Cost Stickiness and Management's Issuance of Earnings Forecasts

Jing Dai
Southwestern University of Finance and Economics

Rong Huang
Baruch College

Yan Yan
Fairleigh Dickinson University

This study investigates how firms' asymmetric cost behavior affects managers' decision to issue earnings forecasts. Cost stickiness reflects managers' deliberate resource adjustment decisions and increases information asymmetry between managers and corporate outsiders. Therefore, as cost stickiness increases, managers are more likely to convey their private information to public through earnings forecasts to reduce information asymmetry. Consistent with our prediction, we find a positive association between cost stickiness and managers' propensity to issue earnings forecasts, and this positive association is more pronounced for long-horizon forecasts than short-horizon forecasts.

INTRODUCTION

Understanding cost behavior is an essential part in the process of predicting expenses and forecasting earnings (Sloan and Lundholm, 2006; Subramanyam and Wild, 2008). Traditional accounting textbooks posit that costs move proportionately with increases or decreases in the activity level (Brewer, Garrison, and Noreen, 2015), while recent studies find that, as a significant component of operating costs, SG&A costs behave asymmetrically. That is, they decrease less when sales go down than they increase when sales go up by an equivalent amount (Anderson, Banker, and Janakiraman, 2003). The asymmetric behavior of SG&A costs is termed as "cost stickiness" and has drawn much attention in accounting literature (Anderson, Banker, and Janakiraman, 2003; Banker, Byzalov, and Chen, 2013; Banker and Chen, 2006; Chen, Lu, and Sougiannis, 2012). Weiss (2010) and Ciftci et al. (2016) document that corporate outsiders (e.g., financial analysts) may partially ignore cost stickiness and hence make errors in predicting firms' earnings performance, but there is no extant study investigating whether managers voluntarily convey their private information on sticky costs to public through earnings forecasts.[1] Our paper fills this gap by examining the following two research questions: (1) Does cost stickiness affect managers' propensity to issue management forecasts? (2) Does cost stickiness has a stronger effect on managers' propensity to issue long-horizon forecasts than short-horizon forecasts?

Prior research has explained cost stickiness with managers' deliberate resource adjustment decisions where adjustment costs play a significant role (Anderson et al., 2003). For example, when sales go up, firms will scale up their resources to accommodate additional sales and increase costs proportionately. When sales go down, managers can choose to remove their slack resources immediately for cost savings. However, by doing so, they may incur large adjustment costs such as firing costs for employees and disposing costs for unutilized assets. If the sales drop is temporary and sales pick up again in the near future, firms must hire new employees and acquire required assets with additional restoring costs (e.g., costs of searching and training new employees). Therefore, if adjustment costs for removing slack resources are greater than the costs for keeping them, managers tend to retain some unused resources and reduce costs to a lesser extent for a sales drop, resulting in sticky cost behavior (Anderson et al., 2003). Other studies have also provided managerial empire building incentives (Chen et al., 2012), managers' incentives to meet earnings target (Kama and Weiss, 2013), and CEO overconfidence (Chen et al., 2013) as explanations for cost stickiness.

Implications of cost stickiness have been investigated by Weiss (2010) and Ciftci et al. (2016). Because asymmetric cost behavior indicates a slower cost cuttings and a greater decrease in earnings when sales fall, Weiss (2010) document that, as corporate outsiders, financial analysts are unable to estimate sticky costs and predict earnings accurately. The accuracy of analysts' earnings forecasts decreases as costs become stickier. In agreement with this notion, Ciftci et al. (2016) find that analysts cannot incorporate all aspects of information on cost behavior appropriately in their earnings prediction process. The asymmetric change in costs when sales go down is partially ignored by analysts and thus leads to larger forecast errors for unfavorable sales than for favorable sales.

Following prior studies on cost stickiness (Anderson, Banker, and Janakiraman, 2003), we expect that managers use their superior private information to predict future sales and to make resource adjustment decisions, generating sticky cost behavior. However, managers' private information relating to future sales and cost stickiness is partly unobservable to corporate outsiders, leading to information asymmetry between managers and corporate outsiders. This information asymmetry and resulting forecast errors made by outsiders are growing as cost stickiness increases (Weiss, 2010; Ciftci et al., 2016). Because information asymmetry is documented to be associated with firms' potential costs, such as high cost of capital, low reputation for opaque information environment, and high CEO turnover risk (Myers and Majluf, 1984; Lang and Lundholm, 1993 & 1997; Baiman and Verrecchia, 1996; Healy, Hutton and Palepu, 1999; Brennan, 1999; Healy and Palepu, 2001), managers are motivated to release their private information on cost behavior through voluntary disclosures to enhance outsiders' understanding of it and revise outsiders' forecast errors. Therefore, we expect that managers are more likely to issue management earnings forecasts that contains their private information as cost stickiness increases. Further, we conjecture that the effect of cost stickiness on managers' issuance decisions varies with forecasting horizon. Because managers have greater information advantage about firms' long-term earnings performance and long-horizon forecasts are perceived by investors to be more informative than short-horizon forecasts (Cotter, Tuna, and Wysocki, 2006; Gong et al., 2013), we expect that the association between cost stickiness and managers' propensity to issue forecasts is stronger for long-horizon forecasts than short-horizon forecasts.

We use a sample of management forecasts from 2001 through 2016. Following Weiss (2010), we measure sticky behavior of SG&A costs as the difference between the rate of cost decrease for the most recent quarter with decreasing sales and the rate of cost increase for the most recent quarter with increasing sales.[2] After dropping observations with missing data on SG&A cost stickiness and other necessary variables, we yield a final sample of 17,343 firm-quarter observations.

Our findings indicate that managers are more likely to issue earnings forecasts as cost stickiness increases. The empirical results are robust after controlling for known determinants of managerial issuance decisions. This is consistent with our hypothesis that sticky cost behavior causes information asymmetry between managers and corporate outsiders, and thus motivates managers to communicate their private information through more frequent voluntary disclosures. We also find that cost stickiness increases the frequency of both long-horizon forecasts and short-horizon forecasts. However, the effect of

cost stickiness on long-horizon forecasts is significantly stronger than short-horizon forecasts, supporting our prediction that managers prefer to issue long-horizon forecasts, which is considered to be more informative by the market, to reduce information asymmetry associated with sticky costs.

This study contributes to the accounting literature by improving our understanding of implications of cost behavior. Previous literature has predominately focused on the impact of cost stickiness on the earnings prediction process of corporate outsiders such as financial analysts and investors (Weiss, 2010; Ciftci et al., 2016), but has largely ignored how managers respond to information asymmetry and biased earnings expectations caused by cost stickiness. Our findings imply that, as resource adjustment decision makers with superior private information, managers are more likely to provide earnings guidance as costs become stickier to reduce information asymmetry and to facilitate the formation of investors' earnings expectations. Collectively, our research provides a new insight into the effects of sticky cost behavior on a firm's information environment.

Our study also extends the literature on voluntary disclosure. Prior studies shows that firms issue voluntary disclosure to reduce information asymmetry, and generally measure information asymmetry by analyst forecast errors (Ajinkya and Gift, 1984) and bid-ask spreads (Coller and Yhon, 1997) without discussing the nature and driver of it. Our paper explains that sticky cost behavior reflects managers' deliberate decisions, which is usually unobservable to or partially ignored by corporate outsiders. Therefore, cost stickiness is a factor that driving information asymmetry and it motivates managers to provide earnings forecasts, particularly long-horizon forecasts, to convey their private information on cost behavior.

The paper proceeds as follows. In Section 2, we review related literature and derive our hypotheses. Section 3 discusses research design. Section 4 presents sample selection and summary statistics. In Section 5, we describe empirical results. Section 6 concludes the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Cost Stickiness

Prior literature finds that SG&A costs behave asymmetrically: they decrease less when volume falls than they increase when volume rises (Anderson et al., 2003). This asymmetric behavior is labeled as "cost stickiness" and its drivers have received increasing attention in accounting research. For example, Anderson et al. (2003) document that stickiness in SG&A costs reflects managers' deliberate decisions in resource adjustment. When sales rise, managers will scale up resources immediately to accommodate additional sales and experience a proportionate increase in costs. When sales fall, managers may retain unutilized resources or remove these resources to cut costs rapidly. If managers choose to remove unutilized resources, they may incur significant adjustment costs, such as firing costs for employees and disposing costs for assets. Moreover, if sales bounce back again, they may incur restoring costs to adjust resources upward, such as costs of searching and training new employees. Therefore, managers facing a sales drop will evaluate if the drop is temporary, compare costs of carrying slack resources and anticipated adjustment costs for removing these resources, and make the optimal decision. If anticipated adjustment costs are relatively high, managers will decide to keep unutilized resources rather than remove them, leading to asymmetric cost behavior. Banker, Byzalov and Chen (2013) contribute to this stream of literature by focusing on employment protection legislation (EPL), which imposes substantial adjustment costs (e.g., firing costs) on employers. Banker, Byzalov and Chen (2013) find that firms in countries with greater EPL provisions strictness have a higher level of cost stickiness.

In addition to adjustment costs, recent empirical studies have identified other explanations for cost stickiness. Chen et al. (2012) document that SG&A cost stickiness may be attributable to the agency problem, and in particular, managerial "empire building" incentives. Empire building managers may increase costs too rapidly when sales rise and slow down cost cuttings when sales fall for higher personal utility from status, power, compensation and prestige (Jensen and Meckling 1976), generating SG&A cost asymmetry. Consistent with this notion, Chen et al. (2012) find a positive association between the agency problem and the level of SG&A cost stickiness. Meanwhile, Kama and Weiss (2013) suggest that

managerial incentives to meet earnings targets may have an impact on the degree of cost stickiness. In order to avoid losses, earnings declines, and missing analyst forecasts, managers cut unutilized resources more rapidly than usual when sales decrease, lowering the degree of cost stickiness. Building on the psychology literature, Chen et al. (2013) provide managerial confidence as a determinant of SG&A cost asymmetry by showing that overconfident managers are likely to overestimate future demand and thus slow down slack resource cuttings when sales drop.

Implications of cost stickiness is also an important topic considered in recent management accounting literature. Banker, Basu, Byzalov, and Chen (2016) focus on the confounding effect of cost stickiness on conditional conservatism estimates. Because cost stickiness indicates that earnings are more responsive to sales decreases than to sales increases and sales changes are positively related with stock returns, the asymmetric relation between earnings and returns caused by cost stickiness leads to an overestimate of conditional conservatism. With regard to implications of cost stickiness in predicting earnings, Banker and Chen (2006) model the effect of cost variability and cost stickiness on future earnings. Results indicate that incorporating cost behavior into their earnings forecast model improves forecast accuracy significantly compared with other time-series models. Although it has been known that considering cost behavior is crucial for earnings forecasts, Weiss (2010) and Ciftci et al. (2016) find that financial analysts are unable to utilize cost behavior information appropriately in their prediction process and hence make earnings forecast errors. Weiss (2010) show that firms with stickier costs have less accurate analyst forecasts than firms with less sticky costs, because cost stickiness increases the variability of the earnings distribution. Ciftci et al. (2016) find that analysts' inappropriate incorporation of information on cost stickiness leads to larger forecast errors for unfavorable sales than for favorable sales, because it is harder for them to estimate asymmetric cost changes when sales go down.

Taken together, previous literature has provided explanations for sticky cost behavior and examined implications of it. However, given that corporate outsiders encounter difficulties in utilizing cost stickiness information to forecast earnings and managers have information advantage on firms' cost behavior, there is limited research investigating if managers are motivated to communicate their private information to outsiders through earnings-related voluntary disclosures. Our study fills the gap by examining the relationship between cost stickiness and managers' propensity to issue management forecasts.

Management Forecasts

Management earnings forecasts is a major mechanism of voluntary disclosures and play an important role in forming the market's earnings expectations (Baginski and Hassell, 1990). Prior studies have identified a number of incentives for firms to issue earnings-related voluntary disclosures. For example, Skinner (1994) finds that managers voluntarily issue forecasts to preempt bad earnings news and to reduce litigation risk caused by large negative earnings surprises. Cotter, Tuna, and Wysocki (2006) show that, in order to avoid negative earnings surprises, managers are more likely to issue guidance to lead analysts toward beatable earnings targets when analysts' initial forecasts are optimistic. Firms with higher earnings response coefficient (ERC) also have stronger incentives to issue management forecasts, because their forecasts is more effective in reducing information asymmetry (Lennox and Park, 2006). Other literature has demonstrated that the issuance of management forecasts is associated with stock-based incentives (Nagar, Nanda, and Wysocki, 2003), corporate governance (Ajinkya, Bhojraj, and Sengupta, 2005), and analyst following (Graham et al., 2005).

Collectively, firms gain benefits from voluntary disclosures, such as reduced information asymmetry and reputation improvement for transparent information environments, but they may incur proprietary costs at the same time (Verrecchia, 1983; Darrough and Stoughton, 1990). Therefore, managers trade off benefits and costs associated with disclosing information to make their management forecast issuance decisions.

Hypothesis Development

Understanding cost behavior is crucial and informative in the earning forecast process (Subramanyam and Wild, 2008; Sloan and Lundholm, 2006). It has been documented that SG&A costs, which is a significant proportion of total operating costs, exhibit asymmetric behavior (Anderson et al., 2003). That is to say, SG&A costs decrease less rapidly when sales fall than they increase when sales rise, leading to lower cost cuttings and a greater decrease in earnings for a sales decline (Weiss, 2010). Such asymmetric changes in costs and earnings reflect managerial deliberate resource adjustment decisions, which may be unobservable to corporate outsiders (Anderson et al., 2003; Weiss, 2010; Banker, Byzalov, and Chen, 2013; Lee, Pittman, and Saffar, 2016). Weiss (2010) supports this notion by showing that cost stickiness is negatively associated with analysts' forecast accuracy because it increases earnings volatility, meanwhile Ciftci et al. (2016) indicate that analysts partially ignore cost stickiness and thus make systematic forecast errors which is larger for unfavorable sales than for favorable sales.

It is difficult for corporate outsiders to observe sticky cost behavior fully or to estimate the degree of cost asymmetry accurately. However, as decision makers in resource adjustment, managers have information advantage on cost behavior over outsiders. In order to reduce information asymmetry associated with cost stickiness, managers are likely to issue earnings forecasts as cost stickiness increases. Particularly when corporate outsiders ignore cost stickiness or understate the degree of cost stickiness, they will fail to predict a greater decrease in earnings when sales fall, leading to an upward biased earnings expectation. Under this circumstance, managers have stronger incentives to disclose private information to avoid a negative earnings surprise (Cotter, Tuna, and Wysocki, 2006). Therefore, we develop the first hypothesis as follows:

H1: *Managers' propensity to issue earnings forecasts increases with cost stickiness.*

In addition to managers' issuance decision, cost stickiness may affect managers' forecasting horizon. Based on findings in previous literature, we expect that managers' forecasting horizon has important implications for the information value of management forecasts for three reasons. First, managers engage in firms' daily operation and develop firms' financial reporting strategies which influence firms' earnings performance significantly over the long-term. Therefore, they have information advantage over outsiders especially with regard to the long-term earnings performance, and this information advantage increases with the firm-specific factors (Gong et al., 2013). Since cost stickiness reflects managers' prediction of future sales based on private information and their personal judgement on resource adjustment, it is an important firm-specific factor that increases mangers' information advantage over outsiders about firms' long-term earnings performance. Second, Ayers and Freeman (1997) suggest that investor need more time and effort to process information related to firm-specific factors, leading to their greater demand for long-horizon management forecasts from firms with sticker costs. Third, we expect that short-horizon management forecasts are less informative on firms' cost behavior than long-horizon management forecasts, because Cotter, Tuna, and Wysocki (2006) posit that short-horizon management forecasts are more likely to be issued to meet or beat analyst consensus forecasts. For these reason, we expect that managers of firms with stickier cost behavior are more likely to issue long-horizon forecasts than short-horizon forecasts for the sake of reducing information asymmetry. In other words, cost stickiness has a more pronounced impact on managers' propensity to issue long-horizon forecasts than short-horizon forecasts. We present the following hypothesis:

H2: *The association between cost stickiness and managers' propensity to issue earnings forecasts is more pronounced for long-horizon forecasts than short-horizon forecasts.*

RESEARCH DESIGN

We estimate the following logistic regression model to investigate the association between cost stickiness and managers' propensity to issue earnings forecasts:

$$Prob(MF = 1)_{i,t} = \beta_0 + \beta_1 Sticky_{i,t-1} + Controls + Industry\ Fixed\ Effect$$
$$+\ Quarterly\ Fixed\ Effect + \varepsilon \tag{1}$$

The dependent variable, *MF*, is a dummy variable that equal to one if at least one earnings-related forecast is issued by firm i in quarter t. To measure sticky behavior of SG&A costs, *Sticky*, we follow Weiss (2010) to calculate the difference between the rate of SG&A costs decrease for recent quarters with decreasing sales and the rate of SG&A costs increase for recent quarters with increasing sales:

$$Sticky_{i,t} = \log\left(\frac{\triangle SG\&A}{\triangle SALE}\right)_{i,\underline{\tau}} - \log\left(\frac{\triangle SG\&A}{\triangle SALE}\right)_{i,\overline{\tau}}\quad \underline{\tau}, \overline{\tau}\ \epsilon\ \{t,..,t-3\}, \tag{2}$$

where $\underline{\tau}$ is the most recent of the last four quarters with a decrease in sales and $\overline{\tau}$ is the most recent of the last four quarters with an increase in sales, $\triangle SALE_{i,t} = SALE_{i,t} - SALE_{i,-1}$, and $\triangle SG\&A_{i,t} = SG\&A_{i,t} - SG\&A_{i,t-1}$.[3] Weiss (201) documents that costs are sticky when they decrease less for a sales decrease than they increase for a sales increase, so a negative value of *Sticky* represents sticky cost behavior and a lower value indicates a higher degree of cost stickiness. We lag *Sticky* by one quarter before the management forecast issuance quarter and predict β_1 to be negative and significant, implying a positive relation between cost stickiness and managers' forecast issuance decisions.

Following Lennox and Park (2006) and Gong et al. (2013), we control for known determinants of the likelihood of management forecasts issuance. All the control variables are calculated at the end of the last quarter prior to the issuance date of management forecasts. Variables definitions are presented in the Appendix.

First, we control for the uncertainty of business environment by including stock return volatility (*RetVolatility*) and book-to-market ratio (*BM*). *RetVolatility* is measured as standard deviation of monthly stock returns over the 36 months before the forecast issuance quarter, and *BM* is the ratio of book value of equity over market value of equity. If firms are operating in highly variable conditions with volatile stock returns and growth potential, they will expect great uncertainty in future earnings performance and investors will have difficulties in earnings prediction. Therefore, managers may have stronger incentives to issue earnings-related forecasts to reduce litigation costs (Skinner, 1994) or may be reluctant to issue forecasts to avoid penalty from missing forecasts (Waymire, 1985). We also control for firm size (*Size*) and industry-adjusted firm performance (*ROA*). Kasznik and Lev (1995) find that larger firms are more likely to provide voluntary disclosures due to higher stockholder litigation costs, meanwhile Miller (2002) documents a higher likelihood of earnings forecast issuance when earnings increase. Therefore, we expect positive coefficients on *Size* and *ROA*.

Next, we include entry costs (*EntCost*) to capture proprietary costs of disclosing information faced by managers. *EntCost* is measured as the average gross property, plant, and equipment within an industry weighted by a firm's market share of sales. Since high proprietary costs discourage managers from providing voluntary disclosures (Verrecchia, 1983), we expect that higher entry costs prohibits a new entrant into a market and thus is associated with lower proprietary costs, leading to a higher frequency of forecast issuance. Following Gong et al. (2013), we control for the number of analysts following the firm (*NAnalysts*) because a larger number of financial analysts have a greater demand for earnings guidance and may motivate managers to provide disclosures more frequently (Graham et al., 2005). Lennox and Park (2006) suggest that managers are more likely to forecast earnings when analyst forecast errors are larger, because management forecasts are relatively more informative under this circumstance. Therefore, we control for |*AFE*|, which is calculated as the absolute value of analyst forecast errors, and expect a positive coefficient on it. Following Kasznik and Lev (1995) and Lennox and Park (2006), we also include an indicator variable that equals one if a firm is in a high-tech industry and zero otherwise (*HighTech*).

Lastly, we include industry fixed effects and quarterly fixed effects to control for other missing factors across industries and quarters. We also cluster standard errors at the firm level to control for potentially correlated error terms. To minimize the effects of outliers, all continuous variables are winsorized at the 1% and 99% levels.

To test the second hypothesis, we replace the dependent variable in model (1) with *MF_LHRZN* and *MF_SHRZN*. Specifically, *MF_LHRZN* is an indicator variable that equal to one if managers issue at least one long-horizon earnings forecast in the fiscal quarter, and zero otherwise. *MF_SHRZN* is an indicator variable that identifies whether managers issue at least one short-horizon earnings forecast during the fiscal quarter.[4] We expect cost stickiness affects the issuance of long-horizon forecasts more significantly than the issuance of short-horizon forecasts.

SAMPLE SELECTION AND DATA DESCRIPTION

Our sample starts from firms with quarterly management forecast information from I/B/E/S Guidance over the period 2001-2016.[5] We obtain financial data from Compustat and stock market data from the Center for Research in Security Prices (CRSP) to calculate cost stickiness and other necessary control variables. We follow Weiss (2010) to measure sticky behavior of SG&A costs and limit our sample to industrial firms (SIC codes 2000-3999) with costs and sales change in the same direction.[6] After deleting firm-quarters with missing data for required variables and non-industrial firm-quarters, we yield a final sample of 17,343 observations over the 2001 to 2016 period.

TABLE 1
SAMPLE SELECTION AND SAMPLE DISTRIBUTION

Panel A: Sample Selection

	Number of firm-quarters
Firm-quarters from I/B/E/S/ Guidance staring from 2001 to 2016	121,374
Drop firm-quarters with missing data on forecast horizon	78,401
Drop firm-quarters with missing data to calculate SG&A cost stickiness and non-industrial firm-quarters	22,076
Drop firm-quarters with missing data to calculate control variables	3,554
Final Sample	17,343

Panel B: Sample Distribution by Fiscal Year

Fiscal year	Number of quarters with management forecasts	Number of quarters with long-term management forecasts	Number of quarters with short-term management forecasts	Total quarters	Percentage of quarters with management forecasts	Percentage of quarters with long-term management forecasts	Percentage of quarters with short-term management forecasts
	(1)	(2)	(3)	(4)	(1)/(4) (5)	(2)/(4) (6)	(3)/(4) (7)
2001	275	0	275	714	38.52%	0.00%	38.52%
2002	346	30	336	1,023	33.82%	2.93%	32.84%
2003	318	28	308	1,037	30.67%	2.70%	29.70%
2004	332	38	322	1,076	30.86%	3.53%	29.93%
2005	356	32	342	1,207	29.49%	2.65%	28.33%
2006	327	24	316	1,185	27.59%	2.03%	26.67%
2007	306	8	305	1,180	25.93%	0.68%	25.85%
2008	287	9	284	1,214	23.64%	0.74%	23.39%
2009	226	9	226	1,084	20.85%	0.83%	20.85%
2010	277	10	277	1,120	24.73%	0.89%	24.73%

Fiscal year	Number of quarters with management forecasts	Number of quarters with long-term management forecasts	Number of quarters with short-term management forecasts	Total quarters	Percentage of quarters with management forecasts (1)/(4)	Percentage of quarters with long-term management forecasts (2)/(4)	Percentage of quarters with short-term management forecasts (3)/(4)
2012	299	5	296	1,173	25.49%	0.43%	25.23%
2013	255	7	252	1,154	22.10%	0.61%	21.84%
2014	255	5	251	1,200	21.25%	0.42%	20.92%
2015	249	1	249	1,106	22.51%	0.09%	22.51%
2016	149	0	149	757	19.68%	0.00%	19.68%
Total	4,522	211	4,453	17,343	26.07%	1.22%	25.68%

Notes: This table reports sample selection procedures in Panel A and sample distribution by fiscal year in Panel B. The sample spreads from 2001 to 2016.

Table 1 presents our sample selection procedures in Panel A and sample distribution by fiscal year in Panel B. Consistent with Gong et al. (2013), our sample is evenly distributed over the sample period and the number of firm-quarters with management forecasts peaks in fiscal year 2005. We also observe a generally decreasing trend in the percentage of firm-quarters with management forecasts from 2001 to 2016, supporting the argument that earnings guidance reflects managerial opportunistic behavior and is criticized by the public (Houston, Lev, and Tucker, 2010; Chen, Matsumoto, and Rajgopal, 2011; Gong et al., 2013).

Table 2 reports descriptive statistics for the relevant variables. Consistent with Weiss (2010), the mean (median) value of *Sticky* is -0.0620 (-0.0697). Since a negative value of *Sticky* indicates cost stickiness, our results confirm that SG&A costs exhibit sticky behavior. In general, the summary statistics of our sample are comparable to those in prior studies (Weiss, 2010; Gong et al., 2013). The mean (median) value is 0.1235 (0.1079) for *RetVolatility* and is 0.5119 (0.4322) for *BM*. The average Size in our sample is 7.0778 (median = 6.9365). Similar to Gong et al. (2013), firms in our sample have better performance than their peers in the same industry, with a positive industry-adjusted ROA (mean = 0.0090; median = 0.0075). On average, our sample firms have high entry costs (mean = 7.6378; median = 7.6138), high analyst coverage (mean = 7.2878; median = 6.0000), and relatively large magnitude of analyst forecast errors (mean = 0.0200; median = 0.0100). Around 7.66% of firms in our sample are in high technology industries, which is lower than the percentage reported in Gong et al. (2013). A potential explanation is that our sample is limited to industrial firms (SIC 2000-3999), whereas the sample in Gong et al. (2013) includes firms in all industries.

TABLE 2
SUMMARY STATISTICS

Variables	Number of observations	Mean	25th Percentile	Median	75th Percentile	Std. Deviation
	(1)	(2)	(3)	(4)	(5)	(6)
Sticky	17,343	-0.0620	-0.9269	-0.0697	0.7965	1.5762
RetVolatility	17,343	0.1235	0.0788	0.1079	0.1518	0.0641
BM	17,343	0.5119	0.2746	0.4322	0.6602	0.4568
Size	17,343	7.0778	5.7967	6.9365	8.2913	1.8241
ROA	17,343	0.0090	-0.0026	0.0075	0.0215	0.0424
EntCost	17,343	7.6378	6.6049	7.6138	8.8726	1.4404
NAnalysts	17,343	7.2878	3.0000	6.0000	10.0000	5.9038
|AFE|	17,343	0.0200	0.0000	0.0100	0.0100	0.1000
HighTech	17,343	0.0766	0.0000	0.0000	0.0000	0.2659

Notes: This table displays summary statistics for main variables. The full sample for our main test contains 17,343 firm-quarter observations from 2001 to 2016. To minimize the effects of outliers, all continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in the Appendix.

In Table 3, we present Spearman and Pearson Correlations between our main variables. The majority of the correlations are significant at 5% level but less than 0.3 in magnitude, which is far less than the 0.8 threshold where multicollinearity may exist (Gujarati, 2003). We also conduct Variance Inflation Factor (VIF) tests for all the independent variables in each model, and find that none of the variables has a VIF value higher than 10, indicating that multicollinearity is not a concern for our results.

TABLE 3
PEARSON AND SPEARMAN CORRELATIONS BETWEEN VARIABLES

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	Sticky		-0.01	0.01	0.03*	0.07*	0.02*	-0.01	-0.01	0.02
(2)	RetVolatility	-0.01		0.12*	-0.47*	-0.20*	-0.01	-0.25*	0.10*	-0.01
(3)	BM	0.0061	0.21*		-0.09*	-0.15*	-0.01	-0.18*	0.22*	-0.11*
(4)	Size	0.03*	-0.52*	-0.14*		0.16*	0.29*	0.62*	-0.05*	0.03*
(5)	ROA	0.09*	-0.22*	-0.39*	0.10*		0.03*	0.14*	-0.11*	0.31*
(6)	EntCost	0.02*	-0.03*	-0.02*	0.26*	0.03*		0.20*	0.02*	0.16*
(7)	NAnalysts	-0.02*	-0.30	-0.26*	0.65*	0.14*	0.18*		-0.06*	0.05*
(8)	|AFE|	-0.01	0.26*	0.31*	-0.13*	-0.29*	0.00	-0.15*		-0.02*
(9)	HighTech	0.02*	-0.02*	-0.17*	0.01	0.33*	0.17*	0.04*	-0.04*	

Notes: This table reports Pearson (lower left) and Spearman (upper right) correlations among our main variables. The full sample for our main test contains 17,343 firm-quarter observations from 2001 to 2016. To minimize the effects of outliers, all continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in the Appendix. Bold figures indicate significant level less than 5%.

EMPIRICAL RESULTS

Likelihood of Issuing Management Forecasts

In our first hypothesis, we predict that managers are more likely to issue earnings forecast for firms with stickier cost behavior to reduce information asymmetry. This is because cost stickiness is mainly based on managers' deliberate resource commitment decisions, resulting in their information advantage over outsiders (Anderson et al., 2003; Weiss, 2010; Banker, Byzalov, and Chen, 2013; Lee, Pittman, and Saffar, 2016). Moreover, since investors have different abilities to process earnings-related information, cost stickiness will lead to differentially informed investors and exacerbate the information asymmetry in the market (Diamond and Verrecchia, 1991; Kim and Verrecchia, 1994). To test this implication, we perform a logistic regression of the decision to issue management forecast on cost stickiness.

Table 4, column (1) shows the results before adding any control variables. The coefficient on *Sticky* (coefficient = -0.047, z-statistic = -3.33) is negative and significant at 1% level. Because a lower value of *Sticky* expresses stickier cost behavior (Weiss, 2010), this result support our hypothesis that managers will increase the frequency of management forecasts to reduce information asymmetry caused by cost stickiness. Column (2) reports the marginal effect of cost stickiness on managers' forecast issuance decisions: one unit of increase in cost stickiness increases the likelihood of management forecast issuance by 0.9% significantly.[7] In Column (3), we include known control variables for the issuance of management earnings forecasts and continue to yield similar results: the coefficient on *Sticky* is negative and significant at 1% level (coefficient = -0.046, z-statistic = -3.12), supporting a positive relation between cost stickiness and managers' decision to issue earnings forecasts. We also find a similar result for the marginal effect that one unit increase in cost stickiness is associated with an increase of 8% in the likelihood of forecast issuance.

Our results on controls are generally consistent with prior research. We find negative coefficients on both *RetVolatility* (coefficient = -3.056, z-statistic = -3.87) and *BM* (coefficient = -0.041, z-statistic = -0.46), but only the first one is statistically significant. This is in agreement with argument in Wyamire (1985) that managers are discouraged to issue forecasts when firms are operating in a highly uncertain environment to avoid penalty from missing their own forecasts. The coefficients on *Size* (coefficient = -0.053, z-statistic = -1.34), *ROA* (coefficient = 1.525, z-statistic = 1.48) and *EntCost* (coefficient = -0.037, z-statistic = -0.80) are insignificant. Consistent with Gong et al. (2013), we find a positive coefficient on

NAnalysts (coefficient = 0.085, z-statistic = 8.38) and a negative coefficient on |*AFE*| (coefficient = -0.088, z-statistic = -0.40). The significant and positive coefficient on *NAnalysts* indicates that firms followed by a larger number of analysts are more likely to provide management earnings forecasts. In addition, we find a lower likelihood of managers' issuance decisions for firms in high-technology industries (coefficient = -0.620, z-statistic = -1.98).

TABLE 4
LOGISTIC REGRESSION OF THE DECISION TO ISSUE MANAGEMENT FORECAST ON COST STICKINESS

	Predicted sign	Dependent variable = *MF*			
		(1) Coefficient (z-stat)	(2) Marginal Effect (z-stat)	(3) Coefficient (z-stat)	(4) Marginal Effect (z-stat)
Sticky	-	**-0.047*****	**-0.009*****	**-0.046*****	**-0.008*****
		(-3.33)	**(-3.33)**	**(-3.12)**	**(-3.12)**
RetVolatility	+/-			-3.056***	-0.528***
				(-3.87)	(-3.87)
BM	+/-			-0.041	-0.007
				(-0.46)	(-0.46)
Size	+			-0.053	-0.009
				(-1.34)	(-1.34)
ROA	+/-			1.525	0.263
				(1.48)	-1.48
EntCost	+			-0.037	-0.006
				(-0.80)	(-0.80)
NAnalysts	+			0.085***	0.015***
				(8.38)	(8.38)
|AFE|	+			-0.088	-0.015
				(-0.40)	(-0.40)
HighTech	+			-0.620**	-0.107**
				(-1.98)	(-1.98)
Intercept		-1.677***		-1.101**	
		(-5.86)		(-1.99)	
Quarter Fixed Effect		Yes		Yes	
Year Fixed Effect		Yes		Yes	
Number of Observations		17,343		17,343	
Pseudo R-Squared		0.0497		0.0922	

Notes: This table reports logistic regression results on predicting the likelihood of management forecast issuance on cost stickiness. Industry and quarter fixed effects in included. Z-statistics are based on robust standard errors clustered at the firm level. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in the Appendix. *, **, and *** denote significant based on two-tailed t-tests at or below the 10%, 5%, and 1% levels, respectively.

TABLE 5
**THE EFFECT OF COST STICKINESS ON THE DECISION TO ISSUE LONG-HORIZON/
SHORT-HORIZON MANAGEMENT FORECAST**

Dependent Variable		MF_LHRZN	MF_LHRZN	MF_SHRZN	MF_SHRZN	
		(1)	(2)	(3)	(4)	(5)
	Predicted	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Difference
	Sign	(z-stat)	(z-stat)	(z-stat)	(z-stat)	(x^2-stat)
Sticky	-	-0.136***	-0.002***	-0.044**	-0.006***	-0.092***
		(-3.15)	(-3.15)	(-2.92)	(-2.92)	（4.34）
RetVolatility	+/-	-0.424	-0.007	-3.100***	-0.531	
		(-0.22)	(-0.22)	(-3.89)	(-3.89)	
BM	+/-	0.166	0.003	-0.060	-0.010	
		(0.71)	(0.71)	(-0.67)	(-0.67)	
Size	+	0.096	0.002	-0.055	-0.009	
		(0.94)	(0.94)	(-1.37)	(-1.37)	
ROA	+/-	-0.305	-0.0045	1.581	0.271	
		(-0.18)	(-0.18)	(1.50)	(1.50)	
EntCost	+	-0.069	-0.001	-0.036	-0.006	
		(-0.69)	(-0.69)	(-0.77)	(-0.77)	
NAnalysts	+	0.063***	0.001***	0.084***	0.014	
		(2.94)	(2.94)	(8.28)	(8.28)	
/AFE/	+	1.000**	0.016**	-0.167	-0.029	
		(2.29)	(2.29)	(-0.71)	(-0.71)	
HighTech	+	0.190	0.003	-0.615	-0.105	
		(0.35)	(0.35)	(-1.94)	(-1.94)	
Intercept		-19.654		-1.077*		
		（-19.25）		（-1.92）		
Industry Fixed Effect		Yes		Yes		
Quarter Fixed Effect		Yes		Yes		
Number of observations		17,343		17,343		
Pseudo R-Squared		0.1608		0.0915		

Notes: This table reports logistic regression results on predicting the likelihood of long-horizon and short-horizon forecast issuance on cost stickiness. Column (1) and (2) reports the results for long-horizon forecasts. Column (3) and (4) displays the results for short-horizon forecasts. Industry and quarter fixed effects are included. Z-statistics are based on robust standard errors clustered at the firm level. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in the Appendix. *, **, and *** denote significant based on two-tailed t-tests at or below the 10%, 5%, and 1% levels, respectively.

Managers' Forecasting Horizon

To test the second hypothesis, we divide firms into those whose forecast issuance date is more than 90 days prior to the forecasting period-end (long-horizon) and those whose forecast issuance date is less than 90 days prior to the forecasting period-end (short-horizon). If a firm has multiple management forecasts for one forecasting period, we use the most recent one. Then we replace the dependent variable in model (1) with *MF_LHRZN* (*MF_SHRZN*), which is an indicator that is equal to one if managers issue a long-horizon (short-horizon) earnings forecast for current forecasting period. We then compare the coefficient on cost stickiness in two regressions.

Table 5 presents the effect of SG&A cost stickiness (*Sticky*) on management forecast horizon. Column (1) and Column (3) show that cost stickiness of SG&A costs increases the likelihood of both long-horizon (coefficient = -0.136, z-statistic = -3.15) and short-horizon management forecasts issuance (coefficient = -0.044, z-statistic = -2.92), but the coefficient is more significant for long-horizon forecasts than for short-horizon forecasts. Column (5) shows the difference in the coefficient on *Sticky* is significant at less than 1% level (difference = -0.092, Chi-square statistic = 4.34), indicating that the effect of cost stickiness is more pronounced for long-horizon forecasts than short-horizon forecasts. These results provide supporting evidence that cost stickiness of SG&A leads to information asymmetry about firms' long-term earnings performance. Therefore, managers tend to issue long-horizon forecasts that are considered to be more informative than short-horizon forecasts to investors and leave more time for investors to process information.

CONCLUSION

In this paper, we investigate whether sticky behavior of SG&A costs affect managers' decisions to issue earnings forecasts. Based on literature on implications of cost stickiness (Weiss, 2010; Ciftci et al., 2016), we predict a positive relation between cost stickiness and the likelihood of management forecasts issuance. In addition, we expect the effect of cost stickiness on managers' issuance decisions to be more pronounced for long-horizon forecasts than short-horizon forecasts. Consistent with our prediction, we find strong evidence that managers' propensity to issue earnings forecasts increases as SG&A costs become stickier, and this positive association strengthens for long-horizon forecasts.

Our study extend the exiting literature on implications of cost stickiness by documenting the impact of firms' asymmetric cost behavior on voluntary disclosure. Cost stickiness is based on managers' deliberate decisions and is often ignored by corporate outsiders in forming earnings expectations. As decision makers with superior private information, managers aware of potential negative consequences associated with cost stickiness and provide management earnings forecasts more frequently to reduce information asymmetry. Overall, our paper sheds light on the important role of managers in determining firms' cost behavior and in shaping firms' information environment.

ENDNOTES

1. Firms may provide different forms of voluntary disclosures. In this paper, we focus on a primary mechanism of voluntary disclosures, management earnings forecasts, because they influence investors' earnings expectations to a large extent (Patell, 1976; Baginski and Hassell, 1990) and occur frequently (Gong, Li, and Zhou, 2013).
2. Anderson et al. (2003) use a time-series regression model to estimate cost stickiness at the firm level for each year, while Weiss (2010) proposes a more direct measure of cost stickiness at the firm level for each quarter. In this paper, we use the measure developed by Weiss (2010) because it provides means of examining how cost stickiness affects the issuance of management earnings forecasts for each quarter.
3. Weiss (2010) measures the stickiness of total operating costs, SG&A costs, and COGS. The results show that only total operating costs and SG&A costs behave sticky, whereas COGS is anti-sticky. Because previous studies mainly document the sticky behavior of SG&A costs (Anderson et al., 2003; Chen et al., 2012), we also focus on SG&A cost stickiness and its impact on management forecast issuance in this paper.

4. Following Gong et al. (2013), we identify a forecast to be long-horizon if the issuance date is more than 90 days prior to the forecasting period end and to be short-horizon if the issuance date is less than 90 days before the forecasting period end.

5. Following Gong et al. (2013), we start our sample from 2001 because Regulation Fair Disclosure Rules became effective in October 2000, which prohibit managers from releasing information to selected corporate outsiders. This setting eliminates the potential influence of private earnings guidance on our results.

6. Weiss (2010) provides two reasons for the limitation to industrial firms. First, industrial firms have a homogenous structure of profit and loss statement, which enable researchers to investigate cost behavior of different major cost components, such as SG&A and COGS. Second, the market for industrial firms is more competitive than other industries (e.g. utility and other regulated industries), reducing the measurement error caused by a potential pricing effect.

7. The likelihood of management forecast issuance from our logistic regression model is calculated as $p(X) = e^{\beta'X}/(1 + e^{\beta'X})$, where β is the vector of coefficient from model (1) and X is the vector of independent variables set. The marginal effect of cost stickiness on management forecast issuance is calculated as $\partial p(X)/\partial x_i = \beta_i p(X)[1-p(X)]$, measured at the mean values of the independent variables.

REFERENCES

Ajinkya, B., Bhojraj, S., & Sengupta, P. (2005). The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research,* 43(3), 343-376.

Ajinkya, B., & Gift, M. (1984). Corporate managers' earnings forecasts and symmetrical adjustments of market expectations. *Journal of Accounting Research,* 22(2), 425-444.

Anderson, M. C., Banker, R. D., & Janakiraman, S. N. (2003). Are selling, general, and administrative costs ''sticky''? *Journal of Accounting Research,* 41(1), 47-63.

Ayers, B., & Freeman, R. (1997). Market assessment of industry and firm earnings information. *Journal of Accounting and Economics,* 24(2), 205-218.

Baginski, S., Conrad, E., & Hassell, J. (1993). The effects of management forecast precision on equity pricing and on the assessment of earnings uncertainty. *The Accounting Review,* 68(4), 913-927.

Baiman, S., & Verrecchia, R. E. (1996). The relation among capital markets, financial disclosures, production efficiency, and insider trading. *Journal of Accounting Research,* 34(1), 1-22.

Banker, R. D., Basu, S., Byzalov, D., & Chen, J. Y. S. (2016). The confounding effect of cost stickiness on conservatism estimates. *Journal of Accounting and Economics,* 61, 203-220.

Banker, R. D., Byzalov, D., & Chen, L. (2013). Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics,* 55, 111-127.

Banker, R. D., & Chen, L. (2006). Predicting earnings using a model based on cost variability and cost stickiness. *The Accounting Review,* 81(2), 285-307.

Brennan, N. (1999). Voluntary disclosure of profit forecasts by target companies in takeover bids. *Journal of Business Finance and Accounting,* 26, 883-918.

Brewer, P., Garrison, R., & Noreen, E. (2015). *Introduction to managerial accounting 7th Edition.* New York, NY: McGraw-Hill.

Chen, C. X., Gores, T., & Nasev, J. (2013*). Managerial Overconfidence and Cost Stickiness.* Working Paper. University of Illinois at Urbana-Champaign, and University of Cologne.

Chen, C. X., Lu, H. & Sougiannis, T. (2012). The agency problem, corporate governance, and the behavior of selling, general, and administrative costs. *Contemporary Accounting Research,* 29(1), 252-282.

Chen, S., Matsumoto, D., & Rajgopal, S. (2011). Is silence golden? An empirical analysis of firms that stop giving quarterly earnings guidance. *Journal of Accounting and Economics,* 51(1-2), 134-150.

Ciftci, M., Mashruwala, R., & Weiss, D. (2016). Implications of cost behavior for analysts' earnings forecasts. *Journal of Management Accounting Research,* 28(1), 57-80.

Cotter, J., Tuna, I., & Wysocki, P. (2006). Expectations management and beatable targets: How do analysts react to public earnings guidance? *Contemporary Accounting Research* 23(3), 593–624.

Coller, M., & Yohn, T. L. (1997). Management forecasts and information asymmetry: An examination of bid-ask spreads. *Journal of Accounting Research,* 35(2), 181-191.

Darrough, M., & Stoughton, N. (1990). Financial disclosure policy in an entry game. *Journal of Accounting and Economics,* 12, 219-244.

Diamond, D., & Verrecchia, R. E. (1991). Disclosure, liquidity, and the cost of capital. *Journal of Finance,* 46(4), 1325-1359.

Gong, G. J., Li, L.Y., & Zhou, L. (2013). Earnings non-synchronicity and voluntary disclosure. *Contemporary Accounting Research,* 30(4), 1560-1589.

Graham, J., Harvey, C. R., & S. Rajgopal. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics,* 40(1-3), 3-73.

Gujarati, D. N. (2003). *Basic Econometrics.* New York, NY: McGraw-Hill.

Healy, P., Hutton, A., & Palepu, K. (1999). Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research,* 16, 485-520.

Healy, P., & Palepu, K. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of empirical disclosure literature. *Journal of Accounting and Economics,* 31, 405-440.

Houston, J., Lev, B., & Tucker, J. (2010). To guide or not to guide? Causes and consequences of stopping quarterly earnings guidance. *Contemporary Accounting Research,* 27(1), 143-185.

Kama, I., & Weiss, D. (2013). Do earnings targets and managerial incentives affect sticky costs? *Journal of Accounting Research,* 51(1), 201-224.

Kasznik, R., & Lev, B. (1995). To warn or not to warn: Management disclosure in the face of an earnings surprise. *The Accounting Review,* 70(1), 113-134.

Kim, O., & Verrecchia, R. E. (1994). Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics,* 17, 41-67.

Lang, M., & Lundholm, R. (1993). Cross-sectional determinants of analysts ratings of corporate disclosures. *Journal of Accounting Research,* 31, 246-271.

Lang, M., & Lundholm, R. (1997). Voluntary disclosure during equity offerings: reducing information asymmetry or hyping the stock? *Contemporary Accounting Research,* 17(4), 623-662.

Lee, W. J., Pittman, J., & Saffar, W. (2016). *Political uncertainty and cost stickiness: evidence from national elections around the world.* Working Paper. Seoul National University, Memorial University of Newfoundland, and Hong Kong Polytechnic University.

Lennox, C., & Park, C. (2006). The informativeness of earnings and management's issuance of earnings forecasts. *Journal of Accounting and Economics,* 42(3), 439-458.

Miller, G. (2002). Earnings performance and discretionary disclosure. *Journal of Accounting Research,* 40(1), 173-204.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, (2), 187-221.

Nagar, V., Nanda, D., & Wysocki, P. D. (2003). Discretionary disclosure and stock-based incentives. *Journal of Accounting and Economics* 34(1), 283-309.

Skinner, D. (1994). Why firms voluntarily disclose bad news. *Journal of Accounting Research* 32: 38–61.

Sloan, R., & Lundholm, R. (2010). *Equity valuation and analysis with eVal 2nd Edition.* New York, NY: McGraw-Hill/Irwin.

Subramanyam, K. R., & Wild, J. (2008). *Financial statement analysis 10th edition.* New York, NY: McGraw-Hill/Irwin.

Verrecchia, R. E. (1983). Discretionary disclosure. *Journal of Accounting and Economics,* 5, 179-194.

Waymire, G. (1985). Earnings volatility and voluntary management forecast disclosure. *Journal of Accounting Research,* 23(1), 268-295.

Weiss, D. (2010). Cost behavior and analysts' earnings forecasts. *The Accounting Review,* 85(4), 1441-1471.

APPENDIX

Variable Definitions

MF: An indicator variable that equals one if management issues at least one earnings forecast during quarter t, and zero otherwise.

MF_LHRZN: An indicator variable that equals one if management issues at least one long-horizon earnings forecast during quarter t, and zero otherwise. A long-horizon forecast indicates the forecast issuance date is more than 90 days prior to the forecasting period-end.

MF_SHRZN: An indicator variable that equals one if management issues at least one short-horizon earnings forecast during quarter t, and zero otherwise. A short-horizon forecast indicates the forecast issuance date is less than 90 days prior to the forecasting period-end.

Sticky: $Sticky_{i,t} = \log\left(\frac{\Delta SG\&A}{\Delta SALE}\right)_{i,\underline{\tau}} - \log\left(\frac{\Delta SG\&A}{\Delta SALE}\right)_{i,\bar{\tau}}$ $\underline{\tau}, \bar{\tau} \in \{t, .., t-3\}$, where $\underline{\tau}$ is the most recent of the last four quarters with a decrease in sales and $\bar{\tau}$ is the most recent of the last four quarters with an increase in sales, $\Delta SALE_{i,t} = SALE_{i,t} - SALE_{i,-1}$, and $\Delta SG\&A_{i,t} = SG\&A_{i,t} - SG\&A_{i,t-1}$.

RetVolatility: Standard deviation of monthly stock returns over the 36 months prior to the beginning of quarter t.

BM: The ratio of book value of equity over market value of equity at the beginning of quarter t.

Size: Log of book value of total assets at the beginning of quarter t.

ROA: Earnigns before extraodinary item divided by lagged total assets, minus the median value for the same four-digit SIC industry for quarter t.

EntCost: Industry-level weighted average of gross property, plant and equipment, weighted by each firm's market share of sales in this industry.

NAnalysts: Total number of I/B/E/S analysts covering the firm prior to the management earnings forecast.

|AFE|: Abosulte value of the difference between reported EPS for quarter t+1 and the analyst consensus forecast (median) issued immediately preceding quarter t earnings announcement, deflated by the stock price at the end of quarter t.

HighTech: An indicator variable that equals one if the firm operates in a high technology industry, and zero otherwise. Drugs (SIC codes 2833-2836), R&D services (SIC codes 8731-8734), Programming (SIC codes 7371-7379), and Computers (SIC codes 3570-3577) are classified as high-tech industries.