The Balance Sheet as an Earnings Management Constraint

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ABSTRACT: The balance sheet accumulates the effects of previous accounting choices, so the level of net assets partly reflects the extent of previous earnings management. We predict that managers’ ability to optimistically bias earnings decreases with the extent to which the balance sheet overstates net assets relative to a neutral application of GAAP. To test this prediction, we examine the likelihood of reporting various earnings surprises for 3,649 firms during 1993–1999. Consistent with our prediction, we find that the likelihood of reporting larger positive or smaller negative earnings surprises decreases with our proxy for overstated net asset values.

Keywords: articulation between income statement and balance sheet; earnings management constraints; measurement and recognition guidance; earnings surprises; analysts’ forecasts.

Data Availability: Data are available from sources identified in the paper.

I. INTRODUCTION

We examine the extent to which Generally Accepted Accounting Principles (GAAP) and their implementation guidelines constrain managers from optimistically biasing earnings. Because the balance sheet accumulates the effects of previous accounting choices, the level of net assets partly reflects the extent of previous earnings management. We predict that managers’ ability to optimistically bias earnings decreases with the extent to which net assets are already overstated on the balance sheet. To test our prediction, we focus on a particularly strong earnings management constraint.
incentive—meeting or beating analysts’ earnings expectations. Meeting or beating expectations is not always the result of optimistic bias in financial reporting, so our empirical analyses control for other reasons behind an earnings surprise. Our analyses suggest that managers are less likely to report a predetermined earnings surprise by optimistically biasing earnings when their firms’ net assets are overstated.

The articulation between the income statement and the balance sheet ensures that accruals reflected in earnings also are reflected in net assets. Therefore, an optimistic bias in earnings implies net assets measured and recorded temporarily at values exceeding those based on a neutral application of GAAP. Managers’ generous assumptions about recognition and measurement in one period reduce their ability to make equally generous assumptions in later periods, if managers want to stay within the guidance provided by accounting regulators and professional groups. Therefore, managers’ ability to optimistically bias earnings decreases with the extent to which net assets are already overstated.

We use the beginning balance of net operating assets relative to sales as a proxy for managers’ previous biased reporting choices. This proxy is consistent with overstated net assets being less efficient at generating a given level of sales, all else equal. If this proxy is valid, then firms with larger levels of net operating assets relative to sales will have reported larger cumulative levels of income-increasing accruals in the past. In our sample of 3,649 nonfinancial, nonregulated firms during 1993–1999, we find that firms with larger levels of net operating assets (relative to sales) reported larger cumulative levels of abnormal accruals in the previous 20 quarters, consistent with prior income-increasing earnings management leading to overstated net assets.

We then examine the association between our sample firms’ quarterly earnings surprises and the beginning balance of net operating assets relative to sales. We focus on earnings surprises because “[p]erhaps the single most important cause [of earnings management] is the pressure imposed on management to meet analysts’ earnings projections” (Johnson 1999). Investors have become especially unforgiving of firms that fail to meet earnings expectations (Skinner and Sloan 2001). Previous research documents an increasing incidence of reported earnings that just meet or slightly beat analysts’ earnings forecasts (Brown 2001; Burgstahler and Eames 2001; Matsumoto 2002), an outcome that is apparently achieved in part through earnings management (Payne and Robb 2000; Burgstahler and Eames 2001; Matsumoto 2002). If missing expectations is costly and managing earnings toward expectations is common, then why do some managers miss expectations even by a small amount? In fact, why do they meet expectations rather than beat them altogether? We suggest some managers do so because, all else equal, they have limited discretion to repeatedly bias earnings upward. Specifically, we predict that managers’ ability to report larger positive or smaller negative earnings surprises decreases with the extent to which net assets are already overstated on the balance sheet.

We model the level of earnings surprise as a function of managers’ previous recognition and measurement decisions, as reflected in the beginning balance of net operating assets relative to sales. Our model controls for other constraints on earnings management, managerial incentives to meet or beat analysts’ forecasts, and firm performance and size. We estimate the model using a generalized ordered logit regression on 35,950 quarterly earnings surprises for our sample. Consistent with our prediction, we find that firms with larger

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2 Departing from GAAP may result in substantial costs to managers and their firms (Dechow et al. 1996).
3 For example, Compaq Computer, Hewlett-Packard, Merck, Sears, Starbucks, and UAL all missed their consensus analyst forecasts by 1¢ per share at least once during 1993–1999, and suffered an average size-adjusted cumulative abnormal return of about –12 percent over the three days surrounding their earnings announcements.
beginning balances of net operating assets relative to sales are less likely to report a predeter-
dmined earnings surprise. These findings are robust to using alternative econometric

techniques, separating net operating assets into their current and long-term components,
controlling for industry and fiscal-quarter effects, using alternative definitions of earning
surprises, and excluding loss firms or firms reporting special items.

Our paper extends research on earnings management in three ways. First, while we do
not measure directly the amount of financial reporting discretion actually available to
managers, our approach provides a basis for doing so in future research. Second, prior research
examines how managers trade off financial reporting discretion available across several
balance sheet accounts when meeting various objectives (e.g., Beatty et al. 1995; Hunt et
al. 1996; Gaver and Paterson 1999). We extend this literature by providing evidence that
the balance sheet accumulates the effects of prior optimism in financial reporting, reducing
managers’ ability to optimistically bias future earnings. Therefore, consistent with Hunt et
al. (1996), our findings suggest that managers likely trade off available financial reporting
discretion over time. Last, prior research provides evidence that managing earnings to meet
expectations is widespread (Degeorge et al. 1999; Payne and Robb 2000; Abarbanell and
Lehavy 2001a; Burgstahler and Eames 2001; Matsumoto 2002), but assumes that the ability
to manage earnings is random or even constant across firms. Our results suggest that the
ability to report a predetermined earnings surprise varies across firms as a function of
previous optimism in financial reporting.

Section II develops our main hypothesis. Section III describes our research design.
Specifically, this section explains the sample selection criteria, reports the frequencies and
market reactions associated with various levels of earnings surprise, describes the charac-
teristics of sample firms, discusses our proxy for overstated net asset values, and develops
our regression model. Section IV describes our main empirical results and sensitivity tests.
Finally, Section V offers some concluding remarks.

II. HYPOTHESIS

The accruals basis of accounting requires managers to report the effects of economic
transactions based on expected cash realizations (SFAC No. 1, FASB 1978; SFAC No. 6,
FASB 1985). Although GAAP requires managers to make numerous judgments and as-
sumptions to report their firms’ performance under accrual accounting, managers do not
have unlimited discretion in doing so. For example, accounting regulators like the Securities
and Exchange Commission and the Financial Accounting Standards Board, along with
professional groups like the American Institute of Certified Public Accountants, provide
detailed guidelines for implementing measurement, recognition, and disclosure rules. Au-
ditors and the courts help enforce these guidelines.

Because of the reversing nature of accrual accounting, managers’ biased estimates and
judgments in one period reduce their ability to make similarly biased estimates and judg-
ments in subsequent periods (Hunt et al. 1996; Abarbanell and Lehavy 2001a). The artic-
ulation between the income statement and the balance sheet ensures that biased assumptions
reflected in earnings are also reflected in net asset values. Therefore, we predict that man-
agers’ ability to optimistically bias earnings decreases with the extent to which net assets
are already overstated on the balance sheet, relative to what their values would have been
under a neutral implementation of GAAP.

Prior research shows that overstated assets and revenues are the most common reason
for restatements of financial statements (Palmrose et al. 2001), Securities and Exchange
Commission’s accounting enforcement actions (Feroz et al. 1991; Dechow et al. 1996), and
lawsuits against auditors (St. Pierre and Anderson 1984; Lys and Watts 1994). Prior research
also shows that managers may understate assets temporarily to regain the ability to optimistically bias earnings in future periods (Moehrle 2002).

Managers have various incentives to bias earnings (see Fields et al. 2001). However, we focus on one particularly strong incentive—meeting or beating analysts’ earnings forecasts. Dechow and Skinner (2000) argue that the bull market of the late 1990s and the increased use of stock options for managerial compensation have increased managers’ incentives to manipulate earnings to preserve high stock valuations. Consistent with this argument, Barth et al. (1999) provide evidence that firms with patterns of increasing earnings have higher price-to-earnings ratios, and that these ratios decline significantly when firms break the pattern by reporting earnings decreases. Moreover, Skinner and Sloan (2001) report significant negative returns for firms that fail to meet analysts’ earnings forecasts. Finally, evidence also suggests widespread earnings management to meet or beat analysts’ forecasts (e.g., Payne and Robb 2000; Burgstahler and Eames 2001; Matsumoto 2002).

Based on these findings, we predict that managers will use available financial reporting discretion to report higher levels of earnings surprises, all else equal. Therefore, we test the following hypothesis:

\[ H_0: \text{The likelihood of reporting larger positive or smaller negative earnings surprises decreases with the extent to which net assets are already overstated on the balance sheet.} \]

### III. RESEARCH DESIGN

#### Sample

Our initial sample contains all firm-quarters on both the Compustat and I/B/E/S databases with complete data for our test variables during 1993–1999. We consider this period because pressure to meet analysts’ forecasts appears to be a recent phenomenon (Levitt 1998; Brown 2001; Matsumoto 2002), and because Abarbanell and Lehavy (2001b) suggest that differences between pre- and post-1993 I/B/E/S forecast errors may be due to changes in the way I/B/E/S calculates actual earnings per share (EPS). We exclude utilities and financial services firms (two-digit SIC codes 49 and 60–67) because they are subject to regulatory requirements that would unnecessarily complicate our research design. Our final sample consists of 35,950 quarterly observations for 3,649 firms.

We define an earnings surprise (SURPRISE) as the I/B/E/S actual EPS for quarter \( t \) less the consensus analyst EPS forecast for quarter \( t \), both rounded to the nearest penny. The consensus forecast is the average of analysts’ most recent forecasts of EPS for quarter \( t \) available on I/B/E/S prior to the earnings announcement for quarter \( t \) (Brown and Kim 1991). To keep our analyses tractable, we combine firms missing the consensus forecast by 5¢ or more (i.e., SURPRISE \( \leq -5\varepsilon \)) into one category and firms beating the forecast by 5¢ or more (i.e., SURPRISE \( \geq 5\varepsilon \)) into another. SURPRISE thus consists of 11 categories coded sequentially from \(-5\) to 5.

Table 1 reports characteristics of quarterly earnings surprises for our sample. Here and in our remaining analyses, we winsorize all variables at the upper and lower one percentile of their distributions. Across levels of SURPRISE, Panel A of Table 1 reports the means of actual EPS, consensus EPS forecast, and forecast error (i.e., actual EPS less consensus EPS forecast) as a percentage of the consensus EPS forecast. Panel A shows these three variables increasing in the level of SURPRISE. The panel also shows that firms missing (beating) earnings expectations by 1¢ per share reported EPS averaging about 6.3 percent lower (6.7 percent higher) than the consensus forecast. On the other hand, firms missing (beating) earnings expectations by 5¢ or more reported EPS averaging about 31 percent lower (20.4 percent higher) than the consensus forecast.
### TABLE 1
Characteristics of Quarterly Earnings Surprises

**Panel A: Mean of Actual Earnings Per Share (EPS), Consensus Analysts’ Forecasts, and Earnings Surprise as a Percentage of Forecasts**

<table>
<thead>
<tr>
<th>SURPRISE</th>
<th>n</th>
<th>Actual EPS</th>
<th>Consensus EPS Forecast</th>
<th>SURPRISE / Consensus EPS Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ −5¢</td>
<td>5,054</td>
<td>2¢</td>
<td>17¢</td>
<td>−31.0%</td>
</tr>
<tr>
<td>−4</td>
<td>871</td>
<td>16</td>
<td>20</td>
<td>−16.1</td>
</tr>
<tr>
<td>−3</td>
<td>1,196</td>
<td>17</td>
<td>20</td>
<td>−13.5</td>
</tr>
<tr>
<td>−2</td>
<td>1,707</td>
<td>20</td>
<td>22</td>
<td>−8.3</td>
</tr>
<tr>
<td>−1</td>
<td>2,811</td>
<td>23</td>
<td>24</td>
<td>−6.3</td>
</tr>
<tr>
<td>0</td>
<td>8,426</td>
<td>22</td>
<td>22</td>
<td>0.6</td>
</tr>
<tr>
<td>1</td>
<td>5,163</td>
<td>25</td>
<td>24</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>3,050</td>
<td>27</td>
<td>25</td>
<td>10.7</td>
</tr>
<tr>
<td>3</td>
<td>1,927</td>
<td>28</td>
<td>25</td>
<td>12.2</td>
</tr>
<tr>
<td>4</td>
<td>1,236</td>
<td>28</td>
<td>24</td>
<td>13.9</td>
</tr>
<tr>
<td>≥ 5</td>
<td>4,509</td>
<td>38</td>
<td>28</td>
<td>20.4</td>
</tr>
</tbody>
</table>

All firm-quarters 35,950 22¢ 23¢ 0.4%

**Panel B: Annual Frequency of Firm-Quarters Reporting a Given Earnings Surprise**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ −5¢</td>
<td>16.4%</td>
<td>13.8%</td>
<td>17.1%</td>
<td>14.0%</td>
<td>13.3%</td>
<td>13.3%</td>
<td>11.9%</td>
<td>14.1%</td>
</tr>
<tr>
<td>−4</td>
<td>3.7</td>
<td>2.7</td>
<td>2.8</td>
<td>2.3</td>
<td>1.8</td>
<td>2.4</td>
<td>1.9</td>
<td>2.4</td>
</tr>
<tr>
<td>−3</td>
<td>4.2</td>
<td>3.9</td>
<td>3.7</td>
<td>3.1</td>
<td>2.8</td>
<td>3.6</td>
<td>2.5</td>
<td>3.3</td>
</tr>
<tr>
<td>−2</td>
<td>6.2</td>
<td>5.3</td>
<td>4.8</td>
<td>5.4</td>
<td>4.6</td>
<td>4.2</td>
<td>3.4</td>
<td>4.8</td>
</tr>
<tr>
<td>−1</td>
<td>9.8</td>
<td>8.6</td>
<td>7.7</td>
<td>7.8</td>
<td>7.6</td>
<td>7.7</td>
<td>6.4</td>
<td>7.8</td>
</tr>
<tr>
<td>0</td>
<td>25.4</td>
<td>24.5</td>
<td>24.0</td>
<td>24.8</td>
<td>24.1</td>
<td>22.5</td>
<td>20.1</td>
<td>23.4</td>
</tr>
<tr>
<td>1</td>
<td>10.4</td>
<td>13.4</td>
<td>13.7</td>
<td>13.7</td>
<td>15.6</td>
<td>15.9</td>
<td>16.0</td>
<td>14.4</td>
</tr>
<tr>
<td>2</td>
<td>6.6</td>
<td>7.6</td>
<td>7.2</td>
<td>8.5</td>
<td>9.1</td>
<td>9.3</td>
<td>10.0</td>
<td>8.5</td>
</tr>
<tr>
<td>3</td>
<td>4.2</td>
<td>4.7</td>
<td>4.8</td>
<td>4.9</td>
<td>6.2</td>
<td>5.6</td>
<td>6.4</td>
<td>5.4</td>
</tr>
<tr>
<td>4</td>
<td>2.4</td>
<td>3.3</td>
<td>3.1</td>
<td>3.3</td>
<td>3.2</td>
<td>3.5</td>
<td>4.8</td>
<td>3.4</td>
</tr>
<tr>
<td>≥ 5</td>
<td>10.7</td>
<td>12.2</td>
<td>11.1</td>
<td>12.2</td>
<td>11.7</td>
<td>12.0</td>
<td>16.6</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Total 100.0% 100.0% 100.0% 100.0% 100.0% 100.0% 100.0% 100.0%

n 3,806 4,371 4,743 5,305 5,757 6,175 5,793 35,950

(Continued on next page)
### TABLE 1 (Continued)

**Panel C: Mean Three-Day Cumulative Abnormal Return (CAR) around Quarterly Earnings Announcement Date**

<table>
<thead>
<tr>
<th>SURPRISE</th>
<th>n</th>
<th>CAR</th>
<th>( t )-Statistic for ( H_0: \text{CAR} = 0 )</th>
<th>CAR / SURPRISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \leq -5 )</td>
<td>4,877</td>
<td>-2.81%</td>
<td>-25.02 ***</td>
<td>-0.27%</td>
</tr>
<tr>
<td>-4</td>
<td>846</td>
<td>-1.84%</td>
<td>-7.60 ***</td>
<td>-0.46</td>
</tr>
<tr>
<td>-3</td>
<td>1,162</td>
<td>-1.98%</td>
<td>-9.24 ***</td>
<td>-0.66</td>
</tr>
<tr>
<td>-2</td>
<td>1,670</td>
<td>-1.41%</td>
<td>-8.44 ***</td>
<td>-0.71</td>
</tr>
<tr>
<td>-1</td>
<td>2,740</td>
<td>-1.16%</td>
<td>-8.95 ***</td>
<td>-1.16</td>
</tr>
<tr>
<td>0</td>
<td>8,221</td>
<td>-0.01%</td>
<td>-0.12</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>4,983</td>
<td>1.04%</td>
<td>10.49 ***</td>
<td>1.04</td>
</tr>
<tr>
<td>2</td>
<td>2,930</td>
<td>2.00%</td>
<td>15.90 ***</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>1,857</td>
<td>2.17%</td>
<td>13.47 ***</td>
<td>0.72</td>
</tr>
<tr>
<td>4</td>
<td>1,177</td>
<td>2.81%</td>
<td>13.28 ***</td>
<td>0.70</td>
</tr>
<tr>
<td>( \geq 5 )</td>
<td>4,278</td>
<td>3.18%</td>
<td>28.81 ***</td>
<td>0.42</td>
</tr>
</tbody>
</table>

All firm-quarters 34,741 0.26% 6.51 *** 0.19%

*** denotes significant at the 0.01 level, based on two-tailed tests.

We calculate the cumulative abnormal return (CAR) as the with-dividend return over the three days surrounding the earnings announcement for quarter \( t \), less the return over the same period on a size-matched portfolio. To calculate the size-matched portfolio’s return, we allocate all firm-quarters to decile portfolios based on market value of common equity at the beginning of quarter \( t \), and then we calculate a value-weighted return for each portfolio for the three-day period surrounding each earnings announcement.

The sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data for our primary tests over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67). Panel C also excludes 1,209 firm-quarters with incomplete data to calculate abnormal returns. SURPRISE is the I/B/E/S actual EPS for quarter \( t \) less the consensus forecast for quarter \( t \), both rounded to the nearest penny. The consensus forecast is the mean of analysts’ most recent EPS forecasts for quarter \( t \) available on I/B/E/S prior to the earnings announcement for quarter \( t \). In Panels A and C, \( n \) denotes the number of firm-quarters in each category of SURPRISE; in Panel B, \( n \) denotes the number of firm-quarters per fiscal year.

Panel B of Table 1 shows that the frequency of firms beating earnings expectations increased over the sample period, consistent with findings reported in Brown (2001) and Matsumoto (2002). A Pearson \( \chi^2 \) test (not tabulated) rejects the null of no association between SURPRISE and fiscal year (\( \chi^2_{(60 df)} = 583.73, p < 0.01 \)).

Panel C of Table 1, which presents mean three-day cumulative abnormal returns (CAR) around the earnings announcement date across levels of SURPRISE, confirms the well-known positive association between CARs and earnings surprises.\(^4\) The mean CAR for

\(^4\) As in Skinner and Sloan (2001), our CARs are based on size-matched portfolios. Specifically, we calculate each firm-quarter’s CAR as the with-dividend return over the three days surrounding the earnings announcement, less the return on a size-matched portfolio over the same period. To calculate the size-matched portfolio’s return, we allocate all firm-quarters to decile portfolios based on market values of common equity at the beginning of the quarter. We then calculate a value-weighted return on each portfolio around each earnings announcement date. We are unable to obtain returns for 1,209 firm-quarters (3.4 percent of our sample).
firms meeting expectations is −0.01 percent, statistically insignificant at conventional levels. The last column of the panel shows that the average proportionate loss in equity value is more severe for firms missing expectations by 1¢ than for firms missing by a larger amount (t = −5.39, p < 0.01, not tabulated). For example, an EPS surprise of −1¢ is associated with a mean CAR of −1.16 percent, whereas an EPS surprise of −4¢ (four times larger) is associated with a mean CAR of −1.84 percent, about −0.46 percent per penny of surprise.

Table 2 reports descriptive statistics for selected firm characteristics. On average, our sample firms have a market capitalization of $2.3 billion, total assets of $1.8 billion, and quarterly sales of $471 million. About 44.1 percent of the firms are traded on NASDAQ, 32.5 percent of their assets are fixed (i.e., consisting of property, plant, and equipment, net of accumulated depreciation), and 61.7 percent of their total assets are financed through debt. Although the average net income is $24.5 million per quarter, 18.6 percent of the firm-quarters report losses. The average quarterly operating cash flow is $102 million, about four times larger than average net income.

The last column of Table 2 reports Spearman rank correlations between the selected firm characteristics and SURPRISE. Although significant at conventional levels, most correlations are less than 0.20 in absolute terms. The correlations suggest that firms reporting higher (i.e., larger positive or smaller negative) levels of SURPRISE are larger in terms of market capitalization, total assets, sales, net income, and operating cash flows. These firms also are less levered, and less likely both to report losses and to be traded on NASDAQ.

**Measuring Overstatement in Net Asset Values**

We use the beginning balance of net operating assets relative to sales (NOA) as a proxy for bias in the implementation of GAAP measurement and recognition guidelines. We define net operating assets as shareholders’ equity less cash and marketable securities, plus total debt. Therefore, NOA consists mainly of accrual-based measures of net assets used in operations. This proxy is consistent with the assumption that overstated net assets are less efficient at generating a given level of sales, all else equal. However, reported sales may also reflect managers’ biased implementation of GAAP. Unlike net asset amounts, sales reflect reporting bias exerted only during the current period. If sales also are overstated, then using NOA will work against finding support for $H_a$.

To provide evidence that NOA captures previous optimism in financial reporting, we test whether firms with larger NOA also reported larger cumulative levels of income-increasing accruals in the past. To this end, we first estimate abnormal accruals for firm i in quarter t using the residual from the following regression, estimated by two-digit SIC code and fiscal year using 1988–1999 data (see Jones 1991; Dechow et al. 1995; Han and Wang 1998):

\[
\frac{\text{TOT\_ACC}_{it}/\text{TA}_{it-1} - \text{RECEivable}}{\text{TA}_{it-1}} = \phi_1(1/\text{TA}_{it-1}) + \phi_2((\Delta\text{REV}_{it} - \Delta\text{REC}_{it})/\text{TA}_{it-1}) + \phi_3(\Delta\text{PPE}_{it}/\text{TA}_{it-1}) + \phi_4(1/\text{TA}_{it-1}) + \phi_5(\Delta\text{Q1}_{it} + \Delta\text{Q2}_{it} + \Delta\text{Q3}_{it} + \Delta\text{Q4}_{it}) + \varepsilon_{it},
\]

where \( \text{TOT\_ACC} \) is total accruals (i.e., earnings before extraordinary items and discontinued operations less operating cash flows); \( \text{TA} \) is total assets; \( \Delta\text{REV} \) is the quarterly change in revenues; \( \Delta\text{REC} \) is the quarterly change in accounts receivable; \( \text{PPE} \) is gross property, plant, and equipment; and \( \text{Q1}, \text{Q2}, \text{Q3}, \text{and Q4} \) are fiscal-quarter indicators. The \( (\Delta\text{REV} - \Delta\text{REC}) \) term controls for normal working capital accruals related to sales, the PPE term...
**TABLE 2**

Descriptive Statistics for Selected Firm Characteristics and Rank Correlations with Earnings Surprise

<table>
<thead>
<tr>
<th>Firm Characteristic</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>First Quartile</th>
<th>Median</th>
<th>Third Quartile</th>
<th>Spearman Rank Correlation with SURPRISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market value of common equity ($)</td>
<td>2,311.9</td>
<td>6,267.0</td>
<td>161.7</td>
<td>459.0</td>
<td>1,453.4</td>
<td>0.11 ***</td>
</tr>
<tr>
<td>Total assets ($)</td>
<td>1,811.8</td>
<td>4,397.9</td>
<td>129.1</td>
<td>371.1</td>
<td>1,251.2</td>
<td>0.06 ***</td>
</tr>
<tr>
<td>Sales ($)</td>
<td>470.9</td>
<td>1,028.1</td>
<td>37.5</td>
<td>111.9</td>
<td>356.6</td>
<td>0.08 ***</td>
</tr>
<tr>
<td>Traded on NASDAQ (%)</td>
<td>44.1</td>
<td>49.7</td>
<td>0.0</td>
<td>0.0</td>
<td>100.0</td>
<td>−0.03 ***</td>
</tr>
<tr>
<td>Ratio of fixed assets to total assets (%)</td>
<td>32.5</td>
<td>22.4</td>
<td>14.9</td>
<td>26.5</td>
<td>45.8</td>
<td>−0.01</td>
</tr>
<tr>
<td>Ratio of total debt to total assets (%)</td>
<td>61.7</td>
<td>111.9</td>
<td>5.2</td>
<td>38.2</td>
<td>85.9</td>
<td>−0.02 ***</td>
</tr>
<tr>
<td>Net income ($)</td>
<td>24.5</td>
<td>78.9</td>
<td>0.8</td>
<td>4.5</td>
<td>16.6</td>
<td>0.21 ***</td>
</tr>
<tr>
<td>Reporting losses (%)</td>
<td>18.6</td>
<td>38.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>−0.19 ***</td>
</tr>
<tr>
<td>Operating cash flows ($)</td>
<td>102.0</td>
<td>322.5</td>
<td>0.6</td>
<td>12.7</td>
<td>59.0</td>
<td>0.11 ***</td>
</tr>
</tbody>
</table>

*** denotes significant at the 0.01 level, based on two-tailed tests.

Tabulated amounts are based on data for quarter t. Dollar ($) amounts are in millions. The sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data for our primary tests over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67). SURPRISE is the I/B/E/S actual EPS for quarter t less the consensus forecast for quarter t, both rounded to the nearest penny. The consensus forecast is the mean of analysts’ most recent EPS forecasts for quarter t available on I/B/E/S prior to the earnings announcement for quarter t. We combine SURPRISE ≤ −5¢ into one category and SURPRISE ≥ 5¢ into another. Fixed assets consist of property, plant, and equipment, net of accumulated depreciation.
controls for normal depreciation and related deferred tax accruals, the TA deflator controls for scale, and the fiscal-quarter indicators control for seasonality.

Equation (1) scales abnormal accruals by lagged TA, so we unscale them by multiplying the regression residuals by their corresponding lagged TA before accumulating them backward in time. To avoid inducing a spurious correlation between prior cumulative (unscaled) abnormal accruals and NOA, we rescale the cumulative abnormal accruals by sales for quarter \( t - 1 \), the same deflator in NOA.

Table 3 reports mean levels of (rescaled) abnormal accruals accumulated over the prior 4, 8, 12, 16, and 20 quarters, across quintiles of adjusted NOA. Consistent with the estimation of Equation (1), we adjust NOA only in this table by subtracting the mean NOA in the same two-digit SIC code and fiscal year. The table shows that abnormal accruals accumulated over up to 20 previous quarters are larger (at the 0.10 significance level or better) for firms in the upper quintile of adjusted NOA than for firms in the lower quintile. These results suggest that prior optimistic accounting choices are associated with larger levels of net operating assets relative to sales.

Model

We consider two issues in developing a model to test \( H_a \). First, recall that we define SURPRISE as actual EPS less the consensus EPS forecast. Because we measure SURPRISE in pennies, treating it as an ordinal variable, we use an estimation model specifically designed for ordinal dependent variables. Second, we suspect that the effects of the independent variables vary across various earnings surprise benchmarks; for example, managers may have less accounting discretion or weaker incentives to beat expectations by 5¢ or more than to beat expectations by just 1¢. Our model thus allows the parameters of the independent variables to vary across predetermined earnings surprise benchmarks. We incorporate both of these design choices using the following generalized ordered logit model, derived in the Appendix:

\[
\Pr(SURPRISE_{it} \geq k)/\Pr(SURPRISE_{it} < k) = \exp(\beta_{0,k} + \beta_{1,k}NOA_{it} + \beta_{k,\text{CONTROLS}}_{it})
\]

where the left-hand-side expression is the odds of reporting an earnings surprise of at least \( k \)¢, a predetermined benchmark; SURPRISE is the signed EPS surprise; NOA is our proxy for overstated net assets already on the balance sheet; \( \text{CONTROLS} \) is a vector of control variables; \( \beta \)s are parameters allowed to vary with \( k \); and \( i \) and \( t \) denote firm and quarter. For \( m \) categories in SURPRISE, Equation (2) yields \( m - 1 \) uniquely identified equations that can be estimated jointly through maximum likelihood techniques.\(^5\) Thus, because we coded SURPRISE using 11 categories (i.e., \(-5, -4, -3, , 3, 4, 5\) ), our empirical implementation of Equation (2) will yield a set of parameter estimates for each of ten uniquely identified equations.

\( H_a \) predicts a negative association between SURPRISE and NOA. Therefore, we expect the coefficients on NOA to be negative in all ten equations. For example, consider \( k = 0 \), a zero earnings surprise. For \( k = 0 \), a negative coefficient \( \beta_{1,0} \) on NOA implies that higher values of NOA are associated with lower odds of a zero or positive earnings surprise. Equation (2) also allows us to estimate how changes in the independent variables affect the

\(^5\) For further details on generalized ordered logit models and their estimation, see Clogg and Shihadeh (1994, 146–147) and Fu (1998).
### TABLE 3
Average Prior Cumulative Abnormal Accruals across Quintiles of Net Operating Assets (Scaled by Sales)

<table>
<thead>
<tr>
<th>Accumulation Period (Quarters)</th>
<th>n</th>
<th>Quintiles of NOA</th>
<th>Difference between Upper and Lower Quantiles</th>
<th>Difference t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>[t − 1, t − 4]</td>
<td>26,146</td>
<td>0.32, −0.07, −0.12, −0.14, −0.06</td>
<td>0.38</td>
<td>11.65 ***</td>
</tr>
<tr>
<td>[t − 1, t − 8]</td>
<td>21,104</td>
<td>0.19, −0.22, −0.27, −0.28, −0.22</td>
<td>0.41</td>
<td>8.29 ***</td>
</tr>
<tr>
<td>[t − 1, t − 12]</td>
<td>17,478</td>
<td>0.08, −0.38, −0.41, −0.40, −0.34</td>
<td>0.42</td>
<td>6.44 ***</td>
</tr>
<tr>
<td>[t − 1, t − 16]</td>
<td>14,969</td>
<td>−0.17, −0.50, −0.52, −0.50, −0.46</td>
<td>0.29</td>
<td>3.81 ***</td>
</tr>
<tr>
<td>[t − 1, t − 20]</td>
<td>11,555</td>
<td>−0.43, −0.63, −0.59, −0.57, −0.58</td>
<td>0.15</td>
<td>1.63 *</td>
</tr>
</tbody>
</table>

*** and * denote significant at the 0.01 and 0.10 levels, respectively, based on one-tailed tests. The t-statistics for differences in means between upper and lower quintiles are based on unequal variances across quintiles.

The initial sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data for our primary tests over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67). Of these firm-quarters, only n have data to estimate cumulative abnormal accruals over a particular accumulation period. NOA is net operating assets (i.e., shareholders’ equity less cash and marketable securities, plus total debt) at the beginning of quarter t, scaled by sales for quarter t − 1. Consistent with the estimation of Equation (1) below, we adjust NOA only in this table by subtracting the mean NOA in the same two-digit SIC code and fiscal year. We estimate abnormal accruals for firm i in quarter t using the residual from the following regression, estimated by two-digit SIC code and fiscal year using 1988–1999 data (see Jones 1991; Dechow et al. 1995; Han and Wang 1998):

(Continued on next page)
TABLE 3 (Continued)

\[
\frac{TOT\_ACC}{TA} = \frac{1}{TA_{t-1}} + \frac{\Delta REV}{TA_{t-1}} + \frac{\Delta REC}{TA_{t-1}} + \frac{PPE}{TA_{t-1}} + Q1_t + Q2_t + Q3_t + Q4_t + \epsilon_t,
\]

(1)

where:

- \( TOT\_ACC \): total accruals (i.e., earnings before extraordinary items and discontinued operations less operating cash flows);
- \( TA \): total assets;
- \( \Delta REV \): quarterly change in revenues;
- \( \Delta REC \): quarterly change in accounts receivable;
- \( PPE \): gross property, plant, and equipment; and
- \( Q1, Q2, Q3, \text{ and } Q4 \): fiscal-quarter indicators.

The abnormal accruals from Equation (1) are implicitly scaled by lagged TA, so we unscale them by multiplying the regression residuals by the corresponding lagged TA before accumulating them backward in time. To avoid inducing a spurious correlation between prior cumulative abnormal accruals and NOA, we rescale the cumulative abnormal accruals by sales for quarter \( t - 1 \), the same deflator in NOA. The tabulated amounts are mean levels of (rescaled) abnormal accruals accumulated over the prior 4, 8, 12, 16, and 20 quarters, across quintiles of adjusted NOA.
odds of a given earnings surprise. For instance, an increase of \(\delta\) in NOA changes the odds of meeting or beating expectations by \(100[\exp(\delta \times \beta_{1,0}) - 1]\) percent. We derive the expression for the percentage change in odds in the Appendix.\(^6\)

The vector \textbf{CONTROLS} includes variables capturing other constraints on earnings management, managerial incentives to meet or slightly beat forecasts, and firm performance and size. We discuss these in turn.

One constraint on earnings management is the number of shares outstanding. Managers of firms with more shares outstanding may find it more difficult to manage earnings toward expectations, because a penny short in EPS translates into more dollars of actual earnings for a firm with more shares outstanding than for a firm with fewer shares outstanding. To capture this effect, we include the weighted average number of common shares outstanding during quarter \(t\) (SHARES), the denominator of basic EPS, and expect its coefficients to be negative.\(^7\)

Another constraint on earnings management is audit quality. Firms with Big 5 auditors have lower levels of abnormal accruals (Becker et al. 1998; Payne and Robb 2000). However, Libby and Kinney (2000) find that few Big 5 auditors expect a client to correct otherwise quantitatively immaterial income-increasing misstatements if such corrections would result in the client missing earnings forecasts. Therefore, we include an indicator variable coded 1 (0 otherwise) if the firm has a Big 5 auditor (BIG5) in quarter \(t\), but make no prediction about the sign of its coefficients.

Managers are more likely to report earnings that meet or beat expectations if they have strong incentives to do so—when their firms have a high price-to-book ratio (Skinner and Sloan 2001), high litigation risk (Soffer et al. 2000; Matsumoto 2002), a large analyst following (Johnson 1999), or a previous pattern of meeting or beating expectations.\(^8\) We measure the price-to-book ratio (PB) as the market value of common equity divided by the book value of shareholders’ equity, both at the end of quarter \(t\). We measure litigation risk (LTGN\_RISK) as an indicator variable coded 1 (0 otherwise) if the firm is in one of four industries identified in prior research (e.g., Francis et al. 1994; Ali and Kallapur 2001) as most susceptible to securities litigation—pharmaceuticals/biotechnology (SIC codes 2833–2836, 8731–8734), computers (3570–3577, 7370–7374), electronics (3600–3674), and retail (5200–5961). We measure analyst following (ANALYSTS) as the number of analysts in the I/B/E/S consensus EPS forecast for quarter \(t\). Last, we measure the previous earnings surprise pattern (PREV\_MB) as an indicator variable coded 1 (0 otherwise) if, based on I/B/E/S, the firm reported a nonnegative earnings surprise (i.e., \(\text{SURPRISE} \geq 0\)) in quarter \(t - 1\). We expect the coefficients on these variables to be positive.

Managers are more likely to report earnings that miss expectations if the expectations are imprecise (Payne and Robb 2000). We measure this imprecision by the coefficient of

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\(^6\) The advantage of interpreting each variable’s effect in terms of a percentage change in odds rather than a discrete or marginal change in probabilities is that the change in odds for that variable does not depend on the levels of other variables in the model.

\(^7\) Alternatively, managers may meet or beat expectations by reducing the denominator of EPS through share repurchases. We do not distinguish between these two reasons since they both predict negative coefficients on SHARES.

\(^8\) Including the firm’s price-to-earnings ratio instead of its price-to-book ratio yields similar results.
variation in analysts’ most recent forecasts for quarter t (CV_FORECAST), and expect the coefficients on this variable to be negative.9

In addition to managing accruals, managers may report earnings that meet or beat expectations by “talking down” analysts’ forecasts (Matsumoto 2002), that is, by guiding analysts’ expectations down prior to announcing earnings. If this strategy is successful, then we expect firms with downward forecast revisions to be more likely to at least meet expectations. However, if analysts underreact to the “bad” news (e.g., Abarbanell and Bernard 1992; Easterwood and Nutt 1999), then firms with downward forecast revisions may still miss expectations. We measure downward forecast revisions (DOWN_REV) as an indicator variable coded 1 (0 otherwise) if at least one analyst revised his or her forecast down after the earnings announcement for quarter $t - 1$ but before the earnings announcement for quarter t (Bartov et al. 2002). We make no prediction for the sign of the coefficients on this variable.

Previous research (e.g., Abarbanell and Lehavy 2001a; Skinner and Sloan 2001) suggests that the level of earnings surprise is increasing in firm performance. We control for performance by including sales growth (SALES_GRW), defined as sales for quarter t divided by sales for quarter $t - 4$, less 1; return on equity (ROE), defined as net income for quarter t divided by shareholders’ equity at the end of quarter t; and the change in the return on equity ($\Delta$ROE), defined as ROE in quarter t less ROE in quarter $t - 4$. We expect the coefficients on these variables to be positive.

Finally, we control for firm size because analysts tend to issue less optimistic forecasts for larger firms (Das et al. 1998). We measure firm size (MKT_CAP) as the natural logarithm of the market value of common equity at the end of quarter t, and expect the coefficients on this variable to be positive.

IV. EMPIRICAL ANALYSES

Descriptive Statistics and Correlations

The first five columns of Table 4 report descriptive statistics for the independent variables. The mean (median) level of NOA is 2.66 (1.97), suggesting that net operating assets are about twice as large or larger as sales for most firm-quarters. Sample firms have on average 61 million shares outstanding, and 97 percent of them have a Big 5 auditor. The mean price-to-book ratio is 3.42; about 33 percent of the firms are in highly litigious industries; the average number of analysts following a firm is 6.39; and firms met or beat analysts’ expectations in the previous quarter 68 percent of the time. The mean (median) coefficient of variation in analysts’ forecasts is 0.20 (0.06), indicating a high degree of consensus among analysts in most firm-quarters. In 23 percent of the cases, at least one analyst revised downward his or her forecast for current-quarter EPS. Average sales growth is 21 percent; however, the mean ROE is 8 percent, about 2 percent lower than ROE for the same quarter in the previous year. The mean MKT_CAP is 6.28, a market value of common equity of about $534 million.

The last column of Table 4 reports Spearman rank correlations between SURPRISE and each independent variable. As predicted, the correlation between SURPRISE and NOA is negative ($r = -0.11$, one-tailed $p < 0.01$). The correlations between SURPRISE and the

[9] Higher values of CV_FORECAST also are consistent with less accurate analysts’ forecasts. Analysts tend to issue less accurate and more optimistically biased forecasts for firms with more volatile earnings (Das et al. 1998; Lim 2001). As a sensitivity check, we include a control variable for earnings volatility, measured as the coefficient of variation in I/B/E/S actual EPS over the previous eight quarters. The coefficients on this variable are significantly negative at the 0.10 level or better; the coefficients on the other variables remain qualitatively unchanged.
### TABLE 4
Descriptive Statistics for Independent Variables and Rank Correlations with Earnings Surprise

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>First Quartile</th>
<th>Median</th>
<th>Third Quartile</th>
<th>Predicted Sign</th>
<th>Spearman Rank Correlation with SURPRISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOA</td>
<td>2.66</td>
<td>2.63</td>
<td>1.26</td>
<td>1.97</td>
<td>2.99</td>
<td>−</td>
<td>−0.11 ***</td>
</tr>
<tr>
<td>SHARES</td>
<td>60.69</td>
<td>116.70</td>
<td>12.03</td>
<td>23.50</td>
<td>52.40</td>
<td>−</td>
<td>−0.04 ***</td>
</tr>
<tr>
<td>BIG5</td>
<td>0.97</td>
<td>0.18</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>?</td>
<td>0.01 *</td>
</tr>
<tr>
<td>PB</td>
<td>3.42</td>
<td>3.57</td>
<td>1.60</td>
<td>2.49</td>
<td>3.99</td>
<td>+</td>
<td>0.12 ***</td>
</tr>
<tr>
<td>LTGN_RISK</td>
<td>0.33</td>
<td>0.47</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>−</td>
<td>−0.01 ***</td>
</tr>
<tr>
<td>ANALYSTS</td>
<td>6.39</td>
<td>4.71</td>
<td>3.00</td>
<td>5.00</td>
<td>8.00</td>
<td>+</td>
<td>0.06 ***</td>
</tr>
<tr>
<td>PREV_MB</td>
<td>0.68</td>
<td>0.47</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>+</td>
<td>0.25 ***</td>
</tr>
<tr>
<td>CV_FORECAST</td>
<td>0.20</td>
<td>0.43</td>
<td>0.03</td>
<td>0.06</td>
<td>0.17</td>
<td>?</td>
<td>−0.13 ***</td>
</tr>
<tr>
<td>DOWN_REV</td>
<td>0.23</td>
<td>0.42</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>?</td>
<td>−0.17 ***</td>
</tr>
<tr>
<td>SALES_GRW</td>
<td>0.21</td>
<td>0.42</td>
<td>0.02</td>
<td>0.12</td>
<td>0.30</td>
<td>+</td>
<td>0.18 ***</td>
</tr>
<tr>
<td>ROE</td>
<td>0.08</td>
<td>0.27</td>
<td>0.04</td>
<td>0.12</td>
<td>0.19</td>
<td>+</td>
<td>0.13 ***</td>
</tr>
<tr>
<td>AROE</td>
<td>−0.02</td>
<td>0.30</td>
<td>−0.07</td>
<td>−0.01</td>
<td>0.04</td>
<td>+</td>
<td>0.17 ***</td>
</tr>
<tr>
<td>MKT_CAP</td>
<td>6.28</td>
<td>1.60</td>
<td>5.09</td>
<td>6.13</td>
<td>7.28</td>
<td>+</td>
<td>0.11 ***</td>
</tr>
</tbody>
</table>

(Continued on next page)
TABLE 4 (Continued)

*** and * denote significant at the 0.01 and 0.10 levels, respectively, based on one-tailed tests for signed predictions and two-tailed tests otherwise.
The sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67). The variables are defined as follows:

**SURPRISE** = I/B/E/S actual EPS for quarter t less the consensus forecast for quarter t, both rounded to the nearest penny. The consensus forecast is the mean of analysts’ most recent EPS forecasts for quarter t available on I/B/E/S prior to the earnings announcement for quarter t. We combine SURPRISE ≤ –5¢ into one category and SURPRISE ≥ 5¢ into another;

**NOA** = net operating assets (i.e., shareholders’ equity less cash and marketable securities, plus total debt) at the beginning of quarter t, scaled by sales for quarter t – 1;

**SHARES** = weighted average number of common shares outstanding during quarter t;

**BIG5** = indicator variable coded 1 if the firm has a Big 5 auditor in quarter t, 0 otherwise;

**PB** = market value of common shares divided by shareholders’ equity, both at the end of quarter t;

**LTGN_RISK** = indicator variable coded 1 if the firm is in one of the following industries: pharmaceuticals/biotechnology (SIC codes 2833–2836, 8731–8734), computers (3570–3577, 7370–7374), electronics (3600–3674), or retail (5200–5961), 0 otherwise;

**ANALYSTS** = number of analysts in the I/B/E/S consensus EPS forecast for quarter t;

**PREV_MB** = indicator variable coded 1 if, based on I/B/E/S, the firm reported a nonnegative earnings surprise (i.e., SURPRISE ≥ 0) in quarter t – 1, 0 otherwise;

**CV_FORECAST** = coefficient of variation in analysts’ most recent forecasts for quarter t;

**DOWN_REV** = indicator variable coded 1 if at least one of the firm’s analysts revised his or her forecast down prior to the end of quarter t but after the earnings announcement date for quarter t but after the earnings announcement date for quarter t – 1, 0 otherwise;

**SALES_GRW** = sales for quarter t divided by sales for quarter t – 4, less 1;

**ROE** = net income for quarter t divided by shareholders’ equity at the end of quarter t;

**ΔROE** = ROE for quarter t less ROE for quarter t – 1; and

**MKT_CAP** = natural logarithm of market value of common shares at the end of quarter t.
remaining variables are significant at conventional levels. Untabulated analyses reveal that rank correlations between most independent variables also are significant at conventional levels.

**Regression Results**

Table 5 reports estimations results for Equation (2). Recall that the model allows the effects of the independent variables to vary across levels of predetermined earnings surprise benchmarks, k. Because SURPRISE consists of 11 categories coded 4 through 5, we obtain ten sets of uniquely identified parameter estimates, one for each k ranging from 4 through 5. We estimate the model using the generalized ordered logit regression technique described in Fu (1998). The test statistics for all coefficients are heteroscedasticity-consistent and, because our sample includes multiple observations for most firms, they are adjusted for residual correlation among observations for the same firm.

Panel A of Table 5 presents complete estimation results when the dependent variable is the odds of at least meeting earnings expectations, that is, when k = 0. For each independent variable, the last column of Panel A presents results of Wald tests proposed by Brant (1990) for the null hypothesis that the coefficients on the independent variable are constant across levels of k. These tests reject the null at the 0.01 level for all variables except BIG5. Therefore, we also report summary results for all values of k. Specifically, Panel B shows the percentage changes in odds for each variable across k. For a continuous variable, the change in odds is based on a standard-deviation increase in the variable; for indicators, it is based on a change from 0 to 1 (see the Appendix).

Panel A of Table 5 shows that the coefficient on NOA is negative (p < 0.01). A standard-deviation increase in the beginning balance of net operating assets relative to sales decreases by 7.7 percent the odds of at least meeting the consensus forecast, all else equal. That is, consistent with H_a, the likelihood of meeting or beating analysts’ earnings forecasts by optimistically biasing earnings decreases with the extent to which net assets are already overstated on the balance sheet.

With respect to the control variables, the coefficient on SHARES is negative (p < 0.01), suggesting that the odds of at least meeting expectations decrease with shares outstanding. The insignificant coefficient on BIG5 suggests that our proxy for audit quality is unrelated to the odds of at least meeting analysts’ expectations. The coefficients on PB, LTGN_RISK, ANALYSTS, and PREV_MB are positive and, except for LTGN_RISK, significant at the 0.10 level or better. These results suggest that the odds of at least meeting expectations are increasing in the firm’s price-to-book ratio, its record of meeting or beating forecasts in the previous quarter, and the size of its analyst following. The coefficients on CV_FORECAST and DOWN_REV are negative (p < 0.01), suggesting that the odds of at least meeting expectations decrease with the dispersion in analysts’ forecasts and with the presence of downward forecast revisions. Finally, the coefficients on SALES_GRW, ROE, ΔROE, and MKT_CAP are positive (p < 0.01), suggesting that the odds of at least meeting expectations increase with the firm’s performance and size.

Panel B of Table 5 shows that the percentage changes in odds for NOA are negative (p < 0.01) across all k. A standard-deviation increase in the beginning balance of net

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10 The odds of SURPRISE ≥ −5ε can be recovered from the odds of SURPRISE ≥ −4ε through tedious algebra. Interested readers may contact us.

11 We report percentage changes in odds because they capture both the sign and relative effect of each independent variable. Therefore, unlike coefficients, percentage changes in odds are comparable across independent variables.
### TABLE 5
Regression Results for Generalized Ordered Logit Model

**Model:**

\[
Pr(SURPRISE_i = k)/Pr(SURPRISE_i < k) = \exp(\beta_{0,k} + \beta_{1,k}NOA_i + \beta_{2,k}SHARES_i + \beta_{3,k}BIG5_i + \beta_{4,k}PB_i + \beta_{5,k}LTGN\_RISK_i + \\
\quad + \beta_{6,k}ANALYSTS_i + \beta_{7,k}PREV\_MB_i + \beta_{8,k}CV\_FORECAST_i + \beta_{9,k}DOWN\_REV_i + \\
\quad + \beta_{10,k}SALES\_GRW_i + \beta_{11,k}ROE_i + \beta_{12,k}\Delta ROE_i + \\
\quad + \beta_{13,k}MKT\_CAP_i + \nu_i)
\]

**Panel A: Regression Results for** \(k = 0\), i.e., Odds of Meeting or Beating vs. Missing Analysts’ Forecasts \(Pr(SURPRISE = 0)/Pr(SURPRISE < 0)\)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>z-statistic</th>
<th>Change in Odds (%)(a)</th>
<th>Brant (\chi^2_{(v df)})(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>-0.805</td>
<td>-7.25***</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NOA</td>
<td>-</td>
<td>-0.031</td>
<td>-4.98***</td>
<td>-7.7</td>
<td>30.73***</td>
</tr>
<tr>
<td>SHARES</td>
<td>-</td>
<td>-0.001</td>
<td>-5.60***</td>
<td>-11.3</td>
<td>47.37***</td>
</tr>
<tr>
<td>BIG5</td>
<td>?</td>
<td>0.013</td>
<td>0.15</td>
<td>1.3</td>
<td>12.68</td>
</tr>
<tr>
<td>PB</td>
<td>+</td>
<td>0.026</td>
<td>4.86***</td>
<td>9.7</td>
<td>289.65***</td>
</tr>
<tr>
<td>LTGN_RISK</td>
<td>+</td>
<td>0.030</td>
<td>0.94</td>
<td>3.0</td>
<td>198.16***</td>
</tr>
<tr>
<td>ANALYSTS</td>
<td>+</td>
<td>0.008</td>
<td>1.62*</td>
<td>3.6</td>
<td>95.44***</td>
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<td>33.18***</td>
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<td>-9.9</td>
<td>1,580.36***</td>
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<td>-0.594</td>
<td>-19.82***</td>
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<td>229.10***</td>
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<tr>
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<tr>
<td>(\Delta ROE)</td>
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(Continued on next page)
TABLE 5 (Continued)

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<th>z-statistic</th>
<th>Change in Odds (%)</th>
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<td>10.17***</td>
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<td>42.05***</td>
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Likelihood ratio $\chi^2_{(130 df)} = 8,105.61^{***}$

Maximum likelihood $R^2 = 0.20$

Panel B: Percentage Change in Odds of Reporting SURPRISE $\geq k$, Given a Change in the Independent Variable$^e$

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<td>–7.7***</td>
<td>–7.9***</td>
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<td>–7.0***</td>
<td>–5.7***</td>
<td>–6.6***</td>
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<td>–1.1</td>
<td>–6.2**</td>
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<td>–13.1***</td>
<td>–14.2***</td>
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<td>–20.3***</td>
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<td>BIG5</td>
<td>?</td>
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<td>14.5*</td>
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<td>3.8</td>
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<td>20.4*</td>
<td>27.6*</td>
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<td>+</td>
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<td>9.1***</td>
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<td>8.1***</td>
<td>3.6*</td>
<td>4.0</td>
<td>6.0*</td>
<td>6.1*</td>
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<td>–9.9***</td>
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<td>5.1*</td>
<td>8.0*</td>
<td>10.0*</td>
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<td>–42.0***</td>
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<td>–47.3***</td>
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<td>28.9***</td>
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<td>16.4***</td>
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<td>ROE</td>
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<td>6.4***</td>
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<td>14.0*</td>
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<td>3.0*</td>
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<td>12.3***</td>
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<td>22.0***</td>
<td>23.7***</td>
<td>26.5***</td>
<td>28.4***</td>
<td>34.4***</td>
</tr>
</tbody>
</table>

(Continued on next page)
TABLE 5 (Continued)

***, **, and * denote significant at the 0.01, 0.05, and 0.10 levels, respectively, based on one-tailed test for signed predictions and two-tailed tests otherwise. The z-statistics are heteroscedasticity-consistent and adjusted for residual correlation among observations pertaining to the same firm.

• denotes significant at the 0.10 level or better, based on two-tailed tests, but opposite to our predicted sign.

a The percentage change in odds is the effect of a change in the independent variable on the odds of reporting SURPRISE ≥ k instead of SURPRISE < k, where k is a predetermined earnings surprise benchmark. For continuous variables, the percentage change in odds is 100[exp(\(s_j\beta_{jk}\)) − 1], where \(s_j\) is the sample standard deviation of variable j (reported in Table 4) and \(\beta_{jk}\) is the estimated regression coefficient for variable j with respect to earnings surprise benchmark k. For indicator variables, the percentage change in odds is 100[exp(\(\beta_{jk}\)) − 1].

b The Brant \(\chi^2\) statistic tests the null hypothesis that odds for the independent variable are proportional, i.e., that the coefficients on the independent variable are constant across k (Brant 1990).

The sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data for our primary tests over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67).

The variables are defined in Table 4.
operating assets relative to sales decreases the odds of reporting a larger positive or smaller negative earnings surprise by 5.7 to 7.9 percent. These results further support \( H_a \).

Panel B of Table 5 also shows that some of the independent variables have a consistent pattern across all \( k \). For example, the percentage changes in odds for BIG5 are not significant at conventional levels for any value of \( k \), suggesting that our proxy for audit quality is unrelated to earnings surprises. The percentage changes in odds for PREV_MB, SALES_GRW, and MKT_CAP are positive (\( p < 0.01 \)) across all values of \( k \), suggesting that the odds of reporting larger positive or smaller negative earnings surprises are increasing in the likelihood of a nonnegative earnings surprise in the previous quarter, sales growth, and firm size. The percentage changes in odds for DOWN_REV are negative (\( p < 0.01 \)) across all \( k \), suggesting that the odds of reporting larger positive or smaller negative earnings surprises decrease when analysts make downward forecast revisions.

Other independent variables have a consistent pattern across only part of the range of values for \( k \). For example, the percentage changes in odds for \( \Delta \text{ROE} \) are positive (\( p < 0.10 \)) when \( k \geq -1 \), suggesting that the odds of reporting larger positive surprises are increasing in \( \Delta \text{ROE} \), but the odds of reporting earnings surprises lower than \( -1 \varepsilon \) are unrelated to \( \Delta \text{ROE} \). The percentage changes in odds for SHARES are negative (\( p < 0.05 \)) when \( k \geq -1 \), suggesting that more shares outstanding decrease the odds of reporting larger positive surprises, but have no effect on the odds of missing expectations by more than \( 1 \varepsilon \). The percentage changes in odds for LTGN_RISK are negative (\( p < 0.10 \)) when \( k \geq 1 \), suggesting that litigation risk decreases the odds of larger positive surprises, but has no effect on the odds of missing expectations.

Finally, the pattern of some variables switches signs around positive earnings surprises of \( 1 \varepsilon \) or \( 2 \varepsilon \). For example, the percentage changes in odds for PB, ANALYSTS, and ROE are positive (\( p < 0.10 \)) when \( k < 1 \) but negative (\( p < 0.10 \)) when \( k > 1 \). These results suggest that firms with high price-to-book ratios, large analyst following, and high returns on equity are more likely to miss expectations by smaller amounts than by larger amounts, and they are less likely to beat expectations by larger amounts than by smaller amounts. In contrast, the percentage changes in odds for CV_FORECAST are negative (\( p < 0.01 \)) when \( k < 2 \) but positive (\( p < 0.10 \)) when \( k > 2 \), suggesting that firms with imprecise forecasts are more likely to miss expectations by larger than smaller amounts, and are more likely to beat expectations by more than \( 2 \varepsilon \).

In sum, the results reported in Table 5 are consistent with \( H_a \), showing a negative association between earnings surprises and our proxy for overstated net asset values. We interpret these results as evidence that the likelihood of reporting larger positive or smaller negative earnings surprises decreases with the extent to which net assets are already overstated on the balance sheet. That is, prior optimism in financial reporting accumulates on the balance sheet, and reduces managers’ ability to optimistically bias earnings in future periods, if managers want to stay within GAAP and its implementation guidance. The results also indicate that the relationship between earnings surprises and the independent variables is complex. The presence of a Big 5 auditor is consistently unrelated to earnings surprises. However, none of the remaining variables measuring constraints on earnings management, managerial incentives to meet or beat analysts’ forecasts, firm performance, and size has a constant effect across earnings surprise levels.

**Sensitivity Analyses**

**Alternative Econometric Techniques**

We use a generalized ordered logit regression of SURPRISE on NOA and CONTROLS because SURPRISE is an ordinal dependent variable and because we allow the coefficients on all independent variables to vary across levels of SURPRISE. Using ordinary least
squares (OLS) or “regular” ordered logit regressions constrains the coefficients on each variable to be constant across levels of SURPRISE, yielding only one set of coefficient estimates. Moreover, OLS regression treats SURPRISE as a continuous dependent variable.

To assess the robustness of our results under alternative econometric specifications that constrain the coefficients on each variable to be constant across levels of SURPRISE, we regress SURPRISE on NOA and \textbf{CONTROLS} using OLS and “regular” ordered logit regressions. The coefficient on NOA is \(-0.053 (t = -8.54, p < 0.01)\) based on OLS regression; it is \(-0.028 (z = -4.31, p < 0.01)\) based on “regular” ordered logit regression. Thus, the results bearing on our hypothesis are robust to these alternative specifications. However, OLS and “regular” ordered logit regressions lead to substantial changes in the coefficients on some of the other independent variables.

\textbf{Composition of Net Operating Assets}

To capture the possibility that different components of net operating assets are subject to varying degrees of managerial manipulation (Beatty et al. 1995; Hunt et al. 1996; Teoh et al. 1998; Gaver and Paterson 1999), we split NOA into three components:

1) Working capital (WC), defined as current assets less cash, marketable securities, and current liabilities, plus short-term debt and the current portion of long-term debt, all at the beginning of quarter \(t\) and scaled by sales for quarter \(t - 1\).

2) Net fixed assets (\textit{FIXED\_ASSETS}), defined as property, plant, and equipment, net of accumulated depreciation, at the beginning of quarter \(t\) and scaled by sales for quarter \(t - 1\).

3) Other long-term assets (\textit{OTHER\_LTASSETS}), defined as NOA less WC and \textit{FIXED\_ASSETS}.

We separate working capital from long-term net operating assets because prior research suggests that current accruals are likely easier to manage than long-term accruals (Hunt et al. 1996; Beneish 1998; Teoh et al. 1998). We separate fixed assets from other long-term assets because managing earnings through depreciation is transparent (e.g., firms are required to disclose the effects of changes in depreciation policies) or costly if managers must time capital investments to make depreciation-related earnings management less transparent (Beneish 1998).

Table 6 reports selected regression results using WC, \textit{FIXED\_ASSETS}, and \textit{OTHER\_LTASSETS} in place of NOA in Equation (2). Consistent with \(H_a\) and the results reported in Table 5, the coefficients on the three components of net operating assets are negative and significant at the 0.05 level or better across the various surprise benchmarks \(k\). Brant (1990) \(\chi^2\) tests reject at the 0.01 level the null hypothesis that the coefficients on each variable are constant across \(k\). Finally, the coefficients on WC are about 9 to 28 (3 to 5) times larger in absolute terms than the coefficients on \textit{FIXED\_ASSETS} (\textit{OTHER\_LTASSETS}), suggesting that, relative to the level of long-term net assets, the level of working capital has a stronger effect on the odds of reporting a predetermined earnings surprise.

\textbf{Additional Robustness Tests}

The level of net operating assets relative to sales tends to vary across industries (Nissim and Penman 2001). To control for this effect, we reestimate Equation (2) including indicators for two-digit SIC codes. The coefficients on NOA (not tabulated) remain negative and significant at the 0.01 level. For reporting quarterly performance, GAAP requires managers to estimate annual operating expenses and allocate these costs across quarters (e.g., APB 1973; FASB 1974). This opportunity to misreport quarterly performance is exacerbated by the fact that financial
TABLE 6
Selected Regression Results for Generalized Ordered Logit Model Using Components of Net Operating Assets

Model:
\[ \Pr(\text{SURPRISE}_u = k)/\Pr(\text{SURPRISE}_u < k) = \exp(\gamma_{0,k} + \gamma_{1,k} \text{WC}_u + \gamma_{2,k} \text{FIXED\_ASSETS}_u + \gamma_{3,k} \text{OTHER\_LTASSETS}_u + \gamma_{4,k} \text{SHARES}_u \]
\[ + \gamma_{5,k} \text{BIG5}_u + \gamma_{6,k} \text{PB}_u + \gamma_{7,k} \text{LTGN\_RISK}_u + \gamma_{8,k} \text{ANALYSTS}_u + \gamma_{9,k} \text{PREV\_MB}_u \]
\[ + \gamma_{10,k} \text{CV\_FORECAST}_u + \gamma_{11,k} \text{DOWN\_REV}_u + \gamma_{12,k} \text{SALES\_GRW}_u + \gamma_{13,k} \text{ROE}_u \]
\[ + \gamma_{14,k} \Delta\text{ROE}_u + \gamma_{15,k} \text{MKT\_CAP}_u + \nu_i) \]

<table>
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<tr>
<th>( k )</th>
<th>Predicted Sign</th>
<th>( k )</th>
<th>Coefficient</th>
<th>( z )-statistic</th>
<th>Change in Odds (%)</th>
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Brant \( \chi^2(9 \ df) \): 92.81***

\( \text{Continued on next page} \)
*** and ** denote significant at the 0.01 and 0.05 levels, respectively, based on one-tailed test for signed predictions and two-tailed tests otherwise. The z-statistics are heteroscedasticity-consistent and adjusted for residual correlation among observations pertaining to the same firm.

The percentage change in odds is the effect of a change in the independent variable on the odds of reporting SURPRISE ≥ k instead of SURPRISE < k, where k is a predetermined earnings surprise benchmark. For continuous variables, the percentage change in odds is $100[\text{exp}(s \beta_{jk}) - 1]$, where $s_j$ is the sample standard deviation of variable $j$ (reported in Table 4) and $\beta_{jk}$ is the estimated regression coefficient for variable $j$ with respect to earnings surprise benchmark $k$. For indicator variables, the percentage change in odds is $100[\text{exp}(\beta_{jk}) - 1]$.

The Brant $\chi^2$ statistic tests the null hypothesis that odds for the independent variable are proportional, i.e., that the coefficients on the independent variable are constant across $k$ (Brant 1990).

The sample consists of 35,950 firm-quarters pertaining to 3,649 firms included in both the Compustat and I/B/E/S databases with complete data for our primary tests over 1993–1999, excluding utilities and financial services firms (two-digit SIC codes 49 and 60–67). The variables are defined as follows:

- **NOA** = net operating assets (i.e., shareholders’ equity less cash and marketable securities, plus total debt) at the beginning of quarter $t$, scaled by sales for quarter $t - 1$;
- **WC** = current assets less cash, marketable securities, and current liabilities, plus current debt, all at the beginning of quarter $t$, scaled by sales for quarter $t - 1$;
- **FIXED_ASSETS** = property, plant, and equipment, net of accumulated depreciation, at the beginning of quarter $t$, scaled by sales for quarter $t - 1$; and
- **OTHER_LTTASSETS** = NOA less WC less FIXED_ASSETS.

All other variables are defined in Table 4.
statements for the first three quarters are usually audited retrospectively during the annual external audit (Elliott and Shaw 1988; Ettredge et al. 2000). Consequently, security markets tend to react more strongly to negative earnings surprises in earlier quarters than in the fourth quarter (Mendenhall and Nichols 1988), suggesting that managers may have stronger incentives to meet or beat expectations earlier in the fiscal year. To capture this potential effect, we reestimate Equation (2) including fiscal-quarter indicators. The coefficients on NOA (not tabulated) remain negative and significant at the 0.01 level.

Because regulators and the media routinely mention the consensus analyst forecast as an earnings target, we calculate SURPRISE using the consensus forecast as a proxy for the market’s earnings expectations. However, market expectations may be based on the most recent forecast (Brown and Kim 1991; Brown 2001). We recalculate SURPRISE using the most recent I/B/E/S forecast prior to the earnings announcement and reestimate Equation (2). Results (not tabulated) are similar to those reported in Table 5.

Abarbanell and Lehavy (2001b) point out that database providers such as I/B/E/S tend to adjust both actual and expected earnings for nonrecurring items. Because SURPRISE is based on I/B/E/S data and some of our independent variables (such as NOA) are based on Compustat data, we repeat the tests reported in Table 5 using (1) only firms for which I/B/E/S actual EPS agrees with Compustat EPS, and (2) only firms without special items on Compustat. The resulting coefficients on NOA (not tabulated) remain negative and significant at the 0.01 level.

Finally, prior research suggests that earnings management behavior and bias in analysts’ forecasts differ between firms reporting losses and firms reporting profits (e.g., Degeorge et al. 1999; Easterwood and Nutt 1999; Brown 2001). We repeat the tests in Table 5 excluding firms reporting losses (1) in quarter t, (2) in quarter t − 1, and (3) in both quarters t and t − 1. For each set of tests, the coefficients on NOA (not tabulated) remain negative and significant at the 0.01 level.

V. CONCLUSION

Because the balance sheet accumulates the effects of previous accounting choices, the level of net operating assets partly reflects the extent of previous earnings management. We present evidence consistent with the hypothesis that managers’ ability to optimistically bias earnings decreases with the extent to which net asset values are already overstated on the balance sheet.

Using 1993–1999 quarterly data for a sample of 3,649 nonfinancial, nonregulated firms, we estimate a generalized ordered logit model relating the level of a firm’s earnings surprise to our proxy for the degree of overstatement in net asset values, other constraints on earnings management, managerial incentives to meet or beat analysts’ earnings forecasts, and firm performance and size. We measure the degree of overstatement in net asset values using the beginning balance of net operating assets relative to sales, a proxy that additional analysis shows is associated with prior optimistic bias in financial reporting.

Our empirical analysis shows that the likelihood of reporting larger positive or smaller negative quarterly earnings surprises decreases with the beginning balance of net operating assets relative to sales, suggesting that managers’ ability to optimistically bias earnings decreases with the extent to which net asset values are already overstated on the balance sheet. Sensitivity tests suggest that our findings are robust. Nevertheless, our evidence should be interpreted with caution given the limitations of our study. In particular, our study focuses on only one incentive to manage earnings—meeting or beating analysts’ earnings forecasts. However, managers have other incentives to manage earnings, some of which
may lead to pessimistically rather than optimistically biased earnings. Our study does not control for these other incentives. We leave this for future research.

**APPENDIX**

We derive Equation (2) by assuming that the cumulative probability of reporting an EPS surprise of less than $k$ is:

$$
\Pr(\text{SURPRISE} < k \mid x) = F(-x\beta_k),
$$

where $x$ is a vector of independent variables, $\beta_k$ is a vector of parameters for a predetermined earnings surprise benchmark $k$, and $F$ is the cumulative logistic distribution:

$$
F(-x\beta_k) = \exp(-x\beta_k) / [1 + \exp(-x\beta_k)].
$$

To ensure that the sum of cumulative probabilities across all $k$ equals 1, we impose the constraint $-x\beta_k \geq -x\beta_{k-1}$ for all $k$. The odds of reporting an earnings surprise of at least $k$ instead of less than $k$ are:

$$
\Omega_k(x) = \Pr(\text{SURPRISE} \geq k \mid x) / \Pr(\text{SURPRISE} < k \mid x)
$$

$$
= [1 - F(-x\beta_k)] / F(-x\beta_k) = \exp(x\beta_k),
$$

which is a general version of Equation (2).

To determine the effect of a change in $x$ on the odds of reporting an earnings surprise of at least $k$, suppose that $x$ changes from $x = x_1$ to $x = x_2$. The odds then change from $\Omega_k(x_1)$ to $\Omega_k(x_2)$ by the factor:

$$
\Omega_k(x_2) / \Omega_k(x_1) = \exp(x_2\beta_k) / \exp(x_1\beta_k) = \exp([x_2 - x_1]\beta_k)
$$

That is, the odds change by $100[\exp([x_2 - x_1]\beta_k) - 1]$ percent. If only one variable, say $x_j$ with parameter $\beta_j$, changes by $\delta$, then the odds of reporting an earnings surprise of at least $k$ will change by $100[\exp(\delta \times \beta_{j,k}) - 1]$ percent, all else equal.

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