on the magnitude, sign or significance of slope coefficients and other key regression statistics (R^2, F, etc.), we measure U(ACSI) as $\mathrm{ACSI}^{\mathrm{FIRM}}$ – $\mathrm{ACSI}^{\mathrm{IND}}$ when estimating Eq. 3. Measuring U (ACSI) in this fashion makes it easier to conceptualize and interpret the impact of unexpected satisfaction on CEO bonus growth and avoids problems associated with the use of generated regressors (Tufte and Wohar 1999).

Unexpected financial performance Return on assets (ROA) is a strong determinant of CEO bonus and total cash compensation (Bushman and Smith 2001; Lambert and Larcker 1987). Following Lambert and Larcker (1987) we define the unexpected component of ROA as the year-on-year change in ROA (i.e., U(ROA)=$\mathrm{ROA}_t - \mathrm{ROA}_{t-1}$). CEO bonuses are also linked to stock returns (Leone et al. 2006). As stock returns are serially uncorrelated, unexpected returns are normally proxied by "raw" returns (e.g., Baber et al. 1999; Lambert and Larcker 1987). Thus, we define unexpected RET as the actual stock return for the period (i.e., U(RET)=RET). As we discuss subsequently, our findings are not impacted by the use of relative financial performance measures.

Controls We include a number of control variables in our empirical analysis. We include total sales (SIZE) as a measure of firm magnitude in order to control for the well-established link between executive compensation and firm size. As firms' growth opportunities can influence compensation, we include a relevant proxy defined with respect to the firm's book-to-market ratio (BTM). We also include a measure of the firm's financial leverage in the empirical specification (DEBT). To account for the impact of industry growth, we include an additional measure (INDGROWTH). We control for firm risk by including the standard deviation of firm stock returns in the empirical analysis (Kroll et al. 1999). This measure, which is calculated for each firm as the time-series variance of unexpected annual stock returns (VAR[U(RET)]=time-series variance of RET), also captures the "noise" in stock returns from a performance measurement perspective (Lambert and Larcker 1987).[4] Finally, to control for the firm's competitive situation, we include a measure of market share (MKTSHARE).

Full empirical model Our model (Eq. 3 above) may be expressed by means of the following extended specification, which includes the performance and control variables:

$$\begin{aligned} \mathrm{U}(\mathrm{BONUS}_{i,t}) = {} & \alpha + \beta_1 \mathrm{U}(\mathrm{ACSI}_{i,t}) + \beta_2 \mathrm{U}(\mathrm{ROA}_{i,t}) \\ & + \beta_3 \mathrm{U}(\mathrm{RET}_{i,t}) + \beta_X (\mathrm{Controls}_{i,t}) \\ & + \beta_Y \mathrm{INDUSTRY} + \beta_z \mathrm{YEAR} + \mathrm{e}_{i,t} \end{aligned} \tag{5}$$

where α_0 represents the regression intercept and e is the (iid) residual and i and t represent firm and year subscripts respectively for our longitudinal dataset. We predict that the unexpected component of customer satisfaction is incrementally informative over financial performance measures and control variables in explaining unexpected CEO bonus compensation (U(BONUS)). Our hypothesis, outlined above, implies that β_1 in Eq. 5 is positive and statistically significant (i.e., β_1>0). We also estimate Eq. 5 using U (TOTALCASH) as an alternate dependent variable. Finally, to control for the potential influence of any remaining panel effects (Hsiao 2003), which are not already accounted for, we include individual 2-digit SIC industry and year

[4] As discussed, consistent with standard practice for studies that employ an expected/unexpected framework, U(RET) = RET throughout.

dummies. We present a summary of the variables used in our study in Table 2.

Data

ACSI data are provided by the National Quality Research Center at the University of Michigan. ACSI reports scores for each firm on a scale of 1–100 annually. Our decision to use ACSI as our measure of customer satisfaction was influenced by a number of characteristics of the Index. As an aggregate measure of satisfaction, ACSI provides an assessment of the firm's overall customer satisfaction, as opposed to an individual's satisfaction with a specific transaction (Fornell et al. 1996). While the disaggregation of satisfaction is recommended for the evaluation of individual employees and employee groups (Hauser et al. 1994), an aggregate measure, such as ACSI, is more relevant to senior management (Gupta and Zeithaml 2006). ACSI data are also independently measured, based on a robust methodology that is applied consistently across firms and data that are publicly available. These attributes fit well with the objective of measuring performance accurately and costlessly (Holmstrom 1979). Even when ACSI is itself not directly utilized for incentive contracting, it appears to be a useful proxy for any of the alternative customer satisfaction metrics—proprietary or otherwise—that firms might use to determine CEO bonus compensation. One feature of ACSI data that merits careful attention in empirical research is that multiple ACSI scores are reported for a number of firms. For example, during the sample period, four separate ACSI numbers are reported for Daimler-Chrysler (reflecting satisfaction for Chrysler, Dodge, Jeep and Mercedes-Benz ranges respectively), while eight individual satisfaction scores are reported for General Motors. Any approach that attempts to aggregate these multiple scores is necessarily arbitrary (Ittner et al. 2009). Consequently, we include only those firms with a single ACSI score in our sample.

We draw CEO compensation data from the ExecuComp database and compute the other variables from COMPUSTAT for the period 1994–2005. We exclude observations where the CEO has been in place for 1 year or less to avoid errors in variables problems. For example, if CEO Y leaves and CEO X joins during a particular fiscal period, the compensation variable will reflect the compensation packages awarded to two different individuals for different time periods. For this reason, observations from fiscal years when there is a change in CEO are normally excluded from compensation studies (e.g., Hayes and Schaefer 2000).

ACSI is measured on an annual basis and the data are released approximately 7 weeks after the end of the

Table 2 Variable definitions and data sources

Variable	Measure	Data source	Rationale for inclusion in the model
U(BONUS)	= ln[CEO BONUS$_t$] – ln[CEO BONUS$_{t-1}$]	ExecuComp	Dependent Variable
U(TOTALCASH)	= ln[CEO (BONUS+SALARY)$_t$] – ln[CEO (BONUS+SALARY$_{t-1}$]	ExecuComp	Dependent Variable
U(ACSI)	= [ACSI FOR FIRM$_t$] – [MEAN ACSI FOR INDUSTRY$_t$]	American Customer Satisfaction Index	Independent Variable
U(RET)	= Stock return including dividends.	COMPUSTAT	Independent Variable
U(ROA)	= [Return on Assets$_t$] – [Return on Assets$_{t-1}$]	COMPUSTAT	Independent Variable
SIZE	= ln[FIRM SALES$_t$] – ln[FIRM SALES$_{t-1}$]	COMPUSTAT	Control Variable
BTM	= {[(Book Value of Equity$_t$)/(Market Value of Equity$_t$)] – [(Book Value of Equity$_{t-1}$)/(Market Value of Equity$_{t-1}$)]}	COMPUSTAT	Control Variable
DEBT	= {[(Book Value of Debt$_t$/Book Value of Total Assets$_t$)] – [(Book Value of Debt$_{t-1}$)/(Book Value of Total Assets$_{t-1}$)]}	COMPUSTAT	Control Variable
INDGROWTH	= ln[INDUSTRY SALES$_t$] – ln[INDUSTRY SALES$_{t-1}$]	COMPUSTAT	Control Variable
MKTSHARE	= {[(FIRM SALES$_t$)/(INDSUTRY SALES$_t$)]^2 – [(FIRM SALES$_{t-1}$)/(INDUSTRY SALES$_{t-1}$)]^2}	COMPUSTAT	Control Variable
VAR[U(RET)]	= Time-series variance of U(RET)	COMPUSTAT	Control Variable

measurement period. However, fiscal year ends for firms usually differ from the 12 month period covered by ACSI. Moreover, even when the period covered by ACSI is identical to the fiscal year, the 7 week lag in releasing ACSI data leads to an additional difficulty, as firms will normally finalize CEO bonus very shortly after the fiscal year end. In light of this, and as $ACSI^{FIRM}$ and $ACSI^{IND}$ are proxies for the actual measures firms use, we need to ensure that the score we define as contemporaneous with the relevant period's bonus was available to the firm at the time the bonus was determined. Furthermore, we form the assumption, consistent with others (e.g., Fornell et al. 2006; Ittner and Larcker 2003), that firms may lack the sophistication to provide a reliable and robust contemporaneous measure of *relative* performance. Thus, we define ACSI as the score reported in the database for the previous year.

After applying the selection criteria outlined above, our sample consists of 748 observations drawn from 118 firms and 29 2-digit SIC industries over the period 1994–2005. The 187 individual CEOs covered by our sample have a mean (median) tenure of 7.59 (5) years. The average annual CEO bonus is $1.644 million while average CEO cash compensation is $2.632 million. These payments constitute an average of 24% and 51% respectively of total annual CEO compensation (i.e., including equity-based and other components). The mean ACSI score for our sample firms ($ACSI^{FIRM}$) is 75.71 with a minimum and maximum of 49 and 88 respectively. U(ACSI) ranges from −22.29 to 13.25 with a mean value of .18. The stock return variable U(RET) has a small number of very extreme observations, so we winsorize U(RET) at the 1% and 99% levels. This has no impact on the reported results.

Our examination of the relationship between CEO compensation and the unexpected component of customer satisfaction is complicated by the potentially confounding impact of year-on-year changes in customer satisfaction (Y(ACSI)). For example, the 1997 ACSI score for FedEx was 82 while the mean for the industry for the same period was 72.25, giving a U(ACSI) value of 9.75 (i.e., 82–72.25). On the surface, this would appear to indicate an extremely positive performance by FedEx. However, the ACSI score for FedEx in 1996 was 86, so Y(ACSI) was −4 (i.e., 82–86). In such instances, it is unclear as to how the compensation committee will interpret customer satisfaction performance, as the firm has recorded a positive performance relative to the industry average, while simultaneously recording a decrease in performance at the firm level. Of course, the opposite scenario can also emerge. The potential outcomes are summarized in Panel A of Table 3. For quadrants I and IV the U(ACSI) signal is clear as both U(ACSI) and Y(ACSI) send consistent feedback (we term this the CLEAR SIGNAL subsample). However, for quadrants II and III the two indicators move in opposite directions so the signal is ambiguous (we term this the AMBIGUOUS SIGNAL subsample). Thus, consistent with studies of the relationship between customer satisfaction and stock market performance (e.g., Aksoy et al. 2008; Fornell et al. 2006), we focus our attention on those observations where there is a CLEAR SIGNAL, i.e., where both Y(ACSI) and U(ACSI) are—jointly—either negative or positive.

In Panel B of Table 3, we present the Pearson correlations for the overall sample and for both the CLEAR SIGNAL and AMBIGUOUS SIGNAL subsamples. For the entire sample (ALL), the correlation coefficient between U(BONUS) and U(ACSI) is .023, which is statistically insignificant. However, when we focus only on the CLEAR SIGNAL subsample (constituting 71% of the overall sample), we can see the strong positive and significant correlation between the two variables of .138, (p=.002). In contrast, for the AMBIGUOUS SIGNAL subsample, the correlation between U(BONUS) and U(ACSI) is a highly significant *negative* correlation of −.190 (p=.006).

While the correlation analysis offers useful preliminary insights, to formally test the differential impact of the AMBIGIOUS and CLEAR SIGNAL observations we proceed as follows.[5] In an analogous fashion to Mittal et al. (2005), we first define SIGNAL as an indicator variable taking a value of 1 when an observation is classified as constituting an AMBIGUOUS SIGNAL and 0 otherwise. We then interact SIGNAL with U(ACSI) to form a new variable [U(ACSI) × SIGNAL]. We now include both SIGNAL and [U(ACSI) × SIGNAL] in the core estimation specification to give:

$$\begin{aligned} \mathrm{U}(\mathrm{BONUS}_{i,t}) = {} & \alpha_0 + \beta_1 \mathrm{U}(\mathrm{ACSI}_{i,t}) + \beta_2 \mathrm{U}(\mathrm{ROA}_{i,t}) \\ & + \beta_3 \mathrm{U}(\mathrm{RET}_{i,t}) + \beta_4 (\mathrm{SIGNAL}_{i,t}) \\ & + \beta_5 [(\mathrm{SIGNAL}_{i,t}) \times \mathrm{U}(\mathrm{ACSI}_{i,t})] \\ & + \beta_X (\mathrm{CONTROLS}_{i,t}) \\ & + \beta_Y \mathrm{INDUSTRY} + \beta_z \mathrm{YEAR} + e_{i,t} \end{aligned} \quad (6)$$

If there is no difference between the CLEAR SIGNAL and AMBIGUOUS SIGNAL observations, then [SIGNAL+(U(ACSI) × SIGNAL)] = 0. The results for this test for U(BONUS) and U(TOTALCASH) are reported in Columns 2 and 4 respectively of Table 5. The respective F-statistics (p values) are 5.68 (.005) and 3.13 (.048). In both cases, we also report a significant [(U(ACSI × SIGNAL)] interaction coefficient with p values of .004 and .031 respectively. Hence, we need to control for the differential impact of the AMBIGUOUS SIGNAL observations in our empirical modeling, as to ignore this effect would lead to a significant

[5] We are grateful to the anonymous review team for their suggestions with respect to this test.

Table 3 Interpreting the relative to peer measure (U(ACSI)) in conjunction with the firm specific measure (Y(ACSI))

Panel A: Interpreting the Relative Measure in Conjunction with the Firm Specific Measure

		Outcome on the Relative Measure	
		U(ACSI)>0	U(ACSI)≤0
Outcome on the Firm-Specific Measure			
	Y(ACSI)>0	I. CLEAR SIGNAL	II. AMBIGUOUS SIGNAL
	Y(ACSI)≤0	III. AMBIGUOUS SIGNAL	IV. CLEAR SIGNAL

Panel B: Pearson Correlations Between CEO Compensation and U(ACSI) Across Subsamples

	ALL	CLEAR SIGNAL (I & IV)	AMBIGUOUS SIGNAL (II & III)
U(BONUS) (*N*=598)	.0228	.138[a]	−.1901[a]
	100%	71%	29%
U(TOTALCASH) (*N*=748)	−.0023	.0719[b]	−.098[b]
	100%	72%	28%

[a, b]: Significance at 1%, 5% and 10% respectively. U(ACSI)=Unexpected ACSI; Y(ACSI)=year-on-year change in $ACSI^{FIRM}$

bias in estimates of the U(ACSI) coefficient. Prior work (Dechow et al. 1994; Gaver and Gaver 1998) shows that compensation committees utilize accounting earnings information in an "informed" manner in that they adjust the earnings figure for the impact of "once-off" items when compensating executives. In an analogous fashion, our findings also suggest that boards use satisfaction data in an informed and rational manner, as they do not utilize satisfaction for compensation purposes when the relative to peer firms and firm-specific satisfaction signals are in conflict.

We present the summary statistics for our sample as well as correlations between the various compensation, performance, and control variables in Table 4.[6]

Results

We present the results of regression estimates of Eq. 5 using U(BONUS) as the dependent variable in Column 1 of Table 5.[7]

The *p* values for the coefficient estimates are based on t-statistics calculated using Huber-White standard errors adjusted for firm-level clustering (Rogers 1993). This ensures that the calculated t-statistics are robust to panel-wide heteroscedasticity and autocorrelation. Our expectation is that U(ACSI) is incrementally informative over the financial performance measures and control variables in explaining U(BONUS). The results in Column 1 of Table 5 confirm this prediction as the regression coefficient associated with U(ACSI) is both positive and statistically significant at p=.015.

Estimates in Column 1 of Table 5 exclude the AMBIGUOUS SIGNAL subsample. We present the analysis using U(BONUS) as the dependent variable for the model which includes both the CLEAR and AMBIGUOUS signal observations (i.e., Eq. 6) in Column 2 of Table 5. These results show that while incorporating the entire sample information leads to slight changes in the various coefficient estimates, the U(ACSI) coefficient is still positive and statistically significant with a magnitude of .014 (p=.016).

When we repeat both regressions using U(TOTALCASH) as an alternate dependent variable (Columns 3 and 4 of Table 5), β_1 is again positive and significant at p=.015 and p=.007 respectively. Thus, the data offers compelling evidence (at $p \leq .016$ in all cases) supporting our prediction that customer satisfaction is incrementally informative over both financial performance measures and control variables in explaining growth in CEO bonus and total cash compensation. In Table 5, we also report the likelihood ratio test statistics for nested tests of the incremental contribution of U(ACSI). These results confirm the statistical significance of U(ACSI).

For all four regression estimates, it is noteworthy that the unexpected component of the financial performance measures (U(RET) and U(ROA)) are also statistically significant at conventional levels. Taken as a whole, the results in

[6] The mean for U(ACSI) for the CLEAR SIGNAL observations is .677 (*N*=536) while that for the AMBIGUOUS SIGNAL observations is -1.04 (*n*=212) and the overall mean is .18 (*N*=748). A *t*-test of the difference between the means for the CLEAR SIGNAL and AMBIGUOUS SIGNAL subsamples is significant at p=.000 with a t-statistic = 6.25. This finding is confirmed by Hotelling and Kruskal-Wallis tests. These findings suggest that U(ACSI) is significantly different for the AMBIGUOUS SIGNAL observations. No other significant differences in the mean values of variables across the CLEAR SIGNAL and AMBIGUOUS SIGNAL subsamples are evident.

[7] For each individual regression estimate outliers defined as those observations with values of Cook's Distance greater than 4/N are excluded from the analysis (Cook 1977). Including outliers has no material impact on our results for U(ACSI).

Table 4 Descriptive statistics and bivariate correlation matrix

		Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	U(TOTALCASH)	.06	1.08	1.00										
(2)	U(BONUS)	.12	.58	.89	1.00									
				(.00)										
(3)	U(ACSI)	.18	3.45	Table 3	Table 3	1.00								
(4)	U(RET)	16.19	34.45	.01	.24	.01	1.00							
				(.79)	(.00)	(.87)								
(5)	U(ROA)	.45	5.08	−.09	.06	−.07	.09	1.00						
				(.02)	(.15)	(.06)	(.02)							
(6)	SIZE	.07	.19	.01	.09	.00	.21	.03	1.00					
				(.77)	(.02)	(.91)	(.00)	(.34)						
(7)	BTM	.45	.35	−.03	−.23	.03	−.54	.02	−.11	1.00				
				(.45)	(.00)	(.41)	(.00)	(.67)	(.00)					
(8)	DEBT	.00	.06	.00	.08	.02	−.12	−.14	−.03	−.15	1.00			
				(.95)	(.05)	(.68)	(.00)	(.00)	(.35)	(.00)				
(9)	INDGROWTH	.05	.14	−.01	.13	.05	.15	.01	.39	−.13	−.02	1.00		
				(.89)	(.00)	(.19)	(.00)	(.86)	(.00)	(.00)	(.65)			
(10)	MKTSHARE	.00	.03	−.02	−.05	−.02	−.02	−.00	.14	−.02	.01	−.29	1.00	
				(.60)	(.26)	(.62)	(.66)	(.93)	(.00)	(.53)	(.81)	(.00)		
(11)	VAR[U(RET)]	1.43	1.93	−.02	−.01	−.03	.15	.23	.13	−.06	−.06	−.01	.07	1.00
				(.50)	(.79)	(.42)	(.00)	(.00)	(.00)	(.11)	(.10)	(.74)	(.06)	

p values in parenthesis; $N=748$ except for U(BONUS) where $N=598$

Table 5 reveal that customer satisfaction is used in conjunction with both earnings and stock returns to determine CEO bonus and total cash compensation. As each of the three performance measures is individually significant it appears that all three reflect distinct aspects of performance from a reward and incentive standpoint.

As we make no empirical predictions about the AMBIGUOUS signal observations, we initially group both quadrant II and III observations together and use a single dummy intercept and single dummy interaction term. In Table 6 we present the results using dummy intercepts for each individual quadrant (QUAD_II and QUAD_III) and dummy interaction variables for each quadrant ((U(ACSI) × QUAD_II) and (U(ACSI) × QUAD_III)). The results when these four terms are used in the regression analysis (instead of SIGNAL and (U(ACSI) × SIGNAL)) are presented in Table 6. These statistics show that the results for our hypothesis test are unchanged as U(ACSI) is positive and significant in both columns. Furthermore, the F-test of the joint significance of the AMBIGUOUS SIGNAL dummies (i.e., $[\text{QUAD\_II} + \text{QUAD\_III} + ((\text{U(ACSI)} \times \text{QUAD\_II})) + (\text{U(ACSI)} \times \text{QUAD\_III}) = 0]$) is rejected indicating, as before, that it is inappropriate to pool the CLEAR SIGNAL and AMBIGUOUS SIGNAL observations. Finally, for both compensation variables, the outcomes with respect to the AMBIGUOUS SIGNAL observations are consistent with those for the CLEAR SIGNAL subsample in that customer satisfaction exhibits a positive association with CEO compensation.[8]

While they are of secondary interest from the perspective of our study, we now briefly analyze the results for the control variables. First, the negative and significant coefficient for the book-to-market ratio suggests that CEO bonus compensation is an increasing function of growth opportunities (Bushman and Smith 2001). Second, we find that bonus compensation is an increasing function of financial leverage (DEBT). Third, SIZE is not significant in three of the four regressions, suggesting that CEO bonus and cash compensation growth is primarily driven by firm performance rather than size. However, INDGROWTH is positive and statistically significant in three of the four regressions, indicating the importance of industry growth as a determinant of CEO compensation. The VAR(RET) construct is negative but insignificant in three of the four regressions, indicating that the noise in stock returns (which may also be viewed as a measure of firm risk) has a comparatively limited impact on CEO compensation. Finally, MKTSHARE is not significant in any of the regressions.

[8] Using the values in Table 6, the partial derivative of U(CASH) with respect to U(ACSI) for quadrant II observations (i.e., when QUAD_II= 1) is .018 ([.012+.006×1]) and .010 for quadrant III observations ([.012 −.002 (×1)]). For U(TOTALCASH), the equivalent figures are .020 for quadrant II observations and .014 for quadrant III observations.

Table 5 Customer satisfaction and CEO bonuses: empirical results

		CLEAR SIGNAL Subsample (1) U(BONUS)		ALL (2) U(BONUS)		CLEAR SIGNAL Subsample (3) U(TOTALCASH)		ALL (4) U(TOTALCASH)	
	Prediction	Estimate	*p* Value	Estimate	*p* Value	Estimate	*p* Value	Estimate	*p* Value
Independent Variable									
Performance Measures									
(β_1) U(ACSI)	+	.015	.015	.014	.016	.010	.015	.011	.007
(β_2) U(RET)		.005	.000	.003	.001	.003	.000	.003	.000
(β_3) U(ROA)		.019	.015	.010	.096	.014	.007	.009	.200
(β_4) SIGNAL				.022	.577			.004	.907
(β_5) U(ACSI) × SIGNAL				−.033	.004			−.018	.031
Control Variables									
(β_6) SIZE		.108	.312	.228	.020	−.029	.804	.178	.071
(β_7) BTM		−.367	.038	−.758	.000	−.338	.027	−.200	.199
(β_8) DEBT		.472	.141	.406	.103	−.252	.265	.136	.595
(β_9) INDGROWTH		.573	.009	.443	.008	.385	.036	.176	.270
(β_{10}) VAR[U(RET)]		−.007	.783	−.000	.044	−.020	.074	−.000	.576
(β_{11}) MKTSHARE		−.526	.555	.395	.550	.072	.862	−.334	.546
(α_0) Intercept		.513	.000	.055	.429	.025	.807	.010	.862
YEAR DUMMIES		Yes		Yes		Yes		Yes	
INDUSTRY DUMMIES		Yes		Yes		Yes		Yes	
F-statistic		2.65	.000	3.78	.000	3.71	.000	2.62	.000
Adjusted R^2		.156		.186		.200		.096	
R^2		.251		.253		.273		.162	
[SIGNAL + (U(ACSI) × SIGNAL) = 0]				5.68	.005			3.13	.048
Likelihood ratio test statistic for U(ACSI)		6.31	.006	5.57	.009	3.65	.028	4.42	.018
Observations		393		559		512		737	

Next, to test the robustness of our findings, we undertake split sample analysis tests for model misspecification and endogeneity, and we utilize a range of alternative empirical estimation models.

Split sample analysis

To test whether or not our findings for the overall sample hold across the various economic sectors, we re-estimate Eq. 6 for each of the following individual sectors: Manufacturing (SIC 20–39), Transportation and Utilities (SIC 40–49), Wholesalers and Retailers (SIC 50–59) and a composite group (to ensure satisfactory minimum sample size) comprising Finance and Insurance (SIC 60–69) and Consumer/Business Services (SIC 70–89). We present a summary of these findings in Panel A of Table 8. For three of the four regressions U(ACSI) is positive and significant at $p \leq .019$. For the fourth regression—Manufacturing—the *p* value (.161) is insignificant at conventional levels. Taken as a whole, our findings indicate that satisfaction is an important determinant of CEO bonus growth across the sectors (other than Manufacturing) covered by ACSI.[9] The differing results between manufacturing and services sectors, in our study, are perhaps unsurprising given that, by definition, service sector firms are more service centric. Our findings here are also broadly consistent with previous research, which suggests that the effect of customer satisfaction on financial performance and firm value varies across industries (Anderson et al. 1997; Ittner and Larcker 1998). Interestingly, while Anderson et al. (1997) find that the relationship between customer satisfaction and contemporaneous financial performance is stronger for manufacturing than for services, we find that the incentive use of

[9] We use Eq. 6 (i.e., we include both CLEAR SIGNAL and AMBIGUOUS SIGNAL observations) for the estimates reported in Panels A and B of Table 8. To maximise sample size, we include outliers in the sector and period estimates in Panel A. Four observations, which are outside of the SIC codes included in our analysis, are excluded from the sector tests. The estimates in Table 8 are for U(BONUS) as the dependent variable in all cases—the results when U(TOTALCASH) is the dependent variable are equivalent and are available from the authors on request.

Table 6 Customer satisfaction and CEO bonuses: empirical results with separate effects for each ambiguous signal quadrant

		ALL (1) U(BONUS)		ALL (2) U(TOTALCASH)	
	Prediction	Estimate	*p* Value	Estimate	*p* Value
Independent Variable					
Performance Measures					
(β_2) U(ACSI)	+	0.012	0.020	0.009	0.013
(β_2) U(RET)		0.003	0.000	0.003	0.000
(β_3) U(ROA)		0.013	0.025	0.010	0.158
(β_4) SIG_QII		−0.302	0.526	−0.731	0.093
(β_5) U(ACSI) × SIG_QII		0.006	0.346	0.011	0.072
(β_6) SIGNAL_ QIII		−0.034	0.972	−0.476	0.528
(β_7) U(ACSI) × SIG_QIII		−0.002	0.899	0.005	0.622
Control Variables					
(β_8) SIZE		0.199	0.049	0.157	0.112
(β_9) BTM		−0.760	0.000	−0.210	0.163
(β_{10}) DEBT		0.441	0.087	0.146	0.568
(β_{11}) INDGROWTH		0.448	0.007	0.179	0.257
(β_{12}) VAR[U(RET)]		−0.000	0.067	−0.000	0.690
(β_{13}) MKTSHARE		0.457	0.481	−0.312	0.574
(α_0) Intercept		0.062	0.367	0.019	0.736
YEAR DUMMIES		Yes		Yes	
INDUSTRY DUMMIES		Yes		Yes	
F-statistic		3.84	.000	2.70	.000
Adjusted R-squared		.196		.103	
R-squared		.266		0.164	
[SIG_QII + (U(ACSI) × SIG_QIII)+SIGNAL_QIII + (U(ACSI)×SIG_QIII) = 0]		4.71	.001	2.60	.039
Likelihood ratio test statistic for U(ACSI)		4.30	.020	4.99	.013
Observations		559		737	

satisfaction is weakest in the manufacturing sector. This may be reflective of the weaker relationship between customer satisfaction and loyalty in the manufacturing sector (Fornell et al. 1996). It may also be due to the greater reliance of manufacturing firms on indirect channels of distribution, which by necessity complicate the process of capturing accurate and timely measures of satisfaction for use in compensation schemes.

We separately examine the results for Eq. 6 across both halves of the sample period, i.e., 1995–2000 and 2001–2005. These results, which we also summarize in Panel A of Table 8, reveal that customer satisfaction is a positive and significant determinant of CEO bonuses for both periods (at $p \leq .021$).

Results of fixed effects estimation

Contemporary econometrics and related literatures have developed a range of alternative approaches for dealing with the potential impact of individual-specific and/or time-specific effects in the context of panel data (Hsiao 2003; Wooldridge 2002). The method chosen should allow for precise statistical testing of the hypothesis under consideration while simultaneously ensuring an econometrically sound solution for dealing with the potential impact of unobservables (Greene 2003). Boulding (1990) and Boulding and Staelin (1995) show that fixed effects estimation offers a powerful mechanisms for controlling for unobserved heterogeneity in a panel context. We present the results of the fixed effects estimation Table 7.

In Column 1 of Table 7, we report the results when U (BONUS) is the dependent variable and only firm fixed effects are employed. In Column 2, we include year as well as firm effects. In Column 3, we report the impact of including CEO fixed effects in addition to firm and time fixed effects. In Column 4, we show the results when we repeat the same analysis using U(TOTALCASH) as the dependent variable. The key message from Columns 3 and

Table 7 Fixed effects estimation

		ALL (1) U(BONUS)		ALL (2) U(BONUS)		ALL (3) U(BONUS)		ALL (4) U(TOTALCASH)	
	Prediction	Estimate	*p* Value	Estimate	*p* Value	Estimate	*p* Value	Estimate	*p* Value
Independent Variable									
Performance Measures									
(β_1) U(ACSI)	+	0.014	0.027	0.015	0.009	0.015	0.016	0.018	0.009
(β_2) U(RET)		0.002	0.014	0.003	0.008	0.003	0.015	0.003	0.001
(β_3) U(ROA)		0.015	0.008	0.012	0.033	0.016	0.009	0.009	0.189
(β_4) SIGNAL		−0.002	0.964	0.012	0.766	−0.026	0.619	−0.023	0.614
(β_5) U(ACSI) × SIGNAL		−0.029	0.007	−0.034	0.006	−0.026	0.012	−0.014	0.298
Control Variables									
(β_6) SIZE		0.272	0.011	0.264	0.031	0.345	0.029	0.076	0.487
(β_7) BTM		−0.819	0.000	−0.963	0.000	−0.908	0.000	−0.213	0.267
(β_8) DEBT		0.331	0.157	0.226	0.352	0.228	0.393	0.226	0.467
(β_9) INDGROWTH		0.344	0.026	0.430	0.004	0.411	0.025	0.205	0.206
(β_{10}) VAR[U(RET)]									
(β_{11}) MKTSHARE		0.053	0.943	−0.065	0.932	−0.387	0.680	−0.533	0.369
(α_0) Intercept		0.014	0.546	0.016	0.743	−0.014	0.817	−0.041	0.329
Observations		559		559		559		737	
Fixed Effects									
FIRM		YES		YES		YES		YES	
YEAR				YES		YES		YES	
CEO						YES		YES	

4 of Table 7 (i.e., the tests including time, firm and CEO fixed effects simultaneously) is that the relationship between CEO compensation and U(ACSI) is positive and significant (at $p \leq .016$) for both compensation variables after simultaneously controlling for the three major sources of potential unobserved heterogeneity in our sample.[10]

Other estimation methods

Hsiao (2003) also suggests that an alternative means of controlling for panel effects is to postulate a conditional distribution of unobserved effects, given the exogenous variables (i.e., random effects estimation). We present the results of random effects estimation in Panel B of Table 8. This estimate shows the outcome using firm random effects allowing for clustering across industries. In unreported results we find that that U(ACSI) is positive and significant at $p < .015$ when we allow for clustering across firms rather than industries.

While initial tests suggest that we need to correct for panel wide heteroscedasticity, there is no evidence of autocorrelation or cross-sectional dependence in the data. Nonetheless, to test the sensitivity of our findings we estimate Eq. 6 allowing for first-order autocorrelation in addition to heteroscedasticity using an alternative econometric approach (Newey-West Estimation). In addition, we allow for the joint possibility of heteroscedasticity, autocorrelation and cross-sectional dependence impacting our calculated t-statistics (using the Driscoll and Kraay (1998) approach as implemented by Hoechle (2007)). From the results presented in Panel B of Table 8, it is clear that employing these alternative estimation approaches has no impact on our results.[11] We also present the results from the alternative econometric approach for simultaneously controlling for heteroscedasticity, autocorre-

[10] One potential noteworthy aspect of these results is that one of our control variables (VAR(RET)) drops out of the analysis as time-invariant variables are dropped in fixed effects estimation. For this reason, we report our main results using Huber-White-Rogers estimation (Rogers 1993).

[11] To investigate the potential impact of our decision to use lagged satisfaction, we examine an alternative measure of satisfaction—defined as the average of the contemporaneous and prior period's measures of satisfaction relative to peer firms—as an alternative to U (ACSI) in Eq. 5. The coefficient estimates (*p* values) for satisfaction using this alternative measure for the regressions in columns (1) to (4) respectively of Table 5 are: [.019, (.009);.016 (.013);.009 (.036).009 (.023)]. These results show that the average measure—which combines both contemporaneous and lagged satisfaction relative to peer firms—is also positive and statistically significant.

Table 8 Split sample analysis and alternative estimation methodologies

	Panel A: Split sample analysis					Panel B: Alternative estimation methodologies (using the entire sample)		
Year	Sector	SIC codes	N	β_1[U(ACSI)]	*p*	Method	β_1[U(ACSI)]	*p*
All	Manufacturing	20–39	190	.026	.161	Random Effects Estimation	.014	.001
All	Transportation & Utilities	40–49	203	.017	.004	Petersen Estimation	.011	.000
All	Wholesalers & Retailers	50–59	101	.032	.015	Newey-West Estimation	.014	.014
All	Finance & Insurance Consumers & Business Services	60–69 70–89	100	.043	.019	Driscoll-Kraay Estimation	.015	.000
1995–2000	All	All	288	.023	.012	Linear Mixed Model Estimation 1 (LMM1)	.014	.009
2001–2005	All	All	310	.018	.021	Linear Mixed Model Estimation 2 (LMM2)	.016	.002

The detailed results for each of the individual regressions are available from the authors on request. U(BONUS) is the dependent variable in all cases and all regressions are based on Eq. 6

lation and cross-sectional dependence presented in Petersen (2009).[12] In Panel B of Table 8, we report the results using Petersen standard errors allowing for clustering over time and across firms when U(BONUS) is the dependent variable. In unreported tests we also find that the U(ACSI) coefficient is significant at $p<.01$ using the Petersen estimation approach allowing for clustering across CEOs as well as over time for U (BONUS) and for both estimation approaches using U (TOTALCASH) as the dependent variable. Overall, the Driscoll-Kraay and Petersen results suggest that our findings are strongly robust to controls for cross-sectional dependence as well as heteroscedasticity and autocorrelation.

Finally, building upon the fixed and random effects estimation discussed above, we undertake additional sensitivity tests that draw on the linear mixed modeling literature (Verbeke and Molenberghs 2000). Linear mixed modeling (LMM) allows for the simultaneous inclusion of controls for both fixed and random effects. We report the results of a LMM model (LMM1 in Panel B of Table 8) which includes (simultaneously) year and industry fixed effects as well as random effects for both firms and CEOs. We also report the results of a model which includes year and CEO fixed effects as well as random effects for firms and industries and random variation in the U(ACSI) slope coefficient across firms (LMM2 in Panel B of Table 8). Both LMM1 and LMM2 are estimated via maximum likelihood and allow for individual firm-level variance and covariance estimation. The U(ACSI) coefficient for both LMM1 and LMM2 is significant at $p<.01$ in both cases. In unreported tests we estimate a range of other plausible LMM specifications and find that our results for U(ACSI) are strongly robust to these alternatives.

[12] The benefits of this estimation approach are discussed in depth in Gow et al. (2009).

Other tests of model specification

The results in Panel B of Table 8 show that satisfaction is a significant determinant of U(BONUS) using both approaches. Second, we undertake both the "linktest" (in Stata 11) and, following Morgan and Rego (2009), the Ramsey (1969) RESET test of model misspecification. The results from both of these tests show that our models are well specified at conventional significance levels. Third, in unreported analysis we de-trend both compensation variables as well as the satisfaction variable by regressing each of the aforementioned variables individually on a linear time trend (in regressions of the form $y = a + bYEAR + residual$). Our results remain unaltered when we utilize the de-trended variables (i.e., the residuals from the de-trending regressions) as substitutes for the original variables in Eq. 6. Fourth, in our sensitivity analysis, we add the following additional controls simultaneously to those shown in Table 5: (i) U(ROA_{t-1}), (ii) U(ROA_{t-2}), (iii) U(RET_{t-1}), (iv) U(RET_{t-2}), (iv) an additional contemporaneous accounting measure—unexpected U(ROE_t), (vi) annual inflation, (vii) the time-series variance of U(ACSI), and (viii) the time-series variance of U(ROA). In addition, we include the first difference of the following contemporaneous measures of industry competition (Karuna 2007) as controls: (ix) concentration, (x) entry costs, and (xi) product substitutability. When we jointly include each of the 11 additional control variables in the regression—in addition to the full set of extant independent variables—the equivalent U(ACSI) coefficient estimates (*p* values) to those in Columns (1) to (4) of Table 5 respectively are as follows: [.016 (.016);.017 (.005);.012 (.005);.010 (.019)]. In further unreported work, we include terms for firm-level estimates of earnings persistence, the interaction between U(ROA) and persistence and advertising ratios. Overall, our results are not materially

affected by the inclusion of these variables and this additional analysis shows that findings with respect to U (ACSI) are not attributable to omitted variable difficulties.[13] Fifth, in unreported tests, we find that our results are not impacted if all three performance measures are expressed as relative measures.[14] Sixth, in their seminal study, Jensen and Murphy (1990) include terms representing firm level performance as well as peer group adjusted performance in empirical tests of relative performance evaluation. Following Jensen and Murphy (1990), we include customer satisfaction at the firm level (ACSI) in addition to the firm less industry measure (U(ACSI)), but the inclusion of the extra variable has no impact on our findings. Finally, Albuquerque (2009) regresses levels of (rather than changes in) her selected performance measures on changes in compensation, on the grounds that there is comparatively little variation in the performance measures from year to year.[15] Accordingly, in additional tests, we replace U(RET) and U(ROA) with RET and ROA respectively; however, this also has no impact on our findings.

Tests for endogeneity

We undertake extensive testing for endogeneity. First, following the approach adopted by Boulding and Staelin (1995) and McAlister et al. (2007), we use one-period lagged U(ACSI) as an instrument for U(ACSI) in the regression estimation. For both compensation variables the instrumental variable is positive and statistically significant at $p<.01$. Second, similar to Krasnikov et al. (2009), we employ the Hausman test. However, we fail to reject the null hypothesis of exogeneity with p values of .976 and .987 for U(BONUS) and U(TOTALCASH) respectively. Third, we undertake the Durbin-Wu-Hausman test as implemented by Davidson and MacKinnon (Wooldridge 2002) and again fail to reject the null hypothesis of exogeneity with p values of .550 and .595 for the bonus and total compensation variables respectively. Fourth, omitted variables may give rise to endogeneity problems (Greene 2003). As discussed above, we conclude that our empirical results are not impacted by any omitted variable bias. In particular, the results from our fixed effects estimation (Table 7)—which jointly control for unobservable heterogeneity across firms, CEOs and time—demonstrate that our core findings are not attributable to omitted variables. This result offers further reassurance that endogeneity is not a significant issue in the present context. Finally, we use bivariate Granger Causality Wald tests (Granger 1969) to investigate the possibility of reverse causality using one- and two-year lags of the individual compensation variables. However, we reject the hypotheses that compensation "Granger causes" satisfaction (with $p=.996$ and $p=.791$) for each of our dependent variables, i.e., U(BONUS) and U (TOTALCASH) respectively. The results of the Granger causality tests offer further evidence that our findings are not attributable to endogeneity (Greene 2003).

Discussion

The need to tie compensation to marketing assets, such as customer satisfaction, is recognized (Mizik and Jacobson 2007). Yet, in the compensation literature there is no strong evidence that firms provide incentives to CEOs to manage marketing assets such as customer satisfaction. Here, we integrate advances in marketing theory and research in executive compensation to examine this relationship. Our results indicate that the unexpected component of customer satisfaction (measured as firm less mean industry satisfaction) is incrementally informative over the unexpected component of financial metrics in explaining growth in CEO bonus and total cash compensation. This result holds across each of the sectors covered by the ACSI (other than manufacturing) and is evident for both halves of the sample period.

The primary theoretical contribution of our work is in showing that, consistent with predictions from marketing theory, customer satisfaction relative to peer firms is a significant determinant of CEO compensation. Furthermore, the economic significance of the association is confirmed by our finding that the unexpected components of customer satisfaction and return on assets have an impact of equivalent magnitude on CEO bonus growth. Our findings are important and timely given recent calls for research on the relationship between marketing (Mizik and Jacobson 2007; Sorescu and Spanjol 2008)—and customer satisfaction in particular (Luo and Homburg 2007)—and executive compensation. Our results also point to the core importance of satisfaction as a forward-looking measure (Anderson et al. 2004) and highlight the multifaceted role of customer satisfaction information usage within firms (e.g., Morgan et al. 2005). Our findings demonstrate that firms compare customer satisfaction with peer group performance when evaluating and rewarding CEOs. While the importance of benchmarking marketing performance has been emphasized (Vorhies and Morgan 2005), this is the first study to provide empirical evidence of the use of benchmarked marketing performance in CEO compensation.

[13] All of the findings discussed here are confirmed for U(TOTALCASH) in unreported tests.

[14] For these tests, U(ROA) is defined as the residual from the following regression: $ROA^{FIRM} = \alpha + \beta_1 ROA^{IND} + u$. Similarly, U (RET) is defined as the residual from the following regression: $RET^{FIRM} = \alpha + \beta_1 RET^{IND} + u$. U(ACSI) in these tests is defined as per Eq. 1.

[15] A detailed discussion of the underlying rationale for the use of levels in such contexts is presented in Wooldridge (2006) and Fahlenbrach (2009).

Findings reported here also contribute to the broader executive compensation literature. Our consideration of the influence of a marketing performance measure—customer satisfaction—extends the literature on the use of nonfinancial measures in executive compensation (Davila and Venkatachalam 2004; Ittner et al. 1997). Our work highlights the importance of including customer satisfaction as an explanatory variable in studies exploring the link between executive pay and corporate performance. For example, Hayes and Schaefer (2000) suggest that firms use "unobservable" performance measures (i.e., measures other than ROA and stock returns) to incentivize and reward CEOs. Our results confirm their finding by showing that one "unobservable" metric—customer satisfaction—is a positive and statistically significant determinant of CEO incentive compensation.

Ours is the first empirical study to show that customer satisfaction directly influences the compensation paid to CEOs. Our finding is consistent with theoretical predictions in marketing and with the established reality (as detailed in proxy statements lodged with the SEC) that many firms link CEO rewards to measures of customer satisfaction. Our research objective, theoretical framework and empirical findings differ substantially from prior research in accounting on the compensation relevance of customer satisfaction. For example, in recent work, Chen et al. (2008b) do not directly report results of tests of the magnitude, direction or significance of the relationship between compensation and customer satisfaction. Instead, in accordance with their specific research objectives, they include a number of terms representing the interaction between satisfaction and other variables in each of their reported regression specifications. In contrast, in the present study, we directly test the association between compensation and satisfaction. The positive and significant main effect relationship reported here provides a clearer motivation for scholars in marketing and accounting interested in testing other aspects of the compensation relevance of satisfaction. Our study also contributes by demonstrating that a key challenge facing any such study is the appropriate modeling of the differential impact of CLEAR SIGNAL and AMBIGUOUS SIGNAL observations. We hope that our paper motivates further empirical work on the compensation relevance of marketing metrics.

Our study has important managerial implications. First, we demonstrate that improving customer satisfaction directly increases the CEO's wealth. We show that CEOs have a personal incentive to engage with and commit resources to customer-oriented, and by extension, marketing initiatives. This finding should be of interest to CEOs and other senior executives. Second, our results should also further motivate senior executives to think carefully about the use of customer satisfaction measures within the firm. Executives may, in particular, wish to reflect on the recommendations of Morgan et al. (2005) with respect to the factors that promote an effective use of customer satisfaction information. In particular Morgan et al. (2005) advocate that firms collect satisfaction data from current and competitors' customers, ensure that customer satisfaction measures are viewed as accurate by users and design systems that are dependent on contingency factors (performance relative to peers, in the current setting).

Third, our findings are important for senior marketers seeking to secure their seat at the executive table. While the positive impact of marketing investments on long-term shareholder value is well established, this knowledge, on its own, may not be enough to encourage top executives to devote an appropriate level of attention to the creation and management of marketing assets (Mizik and Jacobson 2007). However, our findings indicate that there need be no ambiguity in the message from marketers to top executives about the payoffs—to both the firm and the individual executive—from strategic investments in marketing assets. Thus our study provides senior marketers with an additional basis for engaging with senior executives. As Mizik and Jacobson (2007) observe, senior executives have a propensity to focus on short-term performance and myopically manage marketing assets. This propensity is, they argue, a reflection of the extent to which executives perceive accounting earnings to be the central metric that determines both market valuations and compensation. Therefore, marketers should ensure that the relationship between customer satisfaction and compensation is clearly understood by senior executives.

Fourth, our findings should be of interest to compensation committees, executive compensation professionals and practitioners interested in corporate governance. For our sample firms, it would appear that boards take great care in designing executive incentive schemes that encourage a multidimensional approach to performance management. Specifically, our work demonstrates that firms use satisfaction measures in an informed and rational manner. The measure of unexpected satisfaction utilized in this study, which is specified in line with recommendations from agency theory (Holmstrom and Milgrom 1987), marketing theory (Hauser et al. 1994), and compensation studies (Dikolli and Vaysman 2006; Murphy 2000), is a significant determinant of compensation.

Our study is subject to a number of limitations and raises interesting questions for further research. As our sample is comprised of firms covered by ACSI, our findings may not be generalizable to other organizations. Also, as many firms do not disclose how they use satisfaction metrics for inventive contracting, ACSI is not necessarily the most appropriate proxy measure of satisfaction for all our sample firms. Thus, further research examining the relationship between CEO incentives and other satisfaction metrics

could offer additional insights. Future work might usefully investigate whether simply being covered by ACSI impacts the compensation role of customer satisfaction. While many firms are unable to reliably measure satisfaction (Ittner and Larcker 2003), ACSI offers accurate, independent and publicly available satisfaction scores, for both the firm and its industry, which may be more appealing to compensation committees than internal measures. It would be interesting to assess whether firms covered by ACSI are more likely to incentivize and reward CEOs based on customer satisfaction. We look at one marketing performance indicator as it relates to CEO bonus compensation. Whether customer satisfaction influences the long-term components of CEO compensation packages is also an interesting area for future research. While customer satisfaction has a proven impact on firm value and by extension the value of the existing stock and option holdings of executives, little is known about the direct impact of satisfaction on the magnitude, timing and terms of new stock-based incentives. Future research might also look at the relationship between aspects of CEO compensation and marketing metrics such as those related to brand and corporate reputation. We look at just one member of the senior executive team: the CEO. Given the influence exerted by other senior executives, similar work on the extent to which customer satisfaction and marketing performance indicators are used to incentivize and reward this group would be welcome. We adopt one approach to operationalizing clear and ambiguous signals. Other approaches may also be valid. For example, firms may look beyond their industry for a peer level measure or may look at longer term trends to assess current performance. These (and other) alternative approaches offer interesting avenues for future research. We undertake several statistical tests to determine whether endogeneity is a serious concern in our study. While we cannot definitively rule out the possibility, our analysis indicates that endogeneity is not a major issue in the current setting. Finally, the rationale for including marketing metrics in executive compensation is that they act as lead indicators of performance. Further research might usefully consider the relationship between the forward-looking properties of marketing metrics and their impact on compensation.

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