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# Stock option compensation and the likelihood of meeting analysts' quarterly earnings targets

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**Abstract** One role of stock options in executive compensation packages is to counterbalance the inherently short-term orientation of base salary and annual bonuses. Managerial compensation plans frequently include stock options in order to better align the interests of managers and outside shareholders and reduce agency problems. However, since option values are sensitive to fluctuations in stock prices, and investors reward firms that meet or exceed earnings expectations, executives of firms with sizable option components in their compensation plans have increased incentives to report earnings that meet or exceed analysts' forecasts. We show that the propensity to meet or exceed analysts' quarterly earnings forecasts is positively related to the use of options in top executives' compensation plans. Further, firms that employ relatively more options in their compensation plans more frequently report earnings surprises that exceed analysts' forecast by small amounts (between 0 and 1 cent per share). These results suggest that the use of stock-based compensation intensifies top executives' focus on financial analysts' short-term earnings forecasts.

## 1. Introduction

In recent years, managerial compensation plans have increasingly included stock options. Murphy (1999, 21) states, "(t)he most pronounced trend in executive compensation in the 1980s and 1990s has been the explosion in stock option grants, which on a Black-Scholes basis now constitute the single largest component of CEO pay." The role of stock options in executive compensation packages is to counterbalance the inherently short-term orientation of base salary and annual bonuses. Designed to better align the interests of managers and

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outside shareholders, options arguably alleviate agency problems that cause managers to take actions to the long-run detriment of the firm (e.g., Jensen and Meckling, 1976; Rajgopal and Shevlin, 2002).

Coincident with the increased use of stock options in managerial compensation plans, evidence suggests the stock market rewards firms meeting current earnings expectations (Bartov, Givoly, and Hayn, 2002; Kasznik and McNichols, 2002; Skinner and Sloan, 2002). With managerial wealth increasingly tied to stock price performance, and the stock market rewarding firms that meet analysts' earnings forecasts, managers of firms with more options in their compensation schemes face heightened incentives to meet or beat analysts' earnings forecasts.[1] Further, as Bartov, Givoly, and Hayn (2002) show that the market rewards firms that habitually beat analysts' forecasts relative to firms that do so only occasionally, managers face incentives to beat analysts' forecasts by small amounts, thereby storing positive earnings surprises for future quarters. The purpose of this paper is to examine the relation between the level of stock options employed in a firm's top executive pay plan and that firm's propensity to meet or beat analysts' quarterly earnings forecasts, and to do so by small amounts.

Our sample includes firms that report compensation data for its top five executives on the Execucomp database in any of the years 1992–2002. We measure the extent to which the firm employs options in its compensation plan for senior executives by dividing the Black-Scholes value of options granted during the year by the level of total compensation (including option grants) for that year. Using logistic regression analyses, we find that the probability a firm meets or beats analysts' forecasts, and the probability it reports quarterly earnings surprises between 0 and 1 cent per share, is strongly positively related to the extent to which the firm employs stock options in its compensation structure. These results are robust to controls for other determinants of firms' propensity to meet or beat analysts' forecasts, alternative econometric specifications, alternative measures of stock-based compensation, and the use of the I/B/E/S unadjusted database to compute earnings surprise.

This study extends existing research examining the recent phenomenon of firms meeting or beating analysts' earnings forecasts. In particular, we find that compensation via stock options is one important reason for the *increasing* tendency for firms to meet or exceed analysts' earnings forecasts (Brown, 2001). This finding is significant, as the granting of employee stock options is intended to *decrease* managers' focus on short-run results. This result is consistent with survey evidence in Graham, Harvey, and Rajgopal (2005), which shows that a majority of firm managers would not invest in a positive net present value project if doing so would cause the firm to miss analysts' quarterly earnings forecasts. In addition, we add stock-based compensation to the list of managerial motives to meet or exceed earnings targets documented in Matsumoto (2002). Overall, our results are consistent with a positive relation between the extent to which the firm's top executives are compensated with options and those executives' focus on reporting quarterly earnings that exceed analysts' forecasts.

## 2. Hypothesis development

Evidence in Brown and Caylor (2005) suggests of three earnings thresholds examined (avoid losses, avoid earnings decreases, and avoid negative earnings surprises), the valuation

[1] While avoiding losses and earnings decreases are likely important to managers, results in Brown and Caylor (2005) and Dechow, Richardson, and Tuna (2003) suggest that meeting analysts' expectations is particularly salient.

consequences of avoiding negative earnings surprises exceed that of the other thresholds in every year over 1994–2001. That is, avoiding negative earnings surprises has become an important earnings reporting threshold. Dechow, Richardson, and Tuna (2003) also find that meeting analysts' forecasts has become the most important reporting hurdle for firm managers. Consistent with the market placing increased emphasis on meeting analyst forecasts relative to other earnings reporting thresholds, Apple Computer recently posted a 41 percent drop in net income, but saw its stock price rise 5 percent in response to beating analysts' expectations by 2 cents per share (Brown, 2003).

Our hypotheses hinge on the notion that firm managers perceive that the stock market rewards firms that meet analysts' earnings expectations, and penalizes firms that fail to do so. As stock option values are sensitive to fluctuations in stock prices, the personal wealth of senior managers more heavily compensated with options is more sensitive to this disciplining feature of the market. In this regard, Bartov, Givoly and Hayn (2002) show that, even after controlling for absolute performance, firms that meet or beat analysts' expectations enjoy higher quarterly stock returns relative to firms that miss analysts' expectations. The first hypothesis is, therefore,

**H1:** the likelihood a firm meets or beats analysts' earnings forecasts is positively related to the extent to which the firm's senior managers are compensated with stock options.

We also examine whether, conditional on reporting a non-negative earnings surprise, the level of stock options employed in a firm's compensation structure is related to the propensity to report a *small* earnings surprise. Evidence in Bartov, Givoly and Hayn (2002) suggests that the market rewards firms that consistently beat analysts' expectations as compared with firms that only occasionally beat expectations. Further, while the premium to meeting or beating expectations is lower for cases in which earnings or expectations management is most likely to exist, the discount is not economically significant (Bartov, Givoly and Hayn, 2002). This suggests that firms face incentives to "store" future positive earnings surprises by not allowing current earnings surprises to be too large. We therefore expect executives of firms more highly compensated with options to be more interested in reporting small (non-negative) earnings surprises. Thus, the second hypothesis is

**H2:** the likelihood a firm reports a small earnings surprise, conditional on that firm reporting a non-negative surprise, is positively related to the extent to which the firm's senior managers are compensated with stock options.

Following Degeorge, Patel and Zeckhauser (1999), Das and Zhang (2003), and others, we define a small earnings surprise as one between 0 and 1 cent per share.[2]

## 3. Sample selection and option compensation data

### 3.1. Sample selection and data

Our sample is taken from the 2,513 firms with compensation data available from Execucomp for any of the years 1992–2002. We measure the extent to which the firm employs options in its compensation plan for senior executives ($OPT_i$) by dividing the

[2] These studies show a discontinuity in earnings surprise distributions around the zero point; that is, too few observations just below zero, too many just above zero. Anecdotal evidence (e.g., Wall Street Journal, July 22, 2003) also suggests the salience of this range of small surprise.

**Table 1** Sample selection

| | |
|---|---|
| Firm-quarters with actual quarterly earnings per share and an individual analyst forecast of quarterly earnings per share on I/B/E/S during 1992–2002 | 71,876 |
| Less: Firm-quarters lacking Execucomp data | (22,409) |
| Less: Firm-quarters lacking Compustat data | (3,200) |
| Less: Firm-quarters lacking institutional ownership data on Compact Disclosure | (5,606) |
| Firm-quarters used in overall earnings surprise logistic regressions | 40,661 |
| Less: Firm-quarters with negative earnings surprises | (10,989) |
| Firm-quarters used in small earnings surprise logistic regressions | 29,672 |

Black-Scholes value of options granted (Execucomp variable $BLK\_VALU_i$) during the year by the level of total compensation including option grants (Execucomp variable $TDC1_i$) for that year.[3]

We use quarterly analyst forecast and actual earnings data from the I/B/E/S U.S. detailed database. We require firms to have a quarterly earnings announcement date and actual reported quarterly earnings on I/B/E/S, and collect for each of these observations the most recent forecast of that quarter's earnings appearing before the actual earnings announcement date.[4] The most recent analyst forecast is more accurate than the consensus forecast (O'Brien, 1988; Brown, 1991), and earnings surprises based on it are more highly associated with stock prices than are earnings surprises based on the consensus forecast (Brown and Kim, 1991). Further, the most recent analyst forecast is less prone than the consensus forecast to overweight analysts' common information (Kim, Lim and Shaw, 2001). Additional firm-specific variables (see Section 4) are obtained from Compustat and Compact Disclosure.

From Table 1, 71,876 firm-quarters meet our actual and forecast earnings per share requirements. Our tests require additional control variables, yielding a sample of 40,661 firm-quarter observations for tests of the first hypothesis. Our second hypothesis focuses on small earnings surprises, conditional on the firm reporting a non-negative surprise; thus, for these tests we exclude 10,989 observations (27.03 percent of our initial sample) with negative earnings surprises.

## 3.2. Descriptive statistics on options compensation

Table 2 presents the median for our options compensation variable ($OPT_i$) within two-digit SIC code groups and across three approximately equal time partitions (1992–1994, 1995–1998, and 1999–2002).[5] By construction, Execucomp covers firms in the S&P 1500; thus, this aspect of the sample must be considered when attempting to generalize results. While almost 42 percent (1,043 firms) of our 2,513 sample firms are classified as manufacturers, the sample also includes a sizable number of service firms (385), financial firms (367),

[3] In this study, we examine the association between the likelihood of meeting earnings targets and the relative level of stock option compensation, not option grants *per se*. As reported in Section 6.2, the results are robust to alternative definitions of $OPT_i$.

[4] We require that forecasts be no more than 90 days before the related earnings announcement date. We also delete all forecasts of quarter $t$ earnings that I/B/E/S reports as being made after the announcement of quarter $t$ earnings.

[5] These time partitions are for presentation purposes only; we do not use them in any of our empirical tests.

**Table 2** Descriptive statistics on magnitude of stock-based compensation, by industry and time period ($N = 18{,}281$ firm-years)

| Industry | Two-digit SIC code | # of Firms | 1992–1994 | | 1995–1998 | | 1999–2002 | |
|---|---|---|---|---|---|---|---|---|
| | | | Median | *N* | Median | *N* | Median | *N* |
| Agriculture, Forestry, and Fishing | 01–09 | 8 | 0.174 | 16 | 0.280 | 26 | 0.273 | 13 |
| Mining and Construction | 10–19 | 123 | 0.218 | 252 | 0.301 | 377 | 0.382 | 285 |
| Manufacturing | 20–29 | 377 | 0.219 | 860 | 0.279 | 1,311 | 0.385 | 984 |
| | 30–39 | 666 | 0.240 | 1,174 | 0.302 | 2,042 | 0.439 | 1,617 |
| Transportation, Communication, Utilities | 40–49 | 302 | 0.059 | 659 | 0.130 | 927 | 0.296 | 641 |
| Wholesale and Retail Trade | 50–59 | 277 | 0.213 | 556 | 0.290 | 924 | 0.379 | 660 |
| Finance, Insurance, and Real Estate | 60–69 | 367 | 0.171 | 653 | 0.227 | 1,013 | 0.360 | 815 |
| Services | 70–79 | 292 | 0.231 | 328 | 0.399 | 824 | 0.600 | 694 |
| | 80–89 | 93 | 0.329 | 134 | 0.428 | 241 | 0.474 | 182 |
| Public Administration | 90–99 | 8 | 0.234 | 19 | 0.239 | 29 | 0.285 | 25 |
| Full sample | | 2,513 | **0.197** | 4,651 | **0.277** | 7,714 | **0.406** | 5,916 |

The table reports the number of firms within each two-digit SIC industry group, the median percentage of stock-based compensation (*OPT*) within two-digit SIC industry groups and three time periods, and the number of firm-years ($N$) in each industry group and time period. $OPT_i$ is defined as firm $i$'s dollar amount of Black-Scholes value of options granted to its top 5 executives during the year, deflated by the total dollars of compensation (including the value of options granted) for those executives during the year. Data to compute $OPT_i$ are collected from Execucomp.

The bottom row of the table provides the total number of distinct firms in the sample, the median *OPT* within each time period, across all industries, and the number of firm-year observations within each time period.

transportation/communications/utility firms (302), and firms engaged in wholesale or retail trade (277). The evidence in Table 2 shows that option use in the managerial compensation schemes of our sample firms, as captured by $OPT_i$, is sizable, and has increased dramatically over time. On average, the Black-Scholes value of options granted comprises about 20 percent of yearly top executive pay in the early years of our sample period, and doubles to comprise just over 40 percent of yearly top executive pay in the final years of the sample.

## 4. Methodology

### 4.1. Analyst quarterly earnings surprise measures

We measure earnings surprise as the actual reported quarterly earnings per share from I/B/E/S, minus the most recent analyst forecast of that quarter's earnings. We then create an indicator variable, $MEET_{i,q}$, which equals 1 when firm $i$'s actual quarter $q$ earnings either meet or exceed the most recent analyst forecast of that quarter's earnings (i.e., surprise $\geq 0$), and 0 otherwise. For those firms meeting or exceeding the forecast, we create a second indicator, $SMALL_{i,q}$, which equals 1 when the earnings surprise is between 0 and 1 cent per share, and 0 when the earnings surprise is greater than 1 cent per share. We use these indicators as dependent variables in our hypothesis tests.

### 4.2. Logistic regression models

Matsumoto (2002) finds that the probability of meeting or beating analysts' forecasts is positively related to: (a) the percentage ownership by institutions, (b) the extent to which the firm operates in a high litigation risk environment, (c) the extent to which the firm relies on implicit claims with its shareholders (Bowen, DuCharme and Shores, 1995), and (d) the firm's growth opportunities, and inversely related to an indicator variable capturing the existence of quarterly earnings losses. Accordingly, we include these five control variables.

As the probability of meeting or beating the forecast is also a function of the firm's performance (Skinner and Sloan, 2002), we include return on assets as a control variable. As proximity to debt covenants might make firms more likely to choose income-increasing accounting methods (Defond and Jiambalvo, 1994), which would increase the likelihood of meeting or beating the forecast, we also control for leverage.[6] Finally, we add controls for firm size, the year in which the observation resides (to control for the time trend in earnings surprise documented in Brown (2001)), and an indicator for the existence of losses (Brown, 2001), and estimate the following logistic regression model,

$$\begin{aligned} P(MEET_{i,q} = 1) = \beta_0 &+ \beta_1 ROA_{i,q} + \beta_2 LEV_{i,q} + \beta_3 MB_{i,q} + \beta_4 LNASSET_{i,q} \\ &+ \beta_5 INST_i + \beta_6 LIT_i + \beta_7 ICLAIM_{i,q} + \beta_8 LOSS_{i,q} + \beta_9 YEAR_i \\ &+ \beta_{10} OPT_i + e_{i,q} \end{aligned} \quad (1)$$

where $MEET_{i,q}$ is equal to 1 when the firm's actual quarterly earnings either meets or exceeds the most recent analyst forecast of that quarter's earnings (i.e., surprise $\geq 0$), and zero otherwise; $ROA_{i,q}$ is the return on assets, equal to that quarter's net income divided by end of

[6] As leverage might also be related to financial distress, we make no prediction about the sign of its coefficient.

quarter assets; $LEV_{i,q}$ is leverage, defined as total end of quarter long-term debt divided by end of quarter total assets; $MB_{i,q}$ is the market-to-book ratio at quarter-end; $LNASSET_{i,q}$ is the natural log of end of quarter total assets; $INST_i$ is the percentage of shares held by institutional investors during the year; $LIT_i$ is a dummy variable which equals 1 if the firm operates in a high-litigation environment (defined below), and zero otherwise; $ICLAIM_{i,q}$ is a measure of the extent to which the firm relies heavily on implicit claims with shareholders (defined below); $LOSS_{i,q}$ is an indicator variable which equals 1 when actual quarterly earnings (per I/B/E/S) are less than \$0, and zero otherwise; $YEAR_i$ is the fiscal year of the quarterly observation, ranging from 1992–2002; and $OPT_i$ is defined above.[7] Data to compute return on assets, leverage, market-to-book ratio, and total assets are obtained from Compustat. $INST_i$ is the percentage of total outstanding common shares owned by institutions, as reported in the Compact Disclosure database.[8]

Calculation of $LIT_i$ and $ICLAIM_{i,q}$ warrant further discussion. As missing analysts' earnings targets might precipitate large stock price declines that generate shareholder litigation, firms with higher *ex ante* litigation risk are more likely to take actions to achieve positive earnings surprises (Matsumoto, 2002). Considerable research (e.g., Francis, Philbrick and Schipper, 1994; Ali and Kallapur, 2001; Matsumoto, 2002; Barton and Simko, 2002) uses 4-digit SIC codes to identify firms with higher *ex ante* litigation risk. Following these studies we classify high litigation risk firms as those operating in SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), or 5200–5961 (retailing). The dummy variable $LIT_i$ takes on a value of 1 for such firms, and zero otherwise.

Bowen, DuCharme and Shores (1995) argue that a firm's financial image influences stakeholders' (e.g., customers, employees, suppliers) assessments of the firm's ability to fulfill its implied commitments, which in turn impacts the firm's terms of trade with such stakeholders. Firms that rely heavily on such implicit claims arguably have incentives to maintain a favorable financial image by meeting expectations. Following Matsumoto (2002) and Bowen, DuCharme and Shores (1995) we create an indicator variable which equals 1 for membership in a durable goods industry (SIC codes 150–179, 245, 250–259, 283, 301, and 324–399), and zero otherwise. We also compute research and development intensity (quarterly research and development expenses scaled by quarterly total assets), and labor intensity (1 minus the ratio of quarterly gross property, plant, and equipment scaled by total quarterly gross assets).[9] As these three variables are positively correlated, we follow Matsumoto (2002) and reduce them to a single factor (i.e., $ICLAIM_{i,q}$) via the principal components method of factor analysis.[10]

We also examine the relation between stock-based compensation and the propensity to report small earnings surprises, conditional on reporting non-negative surprises. To do this,

[7] Variables without a $q$ (quarter) subscript are measured on an annual basis (year subscripts omitted from all variables). Subscript $i$ refers to firms.

[8] To mitigate the impact of extreme observations we winsorize *ROA, LEV, MB, LNASSET, INST, ICLAIM,* and *OPT* to the top or bottom 1 percent of their sample-wide distributions (using the full sample of 40,661 observations).

[9] We collect data to compute these variables from Compustat. When a firm does not report quarterly research and development expenses, but does report annual research and development expenses, we allocate one-quarter of the annual amount as the estimated quarterly expense. When annual research and development is not reported, we set it to zero. Total gross assets equals reported total assets plus accumulated depreciation, depletion, and amortization.

[10] Like Matsumoto (2002) we retain factors with eigenvalues greater than 1, resulting in the retention of a single factor. The correlations between the common factor and the individual variables are 0.60, 0.64, and 0.48 for the durable goods indicator, research and development intensity, and labor intensity, respectively.

we take the subset of quarterly observations used in estimating equation (1) that report zero or positive earnings surprises and estimate the following logistic regression model,

$$P(SMALL_{i,q} = 1) = \beta_0 + \beta_1 ROA_{i,q} + \beta_2 LEV_{i,q} + \beta_3 MB_{i,q} + \beta_4 LNASSET_{i,q} + \beta_5 INST_i + \beta_6 LIT_i + \beta_7 ICLAIM_{i,q} + \beta_8 LOSS_{i,q} + \beta_9 YEAR_i + \beta_{10} OPT_i + e_{i,q} \quad (2)$$

where $SMALL_{i,q}$ equals 1 if the firm reports an earnings surprise greater than or equal to zero and less than or equal to one cent per share, and zero if earnings surprise is above one cent per share, and all other variables are as defined above. Quarters in which the firm fails to meet or beat the analyst forecast are excluded from estimation of equation (2).

While we employ the same control variables as in equation (1), we expect that the relations between some of the control variables and the likelihood of reporting small surprises will differ from what we find in estimating equation (1). For example, strong operating performance, as evidenced by a high return on assets, increases the likelihood of meeting earnings targets, but could *decrease* the probability of *small* surprises. Likewise, deleting observations with negative earnings surprises likely also impacts the control variable coefficients. In related work, Barton and Simko (2002) find numerous instances in which the signs of the coefficient estimates for control variables vary across earnings surprise benchmarks. Accordingly, we make no predictions about the signs of the coefficients on our control variables in the estimation of equation (2).

## 5. Data and results

### 5.1. Descriptive statistics

From Table 3, which provides descriptive statistics on our full sample of 40,661 observations, our sample firms meet or beat analyst forecasts in 73 percent of the sample observations.[11] A relatively large proportion (38.6 percent) of earnings surprises for our sample firms are between 0 and 1 cent per share. Stock-based compensation is significant, comprising on average 34.1 percent of top executives' total annual compensation. In addition, the mean quarterly return on assets is 1.3 percent, long-term debt averages about 17.3 percent of the sample firms' total assets, and institutions hold on average 56.8 percent of our sample firms' outstanding shares. The mean (median) sample firm has a market-to-book ratio of 3.410 (2.368). Approximately 27 percent of our observations are classified as operating in high litigation risk environments. Our measure of implicit claims averages 0.241, and exhibits considerable variation. Finally, 8.5 percent of the observations entering our logistic regressions reflect reported losses.

### 5.2. Correlations

Table 4 presents a correlation matrix for the variables appearing in our logistic regression model, using the sample of 29,672 firm-quarters for the correlations with $SMALL_{i,q}$ and 40,661 firm-quarters for all other correlations. Overall, the correlations between independent

[11] Descriptive statistics for the subsample of 29,672 small positive surprise observations are similar to those reported in Table 3. Appendix A presents descriptives on this subsample, separately for firms that report small surprises and those that report larger surprises.

**Table 3** Descriptive statistics

| Variable | Mean | Std dev | 1st Quartile | Median | 3rd Quartile |
|---|---|---|---|---|---|
| $MEET_{i,q}$ | 0.730 | 0.444 | 0 | 1 | 1 |
| $SMALL_{i,q}$ | 0.386 | 0.487 | 0 | 0 | 1 |
| $OPT_i$ | 0.341 | 0.258 | 0.127 | 0.309 | 0.526 |
| $ROA_{i,q}$ | 0.013 | 0.025 | 0.004 | 0.013 | 0.024 |
| $LEV_{i,q}$ | 0.173 | 0.152 | 0.028 | 0.149 | 0.281 |
| $ASSET_{i,q}$ | 6,618 | 17,800 | 356 | 1,112 | 4,258 |
| $INST_i$ | 0.568 | 0.189 | 0.436 | 0.585 | 0.713 |
| $MB_{i,q}$ | 3.410 | 3.350 | 1.595 | 2.368 | 3.832 |
| $LIT_i$ | 0.272 | 0.445 | 0 | 0 | 1 |
| $ICLAIM_{i,q}$ | 0.241 | 0.942 | −0.516 | 0.072 | 1.036 |
| $LOSS_{i,q}$ | 0.085 | 0.278 | 0 | 0 | 0 |

Variable definitions (subscripts refer to firm $i$ and quarter $q$; variables without $q$ subscripts are measured on an annual basis). Statistics for all variables other than $SMALL_{i,q}$ are based on 40,661 observations. Statistics for $SMALL_{i,q}$ are based on 29,672 observations.

$MEET_{i,q}$ is an indicator variable which equals 1 if the firm's quarterly earnings met or exceeded the most recent analyst forecast of that quarter's earnings and 0 otherwise; $SMALL_{i,q}$ is an indicator variable, computed for observations with non-negative earnings surprises only, which equals 1 if the firm's quarterly earnings either met or exceeded the most recent forecast of that quarters' earnings by between 0 and 1 cent per share, and 0 if the firm's quarterly earnings surprise is above 1 cent per share; $OPT_i$ is defined as the sum of the dollar amount of Black-Scholes value of options granted to the top 5 executives during the year, deflated by the total dollars of compensation (including the value of options granted) paid to those executives during the year; $ROA_{i,q}$ is the quarterly return on assets, equal to that quarter's net income divided by end of quarter assets; $LEV_{i,q}$ is leverage, defined as end of quarter total long-term debt divided by end of quarter total assets; $ASSET_{i,q}$ is end of quarter total assets, in millions of dollars; $INST_i$ is the percentage of outstanding shares held by institutional owners; $LIT_i$ is a dummy variable which equals 1 if the firm is in a high-litigation environment, defined as SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), or 5200–5961 (retailing), and 0 otherwise; $ICLAIM_{i,q}$ measures the extent to which the firm operates in an industry with greater reliance on implicit claims with shareholders, computed as the factor scores from a factor analysis using a dummy variable to represent membership in a durable goods industry (SIC codes 150–179, 245, 250–259, 283, 301, and 324–399), research and development intensity (quarterly research and development expenses deflated by end of quarter total assets), and labor intensity (1 minus the level of quarterly gross property, plant, and equipment divided by gross total assets); $MB_{i,q}$ is the market to book ratio at quarter-end; and $LOSS_{i,q}$ is a dummy variable which equals 1 if the firm's quarterly earnings are less than zero, and 0 otherwise.

variables are modest, suggesting collinearity is unlikely to adversely affect our regression results. The likelihood of meeting or exceeding quarterly earnings forecasts ($MEET_{i,q} = 1$) is higher for more profitable firms, firms with more institutional ownership, more growth opportunities, more subject to litigation risk, and more reliant on implicit claims with stakeholders, and lower for firms that report losses and are more highly levered. With the exception of institutional ownership, similar correlations exist between $SMALL_{i,q}$ and the control variables. Finally, the likelihood the firm meets or exceeds analysts' earnings forecast is positively related to the level of stock-option compensation in its top executive pay plan (Pearson = 0.091, Spearman = 0.089), consistent with our first hypothesis. The likelihood the firm meets or exceeds the earnings forecast by small amounts is also positively related

**Table 4** Correlation matrices

| | *MEET* | *SMALL* | *OPT* | *ROA* | *LEV* | *ASSET* | *INST* | *MB* | *LIT* | *ICLAIM* | *LOSS* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *MEET* | | | 0.091 | 0.151 | −0.051 | 0.006 | 0.089 | 0.108 | 0.055 | 0.045 | −0.167 |
| *SMALL* | | | 0.055 | 0.056 | −0.089 | −0.036 | −0.028 | 0.099 | 0.114 | 0.039 | −0.053 |
| *OPT* | 0.089 | 0.052 | | −0.017 | −0.103 | 0.024 | 0.216 | 0.269 | 0.277 | 0.239 | 0.061 |
| *ROA* | 0.163 | 0.066 | 0.038 | | −0.173 | −0.113 | 0.091 | 0.231 | 0.023 | −0.025 | −0.489 |
| *LEV* | −0.053 | −0.098 | −0.107 | −0.248 | | 0.195 | 0.068 | −0.090 | −0.225 | −0.289 | 0.073 |
| *ASSET* | 0.003 | −0.085 | 0.004 | −0.273 | 0.275 | | 0.148 | −0.112 | −0.239 | −0.125 | −0.058 |
| *INST* | 0.089 | −0.026 | 0.232 | 0.092 | 0.074 | 0.151 | | 0.022 | 0.025 | 0.033 | −0.113 |
| *MB* | 0.138 | 0.167 | 0.277 | 0.463 | −0.224 | −0.148 | 0.064 | | 0.205 | 0.176 | −0.030 |
| *LIT* | 0.055 | 0.114 | 0.253 | 0.128 | −0.246 | −0.239 | 0.031 | 0.236 | | 0.327 | 0.101 |
| *ICLAIM* | 0.053 | 0.049 | 0.208 | 0.025 | −0.034 | −0.066 | −0.038 | 0.107 | 0.212 | | 0.096 |
| *LOSS* | −0.167 | −0.053 | 0.056 | −0.161 | 0.132 | −0.022 | −0.135 | −0.311 | −0.127 | 0.064 | |

Variables are defined as in Table 3. Subscripts are omitted for presentation purposes. Pearson (Spearman rank) correlation coefficients are reported above (below) the diagonal. 29,672 firm-quarter observations are used to compute correlations with *SMALL*. 40,661 firm-quarter observations are used to compute the remaining correlations in the table. Correlation coefficients greater than 0.01 are statistically different from zero at the 0.05 level, two-tailed tests.

to the level of stock-based compensation (Pearson = 0.055, Spearman = 0.052), consistent with our second hypothesis.

## 5.3. Logistic regression results

We next report results of multivariate logistic regressions to test our hypotheses. For each regression we report maximum likelihood parameter estimates and robust z-statistics (in parentheses), using Huber-White standard errors (see Huber, 1967; Rogers, 1993; White, 1980). The robust standard error estimator relaxes the assumption of independence of observations, potentially important as our sample includes multiple observations for many firms. Clustering observations by firm produces correct standard errors even if the observations are correlated (over time, within firms) and heteroskedastic (Stata, 2001).[12]

We also report the percentage change in odds for each independent variable in each of our regressions. For continuous variables the percentage change in odds is $100[\exp(\text{std}_j \beta_j)\text{-}1]$, where $\text{std}_j$ is the sample standard deviation of variable *j* and $\beta_j$ is the estimated regression coefficient for variable *j*. For indicator variables the percentage change in odds is $100[\exp(\beta_j)\text{-}1]$. These percentage changes in odds allow for interpretation of the relative economic significance of the independent variables.

### *5.3.1. Option compensation and the likelihood of meeting or beating analysts' forecasts*

Table 5 presents the results of estimating equation (1), for separate regressions using all observations (Panel A) and only non-negative surprise observations (Panel B). From Panel A, consistent with expectations, the probability a firm meets or beats analysts' forecasts is positively related to firm performance ($\beta_1 = 6.74$), the market-to-book ratio ($\beta_3 = 0.055$), the percentage of shares held by institutional investors ($\beta_5 = 0.442$), *ex ante* litigation risk ($\beta_6 = 0.185$), and the extent of reliance on implicit claims ($\beta_7 = 0.060$), and these coefficients are significant at $p < 0.01$ (two-tailed tests). The time trend in earnings surprise documented by Brown (2001) is significant, as the coefficient on *YEAR* ($\beta_9 = 0.111$), is also positive and significant at $p < 0.01$. The probability the firm meets or beats earnings expectations is inversely related to the extent of leverage ($\beta_2 = -0.285$, $p < 0.05$), and the reporting of a quarterly loss ($\beta_8 = -0.962$, $p < 0.01$). We find no relation between (logged) total assets and the likelihood the firm meets or exceeds the forecast.

The final row in each panel of Table 5 shows the effect of a large change in the independent variable on the odds of meeting or beating the forecast (Panel A) or reporting a small non-negative surprise (Panel B). Both the existence of losses (change in odds of –61.8 percent) and year (change in odds of 39.3 percent) exhibit large effects on the likelihood a firm meets or beats the analyst forecast. The effects of other independent variables range from –4.2 percent for leverage to 20.3 percent for litigation risk.

Most important, evidence in Panel A of Table 5 shows that the probability a firm meets or beats analysts' quarterly earnings expectations is positively related to the level of options-based compensation. The coefficient on $OPT_i$ equals 0.199, and the related z-statistic (2.82) indicates significance at $p < 0.01$ (two-tailed test). This coefficient estimate indicates that a one standard-deviation increase in $OPT_i$ increases the odds of meeting or exceeding analyst forecasts by 5.3 percent. Thus, after controlling for other determinants of the likelihood

[12] Our results are also robust to the use of Fama-MacBeth (1973) t-statistics, computed using the mean and standard errors of the regression coefficients from annual regressions.

**Table 5** Logistic regression of the probability of meeting or exceeding analyst forecasts on magnitude of stock-based compensation

**Panel A:** All observations ($N = 40{,}661$)

$$P(MEET_{i,q} = 1) = \beta_0 + \beta_1 ROA_{i,q} + \beta_2 LEV_{i,q} + \beta_3 MB_{i,q} + \beta_4 LNASSET_{i,q} + \beta_5 INST_i + \beta_6 LIT_i + \beta_7 ICLAIM_{i,q} + \beta_8 LOSS_{i,q} + \beta_9 YEAR_i + \beta_{10} OPT_i + e_{i,q}$$

| (Predicted sign) | Intercept | ROA (+) | LEV (?) | MB (+) | LNASSET (+) | INST (+) | LIT (+) | ICLAIM (+) | LOSS (−) | YEAR (+) | OPT (+) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coefficient | −222.0 | 6.74 | −0.285 | 0.055 | −0.007 | 0.442 | 0.185 | 0.060 | −0.962 | 0.111 | 0.199 |
| *z-statistic* | (−19.77)** | (9.94)** | (−2.45)* | (7.70)** | (−0.63) | (4.95)** | (4.09)** | (3.08)** | (−16.95)** | (19.77)** | (2.82)** |
| Δ odds % | | 18.5 | −4.2 | 20.2 | −1.2 | 8.7 | 20.3 | 5.9 | −61.8 | 39.3 | 5.3 |

**Panel B:** Non-negative earnings surprise observations only ($N = 29,672$)

$$P(SMALL_{i,q} = 1) = \beta_0 + \beta_1 ROA_{i,q} + \beta_2 LEV_{i,q} + \beta_3 MB_{i,q} + \beta_4 LNASSET_{i,q} + \beta_5 INST_i + \beta_6 LIT_i + \beta_7 ICLAIM_{i,q} + \beta_8 LOSS_{i,q} + \beta_9 YEAR_i + \beta_{10} OPT_i + e_{i,q}$$

| (Predicted sign) | Intercept | ROA (?) | LEV (?) | MB (?) | LNASSET (?) | INST (?) | LIT (?) | ICLAIM (?) | LOSS (?) | YEAR (−) | OPT (+) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coefficient | 91.09 | −1.581 | −0.727 | 0.044 | −0.054 | −0.251 | 0.378 | −0.061 | −0.703 | −0.046 | 0.323 |
| *z-statistic* | (6.60)** | (−1.93) | (−4.35)** | (6.52)** | (−3.08)** | (−1.97)* | (6.08)** | (−2.09)* | (−8.17)** | (−6.58)** | (3.67)** |
| Δ odds % | | −3.7 | −10.3 | 16.7 | −9.0 | −4.6 | 46.0 | −5.6 | −50.5 | −12.5 | 8.8 |

The table reports maximum likelihood parameter estimates and robust z statistics (in parentheses) from logistic regressions. All variables, except for $LNASSET_{i,q}$ are as defined in Table 3. $LNASSET_{i,q}$ is the natural log of the end of quarter total assets. Panel A reports results of estimating the equation with all observations included. Panel B reports the results of estimating the equation with negative earnings surprise observations excluded.

** (*) indicates the parameter estimate differs from zero at less than the 0.01 (0.05) level, two-tailed tests.

Δ odds % is the effect of a change in the independent variable on the odds of meeting or beating the forecast (panel A) or reporting a small earnings surprise (panel B). For continuous variables the percentage change in odds is $100[\exp(\text{std}_j \beta_j) - 1]$, where $\text{std}_j$ is the sample standard deviation of variable j and $\beta_j$ is the estimated regression coefficient for variable j. For indicator variables the percentage change in odds is $100[\exp(\beta_j) - 1]$.

of meeting or exceeding analysts' quarterly earnings forecast, the extent of stock-based compensation in a firm's top executive pay plan emerges as an important factor in the firm's reported quarterly results.

#### *5.3.2. Option compensation and the likelihood of meeting or beating analysts' forecasts by small amounts*

Panel B of Table 5 presents results from estimation of equation (2) on the subset of observations that either meet or exceed analysts' forecasts, conditional on reporting non-negative surprises (29,672 observations). In this regression the dependent variable equals 1 if the reported surprise is between 0 and 1 cent per share, and zero if the earnings surprise is greater than 1 cent per share (observations with negative earnings surprise are deleted). Panel B of Table 5 shows that the likelihood of reporting a small surprise is positively related to the market-to-book ratio ($\beta_3 = 0.044$) and *ex ante* litigation risk ($\beta_6 = 0.378$), and inversely related to return on assets ($\beta_1 = -1.581$, $p = 0.053$), leverage ($\beta_2 = -0.727$), logged assets ($\beta_4 = -0.054$), the percentage of shares held by institutions ($\beta_5 = -0.251$), reliance on implicit claims ($\beta_7 = -0.061$), the reporting of losses ($\beta_8 = -0.703$), and fiscal year ($\beta_9 = -0.046$). As expected, and consistent with Barton and Simko (2002), the coefficient signs (and changes in odds percentages) on some control variables differ from those reported in Panel A. For example, the higher the return on assets, the greater the likelihood of meeting or beating the forecast (Panel A), but the lower the probability of a small earnings surprise (Panel B).

More importantly, the likelihood the firm reports a small earnings surprise, conditional on it reporting either a zero or positive surprise, is positively related to the extent to which its top executives are compensated with stock options. The coefficient on $OPT_i$ equals 0.323, and its related z-statistic (3.67) indicates statistical significance at $p < 0.01$. This coefficient estimate indicates that a standard-deviation increase in $OPT_i$ increases by 8.8 percent the odds of exactly meeting or exceeding analyst forecasts by $\leq 1$ cent per share.

In sum, the evidence in Table 5 suggests compensation via stock options intensifies executives' focus on reporting short-term earnings that meet or exceed analysts' earnings forecasts. We turn next to sensitivity tests of these results.

## 6. Sensitivity analyses

This section reports the results of a battery of tests that assess the sensitivity of the Table 5 results to a) alternative econometric specifications, b) alternative variable definitions, and c) additional control variables. For brevity, Table 6 reports coefficient estimates and significance levels on just the stock-based compensation variable in logistic regression estimations of variations of equations (1) and (2). In sum, the results of these additional analyses support the robustness of the results reported in Table 5; all of the estimated coefficients on stock-based compensation are positive and different from zero at $p < 0.05$ (two-tailed tests), and nearly all are different from zero at $p < 0.01$ (two-tailed tests).

### 6.1. Alternative econometric specifications

We estimate an ordered logistic regression of equation (1) in which the dependent variable takes on values from -1 (missed the forecast) to 5 (exceeded the forecast by more than 4 cents per share). Observations with zero forecast errors are coded as 0, and dependent variable values from 1 through 4 correspond to 1-cent increments of earnings surprise.

**Table 6** Summary results on coefficient estimates on stock-based compensation variable from sensitivity analyses

| Section | Name of sensitivity analysis | Regression equation (1) | Regression equation (2) |
|---|---|---|---|
| **Panel A:** | Alternative econometric specifications | | |
| 6.1 | Dependent variable ranges from −1 to +5 | 0.350** | n/a |
| | $SMALL_{i,q}$ surprise ranges from 0 to 3 cents per share | n/a | 0.248** |
| | Narrow misses (surprise between −2 up to 0 cents per share) and narrow meet or beats (surprise between 0 and 1 cent per share) | n/a | 0.186* |
| | Instrumental variable, based on industry-level *OPT* | 0.042** | 0.017** |
| **Panel B:** | Alternative variable definitions | | |
| 6.2 | $OPT_i$ based on current option grants and end of year portfolio | 0.062** | 0.035** |
| | $OPT_i$ based on sum of three lags of option grants | 0.161** | 0.145** |
| | Expected earnings defined as analysts' mean forecast | 0.110* | 0.308** |
| | Unadjusted I/B/E/S data used to compute earnings surprise | 0.227** | 0.255** |
| **Panel C:** | Additional control variables | | |
| 6.3 | $MGROWN_i$, $BONUS_i$, $NUM\_OPT_i$, $SMOOTH_{i,q}$, $NOA_{i,q}$, $STD\_EST_{i,q}$, and $FOLLOW_i$ all included as independent variables | 0.247** | 0.264** |

This table reports the coefficient estimates and related levels of statistical significance on the stock-based compensation variable in logistic regression estimations of variations of equations (1) and (2). In each of the regressions reported in Panels A and B, all other variables are defined as in Table 3. The additional variables used in the estimations reported in Panel C are defined as follows:

$MGROWN_i$ is the percentage of common shares owned by a firm's top 5 executives during the year, per Execucomp; $BONUS_i$ is the dollar amount of bonuses paid to the firm's top 5 executives during the year, deflated by the total compensation paid to those 5 executives during that year, both per Execucomp; $NUM\_OPT_i$ is the number of options granted during the year divided by the number of outstanding common shares, both per Execucomp; $SMOOTH_{i,q}$ is the standard deviation of operating cash flows divided by the standard deviation of quarterly earnings over the (up to) past twenty quarters, per Compustat; $NOA_{i,q}$ is a measure of the firm's quarterly net operating assets, computed as shareholders' equity minus cash and marketable securities, plus total debt, all deflated by net sales, where all variables are from Compustat; $STD\_EST_{i,q}$ is the standard deviation of estimates contained in analysts' mean forecast of quarterly earnings, computed from I/B/E/S; and $FOLLOW_i$ is the natural log of the number of analysts following the firm, per I/B/E/S.

** (*) indicates the parameter estimate differs from zero at less than the 0.01 (0.05) level, two-tailed tests. Significance tests are based on autocorrelation and heteroscedasticity robust $z$-statistics.

We also estimate several alternative specifications to corroborate our finding that stock option compensation is positively related to meeting or just beating analysts' forecasts. First, like Brown (2001), we define a small surprise as between 0 and 3 cents per share, and find results similar to those reported in Panel B of Table 5. Second, we estimate a binomial logistic regression where the dependent variable is 0 for firms just missing the forecast (earnings surprise from −2 cents per share to just below 0 cents per share) and 1 for firms exactly meeting or narrowly exceeding the forecast (earnings surprise from 0 to 1 cents per share).[13]

Finally, we consider the possibility that simultaneity bias impacts our results. Strong firm performance increases the likelihood the firm meets or exceeds analysts' expectations, but also might increase the level and value of top employee option grants. Under such circumstances, the coefficient estimate on $OPT_i$ might be correlated with the regression residual and thus biased. Accordingly, we employ an instrumental variables approach to address this issue. Following Lev and Sougiannis (1996) and Hanlon, Shevlin and Rajgopal (2003), we regress firm-specific annual values of $OPT_i$ on the average value of $OPT_i$ for other firms in the same four-digit SIC code.[14] This approach assumes that option activity is highly influenced by practices of other firms in the same industry (Murphy, 1999). We then substitute the predicted values of $OPT_i$ from the industry-specific regressions and estimate equations (1) and (2).

### 6.2. Alternative variable definitions

We find similar results with several alternative measures of stock-based compensation, including (a) the sum of the Black-Scholes value of options granted during the year plus the total value of the top executives' option portfolios at the end of that year, and (b) the sum of three lags of Black-Scholes value of options granted during the year (see Hanlon et al. 2003).[15] The use of lagged measures of option compensation provides further evidence suggesting that simultaneity does not impact the results—by construction, any event impacting the regression residuals in year $t$ is unrelated to lagged values of stock option grants.

Instead of the most recent analyst forecast, we also compute earnings surprise from the mean of the most recent individual analyst forecasts occurring within 90 days before the earnings announcement date. Under this approach fewer firm-quarters meet or beat analysts' forecasts, and fewer do so by small amounts, yet our results persist.

Payne and Thomas (2003) and Baber and Kang (2002) show that the I/B/E/S convention to report per share data on a split-adjusted basis can in some cases prohibit researchers from determining the actual values of the variables reported in prior years. As a result, measures of forecast error, and in particular the identification of observations as having zero forecast error, can be inaccurate. Payne and Thomas (2003) perform tests involving the distribution of forecast errors, earnings response coefficients, and temporal trends in forecast accuracy using the actual (unadjusted) I/B/E/S data, and find that results can differ when using the adjusted I/B/E/S data. We compute our earnings surprise variables using the I/B/E/S unadjusted database, and repeat the estimations of equations (1) and (2), with all other variables as defined in Table 5.

[13] There are not enough observations in our sample where firms miss the forecast by 1 cent or less to allow for meaningful tests, thus we expand the small negative surprise group to also include 2 cent misses.

[14] The average *OPT* is computed for each industry-year group with at least 5 observations (excluding the firm in question). The coefficients on the industry-average *OPT* are primarily positive and significant.

[15] We use the Execucomp variables *INMONUN* (the value of in-the-money, unexercisable options) and *INMONEX* (the value of in-the-money, exercisable options) to measure the value of the option portfolio.

### 6.3. Additional control variables

While our controls are motivated by prior research, it is possible that correlated omitted variables bias impacts our results. In this section we report the results of regressions that include additional independent variables.

First, managerial ownership of shares, and managerial bonus plans, present alternative means to address agency problems caused by separation of ownership and control. Thus, it is possible that the effects we document are driven not by stock option compensation but instead by managerial ownership or bonus plans. Using the Execucomp database, we collect the percentage of shares owned by the top executives in our sample firms ($MGROWN_i$) and the percentage of the top five executives' total compensation due to bonus plans ($BONUS_i$). In addition, it is possible that if the number of stock options (in shares) is small relative to the number of common shares outstanding, managers might not be motivated to meet or beat analysts' forecasts; thus, we compute this variable and label it $NUM\_OPT_i$.

Second, earnings smoothing is considered a common reporting behavior which might, as a consequence, impact the likelihood the firm meets or beat analysts' expectations. For each firm-quarter observation we compute the ratio of the standard deviation of operating cash flows divided by the standard deviation over the prior twenty quarters' earnings, and label this variable $SMOOTH_{i,q}$ (see Pincus and Rajgopal, 2002; Bowen, Rajgopal and Venkatachalam, 2004).[16]

Third, Barton and Simko (2002) argue that net operating assets reflect, in part, the extent to which a firm's balance sheet is overstated due to prior accounting choices, relative to a neutral application of generally accepted accounting principles. The level of net operating assets, therefore, provides a constraint on a firm's flexibility to make accounting choices to enable it to meet earnings targets. Barton and Simko (2002) show that the level of net operating assets is negatively related to the probability a firm meets its quarterly analyst earnings forecast. Following Barton and Simko (2002) we compute $NOA_{i,q}$, the level of firm $i$'s net operating assets in quarter $q$, as shareholders' equity minus cash and marketable securities, plus total debt, all deflated by quarter $q$ net sales.[17]

Finally, we consider other aspects of each firm's reporting environment, including the level of dispersion (standard deviation) in analysts' mean forecasts (computed as in Section 6.2 above), and the natural log of the number of analysts forecasting (Barton and Simko, 2002). We label these variables ($STD\_EST_{i,q}$) and ($FOLLOW_i$) respectively, and include them, along with $MGROWN_i$, $BONUS_i$, $NUMOPT_i$, $SMOOTH_{i,q}$, and $NOA_{i,q}$, in estimations of equations (1) and (2). The coefficient estimate on $OPT_i$ is 0.247 (0.264) in logistic estimations of equations (1) and (2) respectively, and each is significant at $p < 0.01$.

## 7. Conclusion

We study the role of option compensation in the "numbers game" (Levitt, 1998), in which managers, analysts, and investors focus on the amount by which reported quarterly earnings meet or beat analysts' forecasts. Our results show that firms that employ higher amounts of stock option compensation in their top executive pay schemes more frequently meet or beat

[16] We require a minimum of ten prior earnings and cash flows observations for firm-quarters with less than twenty prior quarterly earnings and cash flows values available.

[17] For these estimations we followed Barton and Simko (2002) and deleted utilities and financial services firms (SIC codes 47 and 60–67).

analysts' quarterly earnings targets, and more frequently report small (non-negative) earnings surprises, than do firms that use lower amounts of stock-based compensation. While designed to alleviate agency concerns due to separation of ownership and control, these findings suggest compensation via options intensifies top executives' focus on analysts' short-term result earnings forecasts.

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## Appendix A: Descriptive statistics on non-negative surprise observations

**Panel A:** Observations with earnings surprise between 0-1 cent per share ($SMALL_{i,q} = 1$)

| Variable | Mean | Std dev | 1st Quartile | Median | 3rd Quartile |
|---|---|---|---|---|---|
| $OPT_i$ | 0.373 | 0.266 | 0.154 | 0.349 | 0.578 |
| $ROA_{i,q}$ | 0.017 | 0.022 | 0.005 | 0.016 | 0.028 |
| $LEV_{i,q}$ | 0.151 | 0.148 | 0.013 | 0.115 | 0.250 |
| $ASSET_{i,q}$ | 5,995 | 17,050 | 295 | 898 | 3753 |
| $INST_i$ | 0.572 | 0.191 | 0.442 | 0.591 | 0.717 |
| $MB_{i,q}$ | 4.072 | 3.622 | 1.922 | 2.945 | 4.810 |
| $LIT_i$ | 0.352 | 0.478 | 0 | 0 | 1 |
| $ICLAIM_{i,q}$ | 0.313 | 0.913 | −0.376 | 0.072 | 1.112 |
| $LOSS_{i,q}$ | 0.043 | 0.203 | 0 | 0 | 0 |

All variables are defined as in Table 3. Statistics in Panel A (B) are based on 11,453 (18,219) firm-quarter observations in which the earnings surprise is between 0–1 cent per share (greater than 1 cent per share).

$SMALL_{i,q}$ is an indicator variable, computed for observations with non-negative earnings surprises only, which equals 1 if the firm's quarterly earnings either met or exceeded the most recent forecast of that quarters' earnings by between 0 and 1 cent per share, and 0 if the firm's quarterly earnings surprise is above 1 cent per share; $OPT_i$ is defined as the sum of the dollar amount of Black-Scholes value of options granted to the top 5 executives during the year, deflated by the total dollars of compensation (including the value of options granted) paid to those executives during the year; $ROA_{i,q}$ is the quarterly return on assets, equal to that quarter's net income divided by end of quarter assets; $LEV_{i,q}$ is leverage, defined as end of quarter total long-term debt divided by end of quarter total assets; $ASSET_{i,q}$ is end of quarter total assets, in millions of dollars; $INST_i$ is the percentage of outstanding shares held by institutional owners; $LIT_i$ is a dummy variable which equals 1 if the firm is in a high-litigation environment, defined as SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), or 5200–5961 (retailing), and 0 otherwise; $ICLAIM_{i,q}$ measures the extent to which the firm operates in an industry with greater reliance on implicit claims with shareholders, computed as the factor scores from a factor analysis using a dummy variable to represent membership in a durable goods industry (SIC codes 150–179, 245, 250–259, 283, 301, and 324–399), research and development intensity (quarterly research and development expenses deflated by end of quarter total assets), and labor intensity (1 minus the level of quarterly gross property, plant, and equipment divided by gross total assets); $MB_{i,q}$ is the market to book ratio at quarter-end; and $LOSS_{i,q}$ is a dummy variable which equals 1 if the firm's quarterly earnings are less than zero, and 0 otherwise.

**Panel B:** Observations with earnings surprise greater than 1 cent per share ($SMALL_{i,q} = 0$)

| Variable | Mean | Std dev | 1st Quartile | Median | 3rd Quartile |
|---|---|---|---|---|---|
| $OPT_i$ | 0.346 | 0.255 | 0.135 | 0.313 | 0.525 |
| $ROA_{i,q}$ | 0.014 | 0.025 | 0.004 | 0.013 | 0.025 |
| $LEV_{i,q}$ | 0.179 | 0.151 | 0.036 | 0.160 | 0.286 |
| $ASSET_{i,q}$ | 7,355 | 19,255 | 401 | 1,280 | 4,660 |
| $INST_i$ | 0.583 | 0.187 | 0.452 | 0.600 | 0.726 |
| $MB_{i,q}$ | 3.354 | 3.440 | 1.570 | 2.272 | 3.688 |
| $LIT_i$ | 0.246 | 0.431 | 0 | 0 | 0 |
| $ICLAIM_{i,q}$ | 0.238 | 0.948 | −0.541 | 0.072 | 1.031 |
| $LOSS_{i,q}$ | 0.089 | 0.284 | 0 | 0 | 0 |

All variables are defined as in Table 3.

$SMALL_{i,q}$ is an indicator variable, computed for observations with non-negative earnings surprises only, which equals 1 if the firm's quarterly earnings either met or exceeded the most recent forecast of that quarters' earnings by between 0 and 1 cent per share, and 0 if the firm's quarterly earnings surprise is above 1 cent per share; $OPT_i$ is defined as the sum of the dollar amount of Black-Scholes value of options granted to the top 5 executives during the year, deflated by the total dollars of compensation (including the value of options granted) paid to those executives during the year; $ROA_{i,q}$ is the quarterly return on assets, equal to that quarter's net income divided by end of quarter assets; $LEV_{i,q}$ is leverage, defined as end of quarter total long-term debt divided by end of quarter total assets; $ASSET_{i,q}$ is end of quarter total assets, in millions of dollars; $INST_i$ is the percentage of outstanding shares held by institutional owners; $LIT_i$ is a dummy variable which equals 1 if the firm is in a high-litigation environment, defined as SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), or 5200–5961 (retailing), and 0 otherwise; $ICLAIM_{i,q}$ measures the extent to which the firm operates in an industry with greater reliance on implicit claims with shareholders, computed as the factor scores from a factor analysis using a dummy variable to represent membership in a durable goods industry (SIC codes 150-179, 245, 250–259, 283, 301, and 324–399), research and development intensity (quarterly research and development expenses deflated by end of quarter total assets), and labor intensity (1 minus the level of quarterly gross property, plant, and equipment divided by gross total assets); $MB_{i,q}$ is the market to book ratio at quarter-end; and $LOSS_{i,q}$ is a dummy variable which equals 1 if the firm's quarterly earnings are less than zero, and 0 otherwise.

## References

Aboody, D. and R. Kasznik, "CEO Stock Option Awards and the Timing of Corporate Voluntary Disclosures." *Journal of Accounting and Economics* 29(1), 73–100 (2000).

Ali, A. and S. Kallapur, "Securities Price Consequences of the Private Securities Litigation Reform Act of 1995 and Related Events." *The Accounting Review* 76(3), 431–461 (2001).

Baber, W. and S. Kang. "The Impact of Split Adjusting on Analysts' Forecast Error Calculations." *Accounting Horizons*, 16, 277–289 (2002).

Barton, J. and P.J. Simko, "The Balance Sheet as an Earnings Management Constraint." *The Accounting Review* 77(Supplement), 1–27 (2002).

Bartov, E., D. Givoly and C. Hayn, "The Rewards to Meeting or Beating Earnings Expectations." *Journal of Accounting and Economics* 33(2), 173–204 (2002).

Bowen, R., L. DuCharme and D. Shores, "Stakeholders' Implicit Claims and Accounting Method Choice." *Journal of Accounting and Economics* 20(3), 255–295 (1995).

Bowen, R., S. Rajgopal and M. Venkatachalam, "Accounting Discretion, Corporate Governance, and Firm Performance." Working paper, University of Washington and Duke University (2004).

Brown, K., "Wall Street Plays Numbers Game with Earnings, Despite Reforms." Wall Street Journal, July 22, A1, A3 (2003).

Brown, L., “Forecast Selection When all Forecasts are not Equally Recent.” *International Journal of Forecasting* 7(3), 349–356 (1991).
Brown, L., “A Temporal Analysis of Earnings Surprises: Profits Versus Losses.” *Journal of Accounting Research* 39(2), 221–242 (2001).
Brown, L. and K. Kim, “Timely Aggregate Analyst Forecasts as Better Proxies for Market Earnings Estimates.” *Journal of Accounting Research* 29(2), 382–385 (1991).
Brown, L. and M. Caylor, “A Temporal Analysis of Quarterly Earnings Thresholds: Propersities and valuation consequences.” *The Accounting Review* (April 2005).
Das, S. and H. Zhang, “Rounding up in Reported EPS, Behavioral Thresholds, and Earnings Management.” *Journal of Accounting and Economics* 35(1), 31–50 (2003).
Dechow, P., S. Richardson and I. Tuna, “Why are Earnings Kinky? An Examination of the Earnings Management Explanation.” *Review of Accounting Studies* 8, 355–384 (2003).
Dechow, P., R. Sloan and A. Sweeney, “Detecting Earnings Management.” *The Accounting Review* 70(2), 193–225 (1995).
Defond, M. and J. Jiambalvo, “Debt Covenant Violation and Manipulation of Accruals.” *Journal of Accounting and Economics* 17, 1–32 (1994).
Degeorge, F., J. Patel, and R. Zeckhauser, “Earnings Management to Exceed Thresholds.” *Journal of Business* 72(1), 1–33 (1999).
Fama, E. F. and J. MacBeth, “Risk, Return, and Equilibrium: Empirical tests.” *Journal of Political Economy* 71, 607–636 (1973).
Francis, J., D. Philbrick and K. Schipper, “Shareholder Litigation and Corporate Disclosures.” *Journal of Accounting Research* 32(2), 137–164 (1994).
Graham, J., C. Harvey and S. Rajgopal, “The Economic Implications of Corporate Financial Reporting.” *Journal of Accounting and Economics* 40(1–3), 3–73 (2005).
Hanlon, M., S. Rajgopal and T. Shevlin, “Are Executive Stock Options Associated with Future Earnings?” *Journal of Accounting and Economics* 36(1–3), 3–44 (2003).
Huber, P., “The Behavior of Maximum Likelihood Estimates Under Nonstandard Conditions.” In Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability. Berkeley, CA: University of California Press (1), 221–223 (1967).
Jensen, M. and W. Meckling, “Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure.” *Journal of Financial Economics* 3(4), 305–360 (1976).
Kasznik, R. and M. F. McNichols, “Does Meeting Earnings Expectations Matter? Evidence From Analyst Forecast Revisions and Share Prices.” *Journal of Accounting Research* 40(3), 727–759 (2002).
Kim, O., S. Lim and K. Shaw, “The Inefficiency of the Mean Forecast as a Summary Forecast of Earnings.” *Journal of Accounting Research* 39(2), 329–336 (2001).
Lev, B. and T. Sougiannis, “The Capitalization, Amortization and Value-Relevance of R&D.” *Journal of Accounting and Economics* 21(1), 107–138 (1996).
Levitt, A., “The Numbers Game.” Speech Delivered at the New York University Center for Law and Business (September 28, 1998).
Matsumoto, D., “Management’s Incentives to Avoid Negative Earnings Surprises.” *The Accounting Review* 77(3), 483–514 (2002).
Murphy, K. J., “Executive Compensation.” In: Ashenfelter, O., D. Card (Eds.), *Handbook of Labor Economics* Volume 3, North-Holland, Amsterdam (1999).
O’Brien, P., “Analysts’ Forecasts as Earnings Expectations.” *Journal of Accounting and Economics* 10(1), 53–83 (1988).
Payne, J. and W. Thomas, “The Implications of Using Stock-Split Adjusted I/B/E/S Data in Empirical Research.” *The Accounting Review* 78(4), 1049–1067 (2003).
Pincus, M. and S. Rajgopal, “The Interaction Between Accrual Management and Hedging: Evidence From Oil and Gas Firms.” *The Accounting Review* 77(1), 121–160 (2002).
Rajgopal, S. and T. Shevlin, “Empirical Evidence on the Relation Between Stock Option Compensation and Risk Taking.” *Journal of Accounting and Economics* 33(2), 145–171 (2002).
Rogers, W., “Regression Standard Errors in Clustered Samples.” Stata Technical Bulletin Reprints (3), 88–94 (1993).
Skinner, D. J. and R. G. Sloan, “Earnings Surprises, Growth Expectations, and Stock Returns or Don’t Let an Earnings Torpedo Sink Your Portfolio.” *Review of Accounting Studies* 7(2–3), 289–312 (2002).
Stata Corporation (Stata), “Stata User’s Guide: Release 7.” Stata Press: College Station, TX: [U] 23.11, 254–258 (2001).
White, H., “A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity.” *Econometrica 48 (May)*, 817–838 (1980).