# Earnings Guidance and Market Uncertainty[*]

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## Abstract

We study the effect of disclosure on uncertainty by examining how management earnings forecasts affect stock market volatility. Using implied volatilities derived from exchange-traded options prices, we find that management earnings forecasts issued at times other than when earnings are announced can result in increases in both short-term and long-term uncertainty about future stock prices. This finding contrasts with previous findings showing that earnings announcements and other predictable information releases tend to resolve uncertainty. We also find that changes in uncertainty vary with the magnitude and sign of the forecast news and attributes of the firm's information environment. In particular, we find that both the short-term and long-term increases in uncertainty are more pronounced when managers issue forecasts that convey bad news relative to analysts' expectations. Overall, our results suggest that disclosure can increase uncertainty beyond the effects of the underlying news itself.

## 1. Introduction

A large amount of empirical research investigates the voluntary disclosure of earnings forecasts by managers.[1] Most of this research examines managers' incentives to provide earnings forecasts, various properties of these forecasts, and how market participants respond to these disclosures. In terms of the market response to these forecasts, studies typically focus on the short-run reaction to management forecasts, and how this reaction varies as a function of different properties of the forecasts. Almost all of these studies focus on short-run changes in stock prices or analysts' forecasts to assess the informativeness of these types of voluntary disclosures, and generally find that forecasts induce analysts and investors to revise expectations of future earnings.

Our interest is in whether managers' voluntary disclosures increase or decrease uncertainty about firm value. To address this question, we investigate whether managers' earnings forecasts affect investors' longer-run assessments of uncertainty about firm value. To do this, we look at long-run stock volatility, which we measure using implied volatilities from exchange-traded option prices. Our objective is to assess whether managers' decisions to issue earnings forecasts ("earnings guidance") are beneficial in terms of lowering investors' assessments of uncertainty about firm value. In this sense, our research is motivated by the question that lies at the heart of much of the voluntary disclosure literature – whether more forthcoming disclosure lowers investors' uncertainty about firm value, and so reduces the firm's cost of capital.[2]

[1] Examples include Ajinkya and Gift (1984), Baginski et al. (1993), Coller and Yohn (1997), and Rogers and Stocken (2005).

[2] Beginning with papers such as Lang and Lundholm (1994) and Botosan (1997), many papers investigate whether more disclosure by managers translates into either a lower cost of capital or variables that researchers believe are directly associated with cost of capital, such as analyst following, or measures of liquidity such as the bid-ask spread or trading volume. Our primary interest is in the effect of disclosure on uncertainty; to the extent that reductions in

Focusing on market uncertainty as measured by implied volatilities from options prices has several advantages for assessing the effect of voluntary disclosure. First, implied volatilities are a direct measure of market uncertainty. We examine implied volatilities derived from options with maturities of up to two years, the longest maturity currently available. These implied volatilities are, by construction, the market's expectation of the firm's average stock volatility over the option's remaining life. This means we can directly assess market expectations about the uncertainty associated with the firm's cash flows over a relatively long horizon.

Second, empirical estimates of cost of capital are inherently noisy. The typical approach is to use current stock prices along with analysts' earnings forecasts over some horizon to back out an estimate of cost of capital from a standard equity valuation model (often the residual income model).[3] Because we can estimate market uncertainty directly, and because market uncertainty is likely to affect cost of capital in a direct and predictable way, we are able to get a relatively clean measure of how disclosure affects cost of capital.[4]

Third, data on implied volatilities are a rich source of information about investors' expectations about future stock volatility. Since two early studies by Patell and Wolfson (1979, 1981) there is little disclosure-related research of which we are aware that uses implied volatilities from exchange-traded options.[5] In contrast to estimates of volatilities computed from

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uncertainty reduce cost of capital (an open question both theoretically and empirically) our results also speak to the effect of disclosure on cost of capital.

[3] See, for example, Botosan and Plumlee (2005) and Easton and Monahan (2005).

[4] There are at least two ways in which uncertainty is likely to affect cost of capital. First, under Merton's (1987) CAPM, markets are incomplete in an informational sense, so that information risk is priced in the CAPM. This suggests that uncertainty about the firm's cash flows directly affects cost of capital. Second, researchers in finance suggest that shocks to asset prices increase volatility, that such increases in volatility are persistent, and that expected returns increase to compensate investors for the increase in risk (e.g., French, Schwert and Stambaugh, 1987; Campbell and Hentschel, 1992).

[5] Patell and Wolfson investigate whether investors anticipate the higher volatility of stock prices around the times earnings are announced by looking at whether IVs increase in the period before earnings announcements.

realized stock returns, which by construction are backward-looking, implied volatilities provide a direct measure of investors' *expectations* of future volatility and so provide a natural way of measuring how management disclosures affect market uncertainty. Moreover, because exchange-traded options are now listed on large samples of stocks and are actively traded, implied volatilities no longer suffer from the illiquidity and non-trading problems. These problems were prevalent as few as ten years ago. In addition, we utilize *standardized* implied volatilities (hereafter, *IVs*) which can be interpreted as an average implied volatility from at-the-money put and call options based on data drawn from all available put and call options traded on a given stock at a given maturity. This avoids many of the estimation issues inherent in using implied volatilities from options prices.[6]

We investigate several possible effects of earnings guidance on underlying market uncertainty about firms. One possibility is that earnings guidance has no effect on long-run market uncertainty about the firm because it simply accelerates the disclosure of earnings news that otherwise would be revealed at the quarterly earnings announcement date. In the short run, to the extent that the earnings news released to the market (either through the earnings guidance or through the earnings announcement) is informative, there are likely to be temporary effects on stock volatility. For example, if the release of news generally resolves uncertainty, volatility is likely to decline in the period after the announcement relative to the period before the announcement. Alternatively, some theoretical models (e.g., Kim and Verrecchia, 1994) predict that information releases could increase short-term market uncertainty, increasing volatility. In either case, volatility changes associated with the release of the earnings news are likely to be

[6] For example, IVs were traditionally estimated separately using different options contracts (different strike prices, maturities, etc.) which were in- or out-of-the-money to different degrees. This led to measurement error – implied volatilities differed across the different option contracts as a function of the extent to which the options were in the money (see, for example, Dumas, Fleming, and Whaley, 1998).

relatively short-lived.[7] If earnings guidance simply moves the revelation of earnings news forward in time, accelerating any stock price effects attributable to the earnings news, this means that earnings guidance is unlikely to effect longer-run uncertainty about firm value.

An alternative possibility is that the release of earnings guidance increases short-run uncertainty about the stock and that this uncertainty lingers beyond the current period, perhaps because investors interpret the guidance as revealing that managers themselves are uncertain about the business' prospects. Under this view, market uncertainty increases at the time managers issue earnings guidance and that this uncertainty persists through the corresponding earnings announcement date because investors are uncertain about whether the earnings news has been fully revealed. Furthermore, this uncertainty could persist into the period after the earnings announcement date if the act of issuing guidance in and of itself creates uncertainty because, for example, it causes investors to reassess their beliefs about the extent to which managers understand and have control over the firm's operations.[8]

A third possibility is that by providing additional disclosures to investors, managers *lower* uncertainty about firm value. This seems more likely in those cases where managers have an ongoing policy of providing guidance, and provide guidance consistently each quarter. In this case the act of providing guidance does not create uncertainty because it is anticipated. Notice the difference from the previous scenario – if managers do not release earnings guidance routinely, the act of issuing guidance creates uncertainty because investors cannot be sure about managers' motivation for making the disclosure. This is especially true if such irregular

[7] Whaley and Cheung (1982) find that prices on the Chicago Board Options Exchange (CBOE) adjust quickly (within a week) to earnings news and that it is not possible for investors to trade profitably in options markets on the basis of earnings news.
[8] See, for example, Trueman (1986).

disclosures are more likely to occur when the earnings news is negative and/or negative news inherently creates greater levels of market uncertainty (e.g., Hutton, Miller, and Skinner, 2003).[9]

Overall then, our research addresses the broad question of whether disclosure has net benefits. On the one hand the answer seems obvious – how could it be that additional disclosure makes investors worse off?[10] More information, by definition, reduces uncertainty about asset prices, improving liquidity and lowering cost of capital. On the other hand the answer may not be so obvious if the act of disclosure itself has adverse effects on uncertainty as may be the case, for example, if it induces additional "noise" trading.

We measure changes in implied volatility surrounding management earnings forecasts issued from 1996 through 2006. To isolate the effects of earnings guidance, we exclude forecasts made in conjunction with earnings announcements.[11] We show that, on average, uncertainty increases immediately following forecast issuance. This increase is concentrated in forecasts that convey bad news and varies cross-sectionally with the magnitude of the earnings surprise and the pre-forecast dispersion in analyst forecasts. The pattern of changes in implied volatility around our sample of earnings forecasts differs from that around earnings announcements (Patell and Wolfson, 1979, 1981), a result that we expect because the timing of earnings announcements is generally more predictable than that of management forecasts.

[9] The finance literature discusses two explanations for why negative shocks to stock prices increase volatility. First, the 'leverage effect' (e.g., Black, 1976; Christie, 1982) posits that the reduction in equity value mechanically increases market-valued leverage, thus increasing uncertainty and hence stock volatility. Second, 'volatility feedback' (e.g., Campbell and Hentschel, 1992) is the idea that when bad news is announced, uncertainty increases, and that this increase results in a persistent increase in volatility, increasing expected returns, which reduces stock prices. Thus, the feedback effect exaggerates the direct effect of the negative news on stock prices. With good news, however, the feedback effect mitigates rather than reinforces the positive effect of the news on equity prices. The result is an asymmetric response to news.

[10] For example, former FASB member Neel Foster (2003) stated, "More information always equates to less uncertainty, and it is clear that people pay more for certainty. Less uncertainty results in less risk and a consequent lower premium being demanded".

[11] Anilowski, Feng, and Skinner (2007) show that the number of such forecasts has increased substantially over time.

More importantly, we also find that increases in uncertainty persist into the period after the earnings announcement. Using a matched sample to control for the magnitude of the earnings surprise, we find that forecasting firms experience an increase in uncertainty from the period before the forecast is issued to the period after the release of actual earnings. This increase, which is largely attributable to forecasts that convey bad news relative to analysts' expectations, indicates that earnings announcements do not completely subsume the information in management forecasts and so casts doubt on the notion that disclosure reduces uncertainty.

In addition to the disclosure literature, our research speaks to recent calls by practitioners for changes in company reporting practices, including the issuance of earnings forecasts. The U.S. Chamber of Commerce has recently issued a recommendation to "convince public companies to stop issuing earnings guidance."[12] A recent well-publicized study by McKinsey ("the Misguided Practice of Earnings Guidance") based on a survey of managers reaches similar conclusions. In addition, there is some evidence that some companies have stopped issuing earnings guidance in recent years given concerns that guidance has adverse effects and increases the likelihood of litigation.[13]

In the next section, we discuss the related literature and our hypotheses. Section 3 describes our research design. We discuss our data and empirical analysis in section 4, and conclude in section 5.

## 2. Prior Research and Hypothesis Development

### *2.1. Prior Research*

[12] Commission on the Regulation of U.S. Capital Markets in the 21st Century. U.S. Chamber of Commerce, 2007.
[13] For example, see Houston et al. (2007) and Chen et al. (2006).

Our primary research question is whether and how the provision of earnings forecasts affects investors' assessments of uncertainty about firm value. Our study is motivated by two bodies of literature. The first stream of literature examines the effect of management forecasts on market outcomes such as trading volume, stock returns, and analysts' earnings estimates. This research finds that management forecasts affect market outcomes in several ways. For example, previous research finds that management earnings forecasts are informative in that they affect stock prices and analysts' earnings forecasts. The stock price response to earnings forecasts is positively related to unexpected forecast news, and is stronger for more precise forecasts (e.g., Baginski et al., 1993), forecasts that convey negative earnings news (e.g., Hutton et al., 2003), and more credible forecasts (e.g., Jennings, 1987). Similarly, analysts revise their forecasts around management forecasts, and these revisions are positively associated with forecast news (e.g., Baginski and Hassell, 1990). Overall, it seems clear that manager's forecasts are viewed as credible and affect investors' beliefs about the value of the firm and the expected level of earnings.

It is less clear how management forecasts affect investors' *uncertainty* about the firm value because there is limited evidence on the relation between forecasting and uncertainty. Analytical studies typically investigate settings in which any disclosure unambiguously increase investors' precision of beliefs regarding firm value (see, for example, Kim and Verrecchia, 1997, and the disclosure vignettes from Verrecchia, 2001). There are also models in which disclosures can increase investors' assessment of the variance of future cash flows. For example, Jorgensen and Kirschenheiter (2003) model a setting whereby managers choose whether to inform investors about the variance (rather than the expectation) of the firm's future cash flows.

In the empirical realm, Clement et al. (2003) show that "confirming" management forecasts (those within 1% of the prevailing analyst consensus estimate) are followed by a reduction in analyst dispersion. Coller and Yohn (1997) show that forecasting firms have larger bid-ask spreads than control firms prior to management forecasts but that spreads are indistinguishable after forecasts, which suggests a reduction in information asymmetry due to the forecast. Although these studies suggest that disclosure results in lower values for variables that may be correlated with investor uncertainty, the empirical link between management forecasts and investor uncertainty, especially long run uncertainty, remains largely unexplored.[14]

The second body of literature addresses the relation between information releases and market uncertainty in a more general way. For example, Patell and Wolfson (1979, 1981) use implied volatilities from options prices to show that volatility increases in the period before earnings announcements (which is expected if these announcements tend to be informative and investors anticipate their timing) and declines thereafter. More recently, Isakov and Perignon (2001) show that the decline in implied volatility following earnings is larger for positive earnings news than for negative earnings news. Ederington and Lee (1996) study uncertainty on a macroeconomic level, and find that scheduled news releases (e.g., employment reports) are followed by declines in the implied volatility of currency contracts, while the opposite is true for unscheduled releases.

Our study extends these literatures by focusing on the effects of management forecasts on uncertainty. Because earnings announcements are predictable events whose timing is usually known in advance by market participants (e.g., Bagnoli et al., 2002), the Patell and Wolfson (1979, 1981) results are unlikely to apply to management forecasts because these forecasts are, in

[14] Relatedly, Barron et al. (1998) model analyst dispersion as representing both uncertainty and lack of common beliefs among analysts.

many cases, not predictable events. Given the Ederington and Lee (1996) evidence that the effect of disclosure on uncertainty varies with the degree of anticipation, this distinction is likely to be important.

*2.2. Short-Run Changes in Uncertainty*

Our first set of hypotheses relates to changes in market uncertainty immediately surrounding management earnings forecasts. Patell and Wolfson (1979, 1981) and Isakov and Perignon (2001) report that implied volatilities decline in the period after earnings announcements, presumably because these announcements resolve uncertainty. Coller and Yohn (1997) and Clement et al. (2003) find that bid-ask spreads and the dispersion in analysts' forecasts, respectively, decline after management forecasts. Taken together, these studies suggest that uncertainty is likely to decline following the release of earnings guidance as uncertainty is resolved. On the other hand, Ederington and Lee's (1996) results indicate that unscheduled announcements are followed by increases in implied volatility. If forecasts are largely unanticipated, this could lead to an increase in uncertainty following the forecast. Thus, our first hypothesis is non-directional:

**H1: There is no short-term change in uncertainty following the issuance of a management forecast.**

Our next two hypotheses relate to cross-sectional variation in the short-run change in uncertainty around forecasts. The first distinguishes between forecasts conveying good and bad news. Isakov and Perignon (2001) show that the decline in implied volatility following earnings announcements is larger for good news than for bad news announcements. More generally, there is a literature in finance that studies the pattern of return volatility after different types of news. The general finding is that volatility increases more following bad news than good news in part

due to volatility feedback and leverage effects (e.g., Black, 1976; Campbell and Hentschel, 1992; Dennis et al., 2006). Based on this result and previous findings in the accounting literature that management forecasts that convey negative earnings news tend to generate larger stock price reactions than those that convey positive earnings news, we predict that:

**H2: Forecasts conveying bad news result in smaller decreases (or larger increases) in uncertainty than forecasts conveying good news.**

The pattern in uncertainty is also likely to differ based on the magnitude of the forecast news. Prior research suggests that "confirming" forecasts tend to result in decreases in analyst dispersion (Clement et al., 2003). We expect a similar result to hold for forecasts and implied volatility. That is, we expect that as the magnitude of the forecast surprise increases, the likelihood of an increase in uncertainty also increases. Additionally, Subramanyam (1996) models an environment in which investors are unsure about the precision of information they receive. In such an environment, signals with large surprise components are viewed as being less precise, and are therefore weighted less heavily when investors update their beliefs. As a result, such signals are likely to resolve less uncertainty. Thus, our third hypothesis is the following:

**H3: Forecasts conveying larger surprises result in smaller decreases (or larger increases) in uncertainty than forecasts conveying smaller surprises.**

*2.3. Long-Run Changes in Uncertainty*

Our final hypothesis relates to changes in uncertainty over a longer period of time. There is little previous evidence on the effect of earnings guidance on longer run changes in uncertainty about firm value. One possibility is that earnings guidance does not affect long-run uncertainty

about firm value. Under this view, earnings guidance simply accelerates the disclosure of earnings news that would otherwise be revealed at the quarterly earnings announcement date. To the extent that this is the only news conveyed by the forecast, the post-earnings level of uncertainty is unaffected by the provision of guidance prior to the earnings announcement.

Another possibility is that by issuing guidance managers increase short-run uncertainty about the stock and that this uncertainty persists beyond the current period because, for example, investors interpret the guidance as revealing that managers themselves are uncertain about the business' prospects.

Finally, it is possible that by providing additional disclosures to investors, managers *reduce* uncertainty about firm value. This would occur if the forecast causes investors to revise their beliefs about the extent to which managers understand and have control over the firm's operations. Such a result would be consistent with Trueman's (1986) model, in which managers issue forecasts to signal their ability to anticipate and react to economic changes. Because the alternative scenarios discussed above result in different outcomes, we present our final hypothesis in the null form:

**H4: After controlling for the realization of earnings, the provision of a forecast has no effect on uncertainty.**

## 3. Sample Selection and Research Design

### *3.1. Implied Volatility as a Proxy for Uncertainty*

Our proxy for investor uncertainty is the implied volatility ("IV") derived from equity options prices. Implied volatility at a given point in time is the stock volatility implicit in options prices given an options pricing model (such as Black-Scholes) and assumptions about the other model inputs. The use of IV to measure uncertainty has several advantages over other

possible measures such as realized volatility or the dispersion in analyst forecasts. First, implied volatility is an *ex ante* market-based measure of uncertainty about firm value, which is the construct of interest in our study. Second, IVs are constantly updated based on new information, which allows us to study how volatility changes over short periods around information releases. In contrast, realized volatilities must be estimated using a time-series of returns, and so are less suitable for event studies. Moreover, because exchange-traded options are now listed on large samples of stocks and because these options markets are now actively traded, implied volatilities no longer suffer from the illiquidity and non-trading problems that existed even ten years ago.

We obtain the particular values of implied volatility used in this study from the OptionMetrics Standardized Options dataset. In contrast to IV from traded options, these values represent the IV for a hypothetical at-the-money option with a specified duration ranging from 30 days to 730 days. The IVs are imputed based on implied volatilities observed for traded options on the firm's stock.[15] Standardized options have two significant advantages for estimating IVs over the use of traded options. First, they are always at-the-money, which reduces measurement error due to variation in the extent to which options are in the money (e.g., Hentschel, 2003). Second, the constant duration means that our IV estimates are not affected by predictable changes in volatility due to variation in option time to maturity.[16]

*3.2. Management Forecasts*

We obtain management forecasts from First Call's Company Issued Guidelines database. We use EPS forecasts issued from 1996 through 2006 and require that the firm have stock price

[15] Roughly, the implied volatility for a hypothetical 30-day at-the-money option can be thought of as the weighted average of the implied volatilities of the four traded options with strike prices $i$ and $j$ and days to maturity of $m$ and $n$, such that the current stock price is between $i$ and $j$, and $m<30<n$. More information can be found at http://wrds.wharton.upenn.edu/ds/optionm/manuals/IvyDBReference.pdf.

[16] For example, it is impossible to compare the implied volatility of a traded option with 30 days to expiration prior to a forecast to a traded 30-day option $n$ days subsequent to that forecast. Rather, the best one could do is to compare a an option with 30 days remaining to the same option with 30-$n$ days remaining.

data on the CRSP daily stock file, analyst coverage in the IBES dataset, and available data in the OptionMetrics standardized option dataset. The OptionMetric criterion is the most restrictive; we lose approximately 25% of observations with forecasts because there is no options data available for the forecasting firms (this occurs largely because exchange-traded options are not listed on these stocks). After excluding forecasts issued during earnings announcements periods, which we discuss later, we are left with 23,474 forecasts in our sample.

*3.3. Measuring Changes in Uncertainty*

We measure uncertainty during three periods: the period before the forecast is issued, the period between forecast issuance and the earnings announcement, and the period after the earnings announcement. The short-term analysis is straightforward. We compare post-forecast implied volatility ($\sigma_{Post\text{-}Fcst}$, measured 3 trading days after the forecast date) to pre-forecast implied volatility ($\sigma_{Pre\text{-}Fcst}$, measured 3 trading days prior to the forecast date). We assume that observed changes in uncertainty are due to the forecasts.[17]

We measure long-term changes in uncertainty by comparing the post-earnings announcement level of uncertainty ($\sigma_{Post\text{-}Earns}$, measured 3 trading days after the earnings announcement) to the pre-forecast level of uncertainty,$\sigma_{Pre\text{-}Fcst}$. Due to the length of time covered by this period, it is unreasonable to assume that the only factor affecting uncertainty about the firm is the forecast. If, as hypothesized by Ajinkya and Gift (1984) and discussed by King et al. (1990), managers issue forecasts to align investor expectations with their own, it is possible that our sample consists of firms whose managers observed significant differences between the

[17] We recognize that there will be circumstances where the forecast event is not the only source of news for the firm, even after excluding forecasts issued at the time of earnings announcements.

market's expectations and their own expectation.[18] If true, any changes in uncertainty may be driven by the existence of an "expectations gap", rather than the forecast itself.

To address this concern, we construct a control group of non-forecasting firms that had similar expectations gaps, but that did not issue a forecast prior to the announcement of actual earnings. For each forecast observation we calculate the mean analyst earnings estimate for the period being forecast, as of 3 trading days prior to the forecast. We compare this mean estimate to the earnings subsequently announced by the firm, and deflate the difference by the pre-forecast stock price, resulting in our measure of the pre-forecast expectations gap. For each forecast observation, we select the firm that, as of the date of the forecast, had an expectations gap for the fiscal period in question closest to that of the forecasting firm. For that control firm, we compare the implied volatility prior to the forecast date, $\sigma_{Pre\text{-}Fcst}$, and the implied volatility after the control firm's earnings announcement, $\sigma_{Post\text{-}Earns}$.[19] (This timeline is illustrated in Figure 1.) After including the group of control firms in our tests, we attribute any difference in change in uncertainty across the two groups to the fact that the sample firms issued an earnings forecast.

## 4. Empirical Results

### *4.1. Descriptive Statistics*

[18] Support for the notion of an expectations gap driving forecast issuance is provided by a Graham et al. (2005) survey of corporate executives: "Many interviewed CFOs indicate that they guide analysts to a difference consensus estimate if there is a gap between their internal projection of where the firm might end up at the end of the quarter and the consensus number." (p. 42).

[19] We also require that the control firm not issue *any* forecasts, regardless of fiscal period, during the period between the sample firm's forecast date and the control firm's earnings announcement. Although we do not require the control firm to report actual earnings on the same date as the sample firm, we do require that the control firm's earnings announcement date be within 10 days of the sample firm's earnings announcement. Thus, while the pre-forecast implied volatility will be measured on the same date for both the sample firm and the control firm, the post-earnings announcement may be measured on different dates for each firm. Finally, we require that the difference between the sample firm's pre-forecast expectations gap and the control firm's pre-forecast expectations gap to be no more than 0.5%.

Table 1 presents some basic features of our data. Panel A shows the percentage of firms in each CRSP size decile for which OptionMetrics has standardized options data in each year. Because trading activity on options exchanges tends to increase with the size of the underlying firm, options data are concentrated in larger firms – roughly 80% of firms in the largest size decile have options data during the 1996-2006 period while less than 2% of firms in the two smallest size deciles have available data. Panel B presents data on the durations of these options and shows that the availability of options data declines as the duration of the option increases. By construction, all of the forecasts have available data for 30-day standardized options while 71.6% of these observations have data for 182-day standardized options, and 30.2% have data for 365-day standardized options.[20]

Table 2 describes characteristics of both the firms issuing forecasts and of the forecasts themselves. As expected, the firms are fairly large, with a mean (median) pre-forecast market value of $9.4 billion ($1.6 billion), and have substantial analyst following: the median firm has 9 analyst estimates outstanding prior to the forecast and 75% of firms have at least 6 estimates prior to the forecast. Our variable of interest, implied stock volatility, has a mean (median) value of 49.5% (43.0%) prior to the forecast date.

The management forecasts themselves convey bad news, on average, where news is measured as the difference between the manager's forecast and the pre-forecast analyst consensus estimate for the same period.[21] Consistent with this, the average 3-day abnormal return centered on the forecast announcement date is negative, with a mean (median) value of -

[20] The availability of standardized options data is based on the availability of traded options of various durations. Thus, a firm with few options traded will have few standardized option durations available.

[21] The value of the forecast is either the point estimate given by the manager or the midpoint of the range estimate. We do not attempt to calculate forecast values for open-ended or qualitative forecasts, which results in a smaller number of observations for this value.

3.40% (-1.08%). Finally, the mean (median) "expectations gap," calculated as realized earnings minus analyst expectations prior to the forecast deflated by stock price, is -1.20% (-0.01%).

We exclude all forecasts made during earnings announcement periods, which we define as the 5 trading days centered on the earnings announcement date. We exclude these "bundled" forecasts because their effect on volatility will be commingled with that of the earnings announcement.

To provide evidence on the differences between "bundled" and "non-bundled" forecasts, Figure 2 plots each event day's implied volatility (scaled by the firm's average implied volatility over a 30-day period) around management forecasts.[22] Forecasts are divided into bundled forecasts issued with earnings announcements (the solid line) and unbundled forecasts (the dashed line). Volatility changes for bundled forecasts exhibit roughly the same pattern reported in previous research (Patell and Wolfson, 1979, 1981; Isakov and Perignon, 2001). Implied volatility increases in the period before earnings and forecasts are announced and declines thereafter. This pattern is not surprising given the predictable timing of earnings announcements.

Implied volatilities around the non-bundled forecasts exhibit a very different pattern to that of bundled forecasts. As expected if these forecasts are unanticipated, there is little evidence of an increase in implied volatility before the forecast date. However, there is a pronounced increase in implied volatility immediately following the forecast, suggesting that the forecast increases short-term uncertainty. This pattern is consistent with Ederington and Lee (1996), who find that implied volatilities on foreign currency contracts increase following unscheduled macroeconomic information releases. Because changes in implied volatility around bundled

[22] This figure is based on implied volatilities from 30-day options. Longer-dated option volatilities follow a similar pattern, albeit with less extreme changes around the forecast date.

forecasts are likely to be affected by both the earnings announcement and the forecast, we restrict our analysis to non-bundled forecasts for the remainder of the paper.

*4.2. Short-term changes in uncertainty*

Our first set of hypotheses relates to short-term changes in uncertainty. To assess the statistical significance of the increase in volatility illustrated in Figure 1, we test for difference between the pre- and post-forecast levels of implied volatility. Pre-forecast implied volatility ($\sigma_{Pre\text{-}Fcst}$) is measured 3 trading days before the forecast while post-forecast implied volatility ($\sigma_{Post\text{-}Fcst}$) is measured 3 trading days after the forecast. The results of this test are shown in Table 3. Panel A includes all forecasts, while Panel B separates the forecasts into two groups based on the sign of the forecast news (based on the market-adjusted stock return for the 3-day forecast period). For the overall sample in Panel A, implied volatilities increase significantly in the period immediately after the forecast is issued for options of all maturities although the relation is stronger for the shorter duration options. This result confirms that, on average, the market uncertainty about firm value increases after earnings guidance.

The results in Panel B of Table 3 show that the overall result is driven by forecasts that convey bad news and that the opposite result holds for good news forecasts. In particular, we find that there is a substantial increase in volatility after those forecasts that convey bad news. The increase in volatility averages 6.4% for the shorter duration options and declines monotonically as option duration increases, to around 2.6% for the options with maturity of 18 and 24 months. All of these increases are highly statistically significant. In comparison, volatility declines modestly – by 1% to 1.5% – for the good news forecasts although the changes are again statistically significant. The fact that the magnitude of the volatility changes is larger

for the shorter duration options suggests that these volatility effects are expected to be relatively short-lived.

We next investigate the determinants of the changes in implied volatility. Table 4 shows the results of a multivariate regression of the log change in implied volatility, $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$, as a function of various market, firm, and forecast characteristics. To test our hypotheses about the sign and magnitude of the forecast news, we regress the short-run change in volatility on a bad news indicator variable and on both good and bad news indicator variables interacted with the magnitude of the forecast news. We also include control variables for forecast width (the width of a range forecast, set to zero for point forecasts), forecast horizon, firm size, analysts following, analyst forecast dispersion, market volatility (measured using the VIX volatility index), as well as industry fixed effects. [23]

Consistent with the univariate results, the regressions in Table 4 indicate that firms whose managers issue bad news forecasts experience greater increases in uncertainty. Furthermore, the increase in uncertainty for these forecasts is positively associated with the magnitude of the forecast news. . This result on magnitude does not hold for forecasts conveying good news – the magnitude of good news is unrelated to short-term changes in volatility. Thus, we have mixed results for hypothesis H3: the increase in uncertainty increases with the magnitude of the forecast surprise, but only for those forecasts that convey bad news.

Concerning the control variables, we find that higher levels of analyst following and analyst dispersion are associated with larger reductions (or smaller increases) in uncertainty. that As expected, firm-level changes in volatility are strongly associated with the market's change in volatility over the same period. Surprisingly, less-precise (wider) forecasts are associated with

[23] The VIX index is the Chicago Board Options Exchange Volatility Index.

reductions in implied volatility. Overall, based on the results in Tables 3 and 4, we conclude that the short-run changes in uncertainty around management earnings forecasts are, on average, positive, but that this result is largely driven by forecasts that convey negative news, and that the increase is larger when the magnitude of that bad news is larger.

*4.3. Long-term changes in uncertainty*

We next turn to our final hypothesis, which addresses longer-term changes in uncertainty following forecast issuance. We first present univariate statistics on the change in uncertainty from the period before the forecast, $\sigma_{\text{Pre-Fcst}}$, to the period immediately following the corresponding earnings announcement, $\sigma_{\text{Post-Earns}}$. Table 5, Panel A shows the results for the entire sample of forecasts. On average, the post-earnings level of uncertainty is lower than the pre-forecast level. This result holds for options at all durations, with some evidence of a larger decline over a longer period. This result suggests that, overall, management forecasts reduce longer-run investor uncertainty about firm value.

Similar to our analysis in Table 3, we separate the forecasts into groups representing good and bad news in Panel B of Table 5. In this table, we measure earnings news based on the consensus analyst earnings estimate prior to the forecast relative to the actual earnings reported by the firm. This means that we classify an observation as conveying bad news if analysts, and by extension the market, experience a disappointment at any point in time between the consensus date and the earnings announcement date, whether that bad news was revealed by the forecast, by the actual earnings announcement, or by some other channel. The results in Panel B show that the overall decrease in uncertainty evident in Panel A is largely attributable to the good news forecasts. For these forecasts, volatility declines by 3% to 4% from the period before the forecast to the period after earnings are announced. These declines are similar across the

different durations and are highly statistically significant. In contrast, there is little evidence of any systematic change in volatility for the bad news forecasts. This is consistent with our earlier results that indicated greater increases in uncertainty for bad news firms than for good news firms.

The results in Table 5 do not tell us is whether uncertainty would have decreased in the absence of a forecast. For example, the market may have considerable uncertainty about the future earnings realization that is resolved when the firm announces earnings. In this case, we would expect to observe a decline in uncertainty due to the earnings announcement, regardless of whether the firm issued a forecast. To address that issue, we include the group of control firms in a multivariate regression to determine the net effect of forecast issuance on uncertainty. The results of these regressions are shown in Table 6.

The dependent variable in our regressions is the natural logarithm of the ratio of post-earnings implied volatility, $\sigma_{\text{Post-Earns}}$, to pre-forecast implied volatility, $\sigma_{\text{Pre-Fcst}}$. Hypothesis H4 relates to the incremental affect of forecast issuance on uncertainty, after controlling for other factors that could affect changes in uncertainty. The primary independent variable of interest is *Forecaster*, which equals 1 for forecasting firms and 0 for the control firms. The control variables include the sign and magnitude of the earnings news along with forecast horizon, firm size, analyst following and forecast dispersion, and market volatility. After controlling for the effect of these other variables, we find that the forecaster variable is positive and significant for the longer duration options (91 and 152 days) and positive but insignificant for the 30 day options (the t-statistic is 2.33 for the 91-day options and 2.80 for the 152-day options).[25]

[25] Our construct of interest is the market's assessed uncertainty regarding the firm's future returns. Conceptually, this means the uncertainty about future returns for the remaining life of the firm. Therefore, we view the longer-duration options as more informative about our research question than shorter-duration options. The 152-day standardized option is the longest-duration option for which we have a relatively large sample size. Moving to the

The regressions in Table 6 also show that, regardless of whether the firm issues guidance (i.e., for both forecasters and control firms), uncertainty is increasing when analysts have what turn out to be overly optimistic expectations (*Negative Expectations Gap Indicator*) at the beginning of the measurement period and when the magnitude of the surprise is large (|*Expectations Gap*| for both negative and positive expectations gaps). Uncertainty is also increasing when, holding the expectations gap constant, the earnings announcement date is closer to the forecast (based on the negative coefficient on *Horizon*). Finally, uncertainty is decreasing as pre-forecast analyst dispersion is increasing.

As a whole, the results from these regressions indicate that forecasters do not experience a net decrease in uncertainty after controlling for other factors. Thus, while the univariate statistics indicate a decrease in uncertainty after the earnings announcement, this decrease is attributable to influences other than the issuance of earnings guidance. Specifically, uncertainty is resolved when analysts start with high levels of disagreement, large forecast errors, and optimistic forecast errors.

In Table 7, we expand the regression specification to allow the *Forecaster* indicator to take on different values for positive and negative surprises. As for Table 6, the positive expectations gap designation means that, prior to the forecast date, analysts had a lower expectation of earnings than was ultimately announced. The results conform to the pattern seen earlier for good news and bad news forecasts. When firms issue forecasts and the earnings news is positive there is no effect on uncertainty (after controlling for the earnings realization) (t-stat of -0.35 for the 152-day option). In contrast, firms that issue forecasts when the earnings news is negative experience a significant increase in uncertainty that persists after the earnings

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next longest duration option, the 182-day option, results in a decrease in sample size (based on the Table 6 regression) of 60%.

announcement. The magnitude of the change ranges from 1.57% to 2.40% depending on the option duration in question, with t-statistics from 3.63 to 7.21. Note that the increase in uncertainty increases with option duration, which suggests that this result is not simply a manifestation of the short-term changes in volatility reported above. When managers provide earnings guidance in quarters when they report bad news, this results in a relatively long-run increase in uncertainty about firm value. In contrast, when managers provide guidance in good news quarters there is little effect on long-run uncertainty, although short-run uncertainty tends to decline.

## 5. Conclusion

We study how managers' earnings forecast disclosures affect market uncertainty about firm value. Our principal motivation is to provide evidence on the more general question of how disclosure affects investor uncertainty about firm value. We believe our research is important because there is relatively little evidence in the literature that provides direct evidence on this question.

Our principal tests use a sample of management earnings forecasts disclosed at times other than earnings releases (when forecasts are issues in conjunction with earnings announcements, it is difficult to measure the effect of the forecast). We use implied volatilities derived from equity options prices to measure uncertainty, and compare volatility during three periods of time: the period before the forecast is released, the period between when the forecast is released and earnings are announced, and the period after earnings are announced. We are thus able to measure changes in both short-run and long-run volatility; we assess short-run volatility changes by comparing volatility immediately following forecasts to that immediately

before the forecast, and long-run volatility by comparing volatility in the period after earnings announcements to that in the period before the forecast. We use data for options of various maturities, and so can assess the relative permanence of these volatility effects.

In general, our results indicate that when managers have good earnings news, issuing earnings guidance either reduces or has little effect on uncertainty, depending on the horizon being examined. In contrast, when managers have bad news, guidance results in noticeable increases in market uncertainty. More specifically, we find that short-run volatility increases noticeably following management earnings forecasts, but only for forecasts that convey bad news. For forecasts that convey good news, there is no discernible change in volatility. We also find that in quarters when managers release good news, long-run volatility is not affected by the issuance of earnings guidance. However, in quarters when managers release bad news, there is a noticeable increase in volatility, an effect that becomes more pronounced over longer horizons. This evidence suggests that earnings guidance can have adverse capital market effects in the case of bad news disclosures.

It is hard to understand why the manner in which news is disclosed affects the market's assessment of uncertainty about firm value, as the result on disclosure of bad news implies. One possibility is that by issuing guidance that conveys bad earnings news, managers signal to investors that the firm is in some way riskier than previously thought, perhaps because the managers are not as competent as previously believed. Alternatively, it could be that the adverse earnings news is more permanent in cases where it is disclosed through an earnings forecast, and consequently creates greater uncertainty about firm value (Kasznik and Lev, 1995). In either case, our result is an interesting corollary to extant evidence that managers tend to preempt

adverse earnings news more often than positive earnings news (Skinner, 1994). Although we do not investigate explanations for this result, they remain an interesting area for future research.

**References**


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

Anilowski, C., Feng, M., and Skinner, D.J., 2007. Does earnings guidance affect market returns? The nature and information content of aggregate earnings guidance. *Journal of Accounting and Economics* 44, 36-63.

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

Baginski, S.P., Hassell, J.M., 1990. The market interpretation of management earnings forecasts as a predictor of subsequent financial analyst forecast revision. *The Accounting Review* 65, 175-190.

Baginski, S.P., Hassell, J.M., Hillison, W.A., 2000. Voluntary causal disclosures: Tendencies and capital market reaction. *Review of Quantitative Finance and Accounting* 15, 371-389.

Bagnoli, M., Kross, W., and Watts, S.G., 2002. The information in management's expected earnings report date: A day late, a penny short. *Journal of Accounting Research* 40, 1275-1296.

Barron, O.E., Kim, O., Lim, S.C., Stevens, D.E., 1998. Using analysts' forecasts to measure properties of analysts' information environment. *The Accounting Review* 73, 421-433.

Black, F., 1976. Studies of stock price volatility changes. Proceedings of the 1976 Meetings of the American Statistical Association, Business and Economic Statistics Section.

Botosan, C.A., 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72, 323-349.

Botosan, C.A., and Plumlee, M.A., 2005. Assessing alternative proxies for the expected risk premium. *The Accounting Review* 80, 21-53.

Campbell, Y.Y., Hentschel, L., 1992. No news is good news: An asymmetric model of changing volatility in stock returns. *Journal of Financial Economics* 31, 281-318.

Chen, S., Matsumoto, D.A., Rajgopal, S., 2006. Is silence golden? An empirical analysis of firms that stop giving quarterly earnings guidance. Working paper, University of Washington.

Christie, A.A., 1982. The stochastic behavior of common stock variances: Value, leverage and interest rate effects. *Journal of Financial Economics* 10, 407-432.

Clement, M., Frankel, R., Miller, J., 2003. Confirming management earnings forecasts, earnings uncertainty, and stock returns. *Journal of Accounting Research* 41, 653-679.

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

Dennis, P., Mayhew, S., Stivers, C., 2006. Stock returns, implied volatility innovations, and the asymmetric volatility phenomenon. *Journal of Financial and Quantitative Analysis* 41, 381-406.

Dumas, B., Fleming, J., and Whaley, R.E., 1998. Implied volatility functions: Empirical tests. *Journal of Finance* 53, 2059-2106.

Easton, P.D., and Monahan, S.J., 2005. An evaluation of accounting-based measures of expected returns. *The Accounting Review* 80, 501-538.

Ederington, L.H., Lee, J.H., 1996. The creation and resolution of market uncertainty: The impact of information releases on implied volatility. *Journal of Financial and Quantitative Analysis* 31, 513-539.

Field, L., Lowry, M., Shu, S., 2005. Does disclosure deter or trigger litigation? *Journal of Accounting and Economics* 39, 487-507.

Foster, N., 2003, The FASB and the capital markets, The FASB Report (June 2003).

French, K.R., Schwert, G.W., Stambaugh, R.F., 1987. Expected stock returns and volatility. *Journal of Financial Economics* 19, 3-29.

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

Houston, J.F., Lev, B., Tucker, J., 2007. To guide or not to guide? Causes and consequences of stopping quarterly earnings guidance. Working paper, New York University.

Hutton, A.P., Miller, G.S., and Skinner, D.J., 2003. The role of supplementary statements with management earnings forecasts. *Journal of Accounting Research* 41, 867-890.

Isakov, D., Perignon, C., 2001. Evolution of market uncertainty around earnings announcements. *Journal of Banking & Finance* 25, 1769-1788.

Jennings, R., 1987. Unsystematic security price movements, management earnings forecasts, and revisions in consensus analyst earnings forecasts. *Journal of Accounting Research* 25, 90-110.

Jorgensen, B.N., Kirschenheiter, M.T., 2003. Discretionary risk disclosures. *The Accounting Review* 78, 449-469.

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

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

Kim, O., Verrecchia, R.E., 1997. Pre-announcement and event-period private information. *Journal of Accounting and Economics* 24, 395-419.

King, R., Pownall, G., Waymire, G., 1990. Expectations adjustment via timely management forecasts: Review, synthesis, and suggestions for future research. *Journal of Accounting Literature* 9, 113-144.

Lang, M.H., Lundholm, R.J., 1996. Corporate disclosure policy and analyst behavior. *The Accounting Review* 71, 467-492.

Merton, R.C., 1987. A simple model of capital market equilibrium with incomplete information. *Journal of Finance* 42, 483-510.

Patell, J.M., Wolfson, M.A., 1979. Anticipated information releases reflected in call option prices. *Journal of Accounting and Economics* 1, 117-140.

Patell, J.M., Wolfson, M.A., 1981. The ex ante and ex post price effects of quarterly earnings announcements reflected in option and stock prices. *Journal of Accounting Research* 19, 434-458.

Rogers, J.L., Stocken, P.C., 2005. Credibility of management forecasts. *The Accounting Review* 80, 1233-1260.

Skinner, D.J., 1994. Why firms voluntarily disclose bad news. *Journal of Accounting Research* 32, 38-60.

Subramanyam, K.R., 1996. Uncertain precision and price reactions to information. *The Accounting Review* 71, 207-220.

Trueman, B., 1986. Why do managers voluntarily release earnings forecasts? *Journal of Accounting and Economics* 8, 53-71.

Verrecchia, R.E., 2001. Essays on disclosure. *Journal of Accounting and Economics* 32, 97-180.

Whaley, R.E., and Cheung. 1982. Anticipation of quarterly earnings announcements: A test of option market efficiency. *Journal of Accounting and Economics* 4, 57-83.

**Figure 1 – Event Timeline**

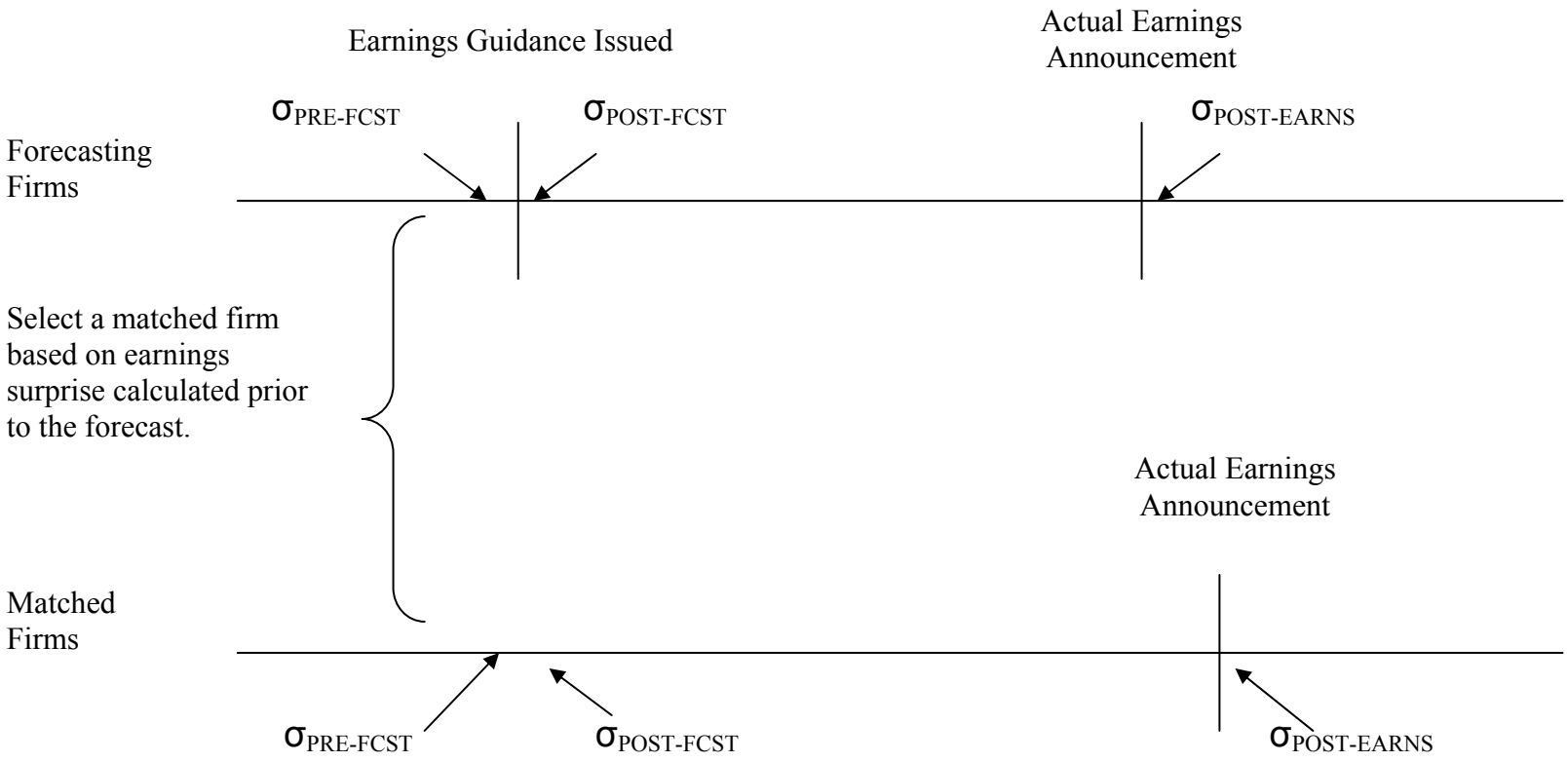


**Figure 1 Notes:**
This figure illustrates the event dates in our sample. For the forecasting firms, we measure implied volatility at 3 points in time: 3 trading days prior to the forecast issuance, 3 trading days following the forecast, and 3 trading days following the earnings announcement to which the forecast related. For each matched (non-forecasting) firms, we measure implied volatility 3 trading days prior to its paired firm's forecast, 3 trading days subsequent to its paired firm's forecast, and 3 trading days subsequent to its own earnings announcement. The daily value of implied volatility at each of these three dates is denoted $\sigma_{Pre\text{-}Fcst}$, $\sigma_{Post\text{-}Fcst}$, $\sigma_{Post\text{-}Earns}$, respectively. The matched firm's earnings announcement may be on a different date than that of its paired firm, but is restricted to be within 10 days of the forecasting firm's announcement date.

**Figure 2 – Implied Volatility Around Management Forecasts**

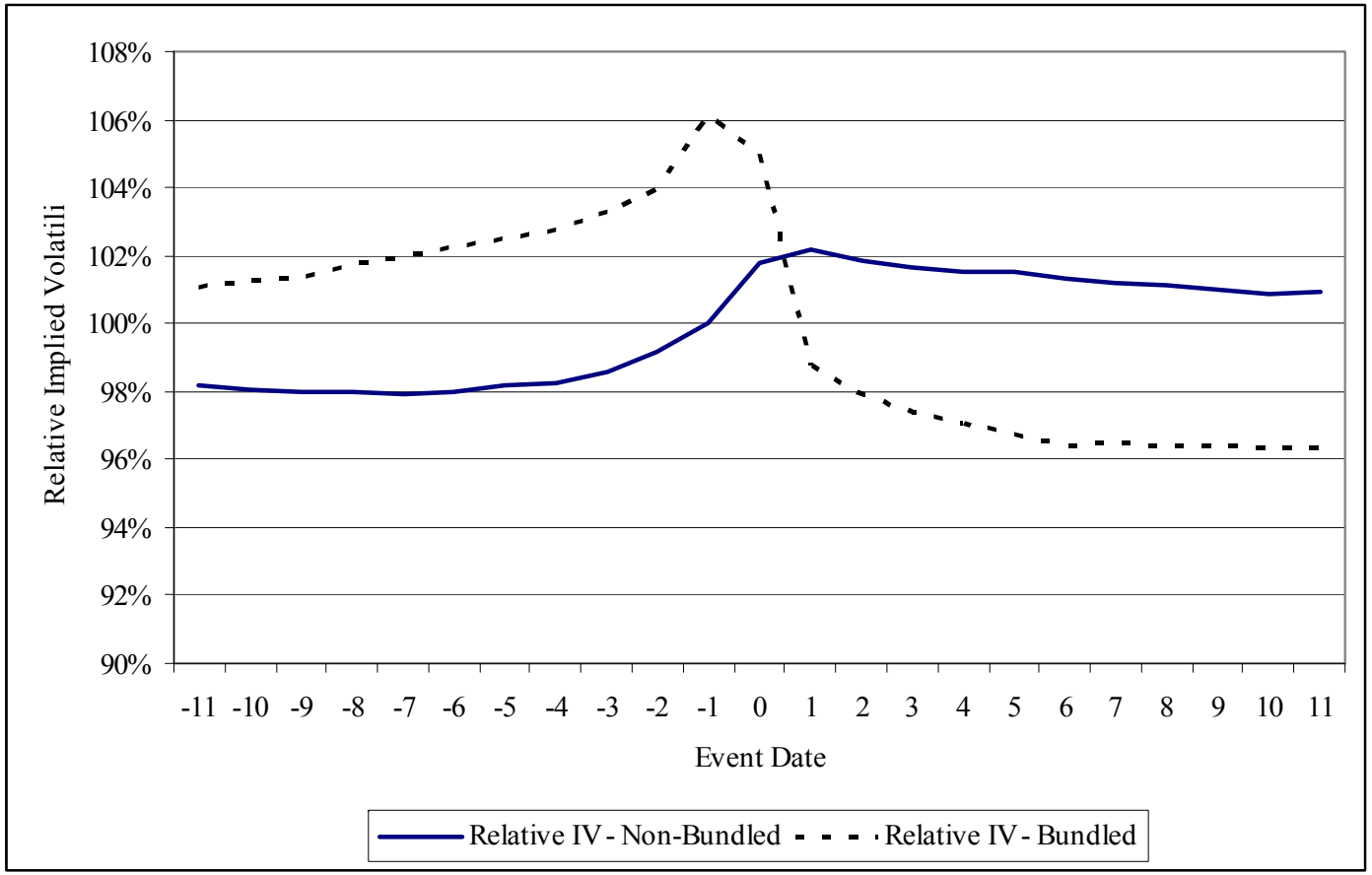


**Figure 2 Notes:**
This figure illustrates the pattern of implied volatility surrounding management earnings forecasts. The plotted values ("Relative IV") are equal to the daily implied volatility for a particular firm, divided by the average volatility for that firm over the 30- day period surrounding the management forecast. Implied volatilities are taken from the OptionMetrics dataset of standardized options, calculated as the average of the implied volatilities for 30-day call options and 30-day put options. The dashed line represents the pattern surrounding forecasts issued within 2 days of an earnings announcement, while the solid line represents forecasts issued outside of earnings announcement periods.

**Table 1 – Descriptive Statistics**

**Panel A: OptionMetrics coverage by CRSP capitalization decile. As a % of CRSP firms.**

| | CRSP Size Decile | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **Total** |
| 1996 | 0.0% | 0.0% | 0.1% | 1.4% | 3.7% | 9.7% | 17.4% | 29.4% | 44.8% | 78.7% | 17.6% |
| 1997 | 0.0% | 0.0% | 0.4% | 1.9% | 5.5% | 12.3% | 24.1% | 37.7% | 54.4% | 81.5% | 21.1% |
| 1998 | 0.1% | 0.0% | 0.6% | 3.7% | 7.9% | 18.9% | 28.5% | 44.8% | 60.8% | 82.5% | 24.5% |
| 1999 | 0.1% | 0.0% | 0.7% | 3.1% | 11.3% | 20.9% | 32.1% | 44.5% | 61.4% | 79.9% | 26.1% |
| 2000 | 0.0% | 0.0% | 0.7% | 2.8% | 9.5% | 16.2% | 30.0% | 41.6% | 59.9% | 79.3% | 24.5% |
| 2001 | 0.1% | 0.1% | 0.4% | 2.7% | 6.3% | 16.7% | 28.2% | 43.4% | 62.8% | 84.0% | 24.5% |
| 2002 | 0.1% | 0.3% | 0.9% | 1.3% | 7.2% | 20.1% | 34.0% | 50.8% | 72.2% | 87.8% | 27.3% |
| 2003 | 0.0% | 0.4% | 1.5% | 3.0% | 10.5% | 21.4% | 35.6% | 45.5% | 67.0% | 87.2% | 27.1% |
| 2004 | 0.1% | 0.3% | 2.5% | 6.8% | 16.6% | 25.8% | 40.2% | 53.9% | 71.8% | 87.5% | 30.1% |
| 2005 | 0.4% | 0.4% | 4.6% | 10.4% | 20.5% | 29.8% | 44.6% | 55.4% | 73.1% | 87.4% | 32.0% |
| 2006 | 0.0% | 1.5% | 6.6% | 13.6% | 23.2% | 32.6% | 47.6% | 59.2% | 71.0% | 84.4% | 33.0% |

**Panel B: Frequency distribution of duration, by forecasts**

| Days to Expiration | Forecasts with Option Data Available |
|---|---|
| 30 | 23,474 |
| 60 | 23,426 |
| 91 | 23,355 |
| 122 | 23,271 |
| 152 | 22,717 |
| 182 | 16,819 |
| 273 | 7,126 |
| 365 | 7,078 |
| 547 | 6,944 |
| 730 | 4,200 |

*(see notes on following page)*

**Table 1 Notes:**
This table provides summary information regarding the extent of OptionMetrics coverage. Panel A shows the proportion of the CRSP population, by size decile, covered by OptionMetrics. CRSP population and size deciles are determined at the beginning of each year. A firm is considered to have coverage in a particular year if that firm has at least 100 observations in the OptionMetrics dataset in that year.

Panel B describes, for the population of management forecasts used in our study, the standardized option durations available in the OptionMetrics dataset. Option availability is based on the existence of a standardized option 3 trading days prior to the issuance of the forecast. This table includes only forecasts issued between 1996-2006 and were made outside of earnings announcement periods, defined as the 5-day window centered on a firm's earnings announcement date.

**Table 2 – Descriptive Statistics – General**

| Variable | N | Mean | Median | 25th Percentile | 75th Percentile |
|---|---|---|---|---|---|
| **Firm Characteristics:** | | | | | |
| Market Value | 23,474 | 9,416 | 1,609 | 582 | 5,883 |
| Pre-Forecast Gap in Analyst Expectations | 20,956 | -1.20% | -0.01% | -0.56% | 0.14% |
| Pre-Forecast Implied Volatility | 23,474 | 49.5% | 43.0% | 31.6% | 61.7% |
| Analyst Following | 22,342 | 10.9 | 9.0 | 6.0 | 15.0 |
| | | | | | |
| **Forecast Characteristics:** | | | | | |
| Forecast Horizon (days) | 23,474 | 95.0 | 25.0 | -2.0 | 156.0 |
| Forecast News | 16,633 | -0.3% | 0.0% | -0.3% | 0.0% |
| % Annual Forecasts | 23,474 | 38.1% | | | |
| Stock Return, 3-day Forecast Period | 23,474 | -3.40% | -1.08% | -7.84% | 3.01% |
| Ex post Forecast Error | 15,947 | -0.15% | 0.03% | -0.05% | 0.14% |

**Table 2 Notes:**
This table provides descriptive information about the forecasting firms in our sample, covering a period from 1996-2006. This table includes only forecasts made outside of earnings announcement periods, defined as the 5-day window centered on a firm's earnings announcement date. *Market Value* is the market value of the firm's common equity. *Pre-Forecast Gap in Analyst Expectations* is the reported EPS figure (from IBES) for the period being forecast minus analyst consensus forecast for that period. *Pre-Forecast Implied Volatility* is the average of the implied volatilities for a standardized 30-day put and call from the OptionMetrics dataset. *Analyst Following* is the number of analysts with outstanding earnings estimates on IBES. *Market Value*, *Pre-Forecast Gap in Analyst Expectations*, *Pre-Forecast Implied Volatility*, and *Analyst Following* are all measured 3 trading days prior to forecast issuance. *Forecast Horizon* is the number of days between the forecast date and the end of the fiscal period being forecast; negative values represent forecasts issued after quarter-end. *Forecast News* is equal to the forecast value minus the mean analyst estimate for that period as of 3 trading days prior to the forecast. The forecast value is equal to the median value for range forecasts and is not calculated for open-ended or qualitative forecasts. *%Annual Forecasts* is the % of all forecasts that are made for annual, rather than quarterly, fiscal periods. *Stock Return, 3-day Forecast Period* is the cumulative stock return for the 3 trading days surrounding the forecast date. *Ex post Forecast Error* is the realized earnings value minus the forecast value, using only point and range estimates.

**Table 3 - Univariate Short-Term Changes in Implied Volatility**

**Panel A: Full Sample of Forecasts**

| Option Duration | N | $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t statistic[#] |
|---|---|---|---|
| 30 days | 23,474 | 0.031 | 17.14*** |
| 60 days | 23,426 | 0.028 | 13.10*** |
| 91 days | 23,355 | 0.027 | 15.99*** |
| 122 days | 23,271 | 0.025 | 15.35*** |
| 152 days | 22,717 | 0.024 | 14.93*** |
| 182 days | 16,819 | 0.021 | 12.27*** |
| 273 days | 7,126 | 0.012 | 8.93*** |
| 365 days | 7,078 | 0.010 | 8.78*** |
| 547 days | 6,944 | 0.009 | 8.68*** |
| 730 days | 4,200 | 0.009 | 6.70*** |

**Panel B: Forecasts Grouped by Sign of News**

| | Good News Forecasts | | | Bad News Forecasts | | |
|---|---|---|---|---|---|---|
| Option Duration | N | $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t-statistic[#] | N | $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t-statistic[#] |
| 30 days | 9,963 | -0.013 | -7.34*** | 13,511 | 0.064 | 28.31*** |
| 60 days | 9,939 | -0.015 | -8.83*** | 13,487 | 0.059 | 21.68*** |
| 91 days | 9,900 | -0.013 | -8.13*** | 13,455 | 0.056 | 23.63*** |
| 122 days | 9,869 | -0.012 | -7.68*** | 13,402 | 0.053 | 22.77*** |
| 152 days | 9,622 | -0.012 | -8.22*** | 13,095 | 0.050 | 21.54*** |
| 182 days | 7,195 | -0.011 | -9.25*** | 9,624 | 0.045 | 18.81*** |
| 273 days | 3,348 | -0.011 | -10.22*** | 3,778 | 0.033 | 13.99*** |
| 365 days | 3,325 | -0.012 | -12.09*** | 3,753 | 0.028 | 14.44*** |
| 547 days | 3,258 | -0.010 | -9.90*** | 3,686 | 0.026 | 13.66*** |
| 730 days | 1,938 | -0.010 | -8.46*** | 2,262 | 0.026 | 11.25*** |

*(See notes on following page)*

**Table 3 Notes:**

***, **, * indicates that the coefficient is statistically different from 0 at the 1%, 5%, and 10% significance level, respectively (two tailed).

#Test statistics are based on standard errors that are clustered at the 2-digit SIC level.

This table shows the univariate change in implied volatility ("IV") surrounding management earnings forecasts. $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$ is the natural logarithm of the ratio of the post-forecast IV (3 trading days following the forecast date) to the pre-forecast IV (3 trading days prior to the forecast date). The IVs are taken from OptionMetrics standardized options datasets and are equal to the average of the IVs from at-the-money puts and calls of various durations. The change represents the difference between IV measured 3 trading days subsequent to the forecast and IV measured 3 trading days prior to the forecast. Panel A calculates the change for all forecasts in our sample, while Panel B groups the forecasts based on the sign of the news. A forecast is considered to be a good news forecast if the firm's market-adjusted 3-day stock return surrounding the forecast date was greater than or equal to zero, and a bad news forecast otherwise.

**Table 4 - Regression Analysis of Change in Implied Volatilities (Short-term)**

**Dependent Variable:** $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$

| | Option Duration | | |
|---|---|---|---|
| **Independent Variable** | **30 days** | **91 days** | **152 days** |
| Bad News Indicator | 0.02221*** | 0.02217*** | 0.01936*** |
| | (6.41) | (8.11) | (7.85) |
| \|Forecast News\|*Bad News Indicator | 2.48250*** | 2.66055*** | 2.53991*** |
| | (5.71) | (6.82) | (6.99) |
| \|Forecast News\|*Good News Indicator | -0.01692 | -0.08966 | -0.02531 |
| | (-0.03) | (-0.18) | (-0.05) |
| Forecast Width | -1.51866*** | -1.69782*** | -1.79598*** |
| | (-3.58) | (-5.04) | (-5.81) |
| Forecast Horizon | -0.00002** | -0.00002** | 0.0000 |
| | (-2.02) | (-2.25) | (-1.15) |
| Log(Market Value) | 0.00209 | 0.00199** | 0.00152* |
| | (1.56) | (2.28) | (1.74) |
| Log(Analyst Following) | -0.01613*** | -0.01436*** | -0.01276*** |
| | (-5.54) | (-6.18) | (-6.67) |
| Analyst Dispersion | -0.13156*** | -0.08576*** | -0.08288*** |
| | (-4.85) | (-4.69) | (-5.27) |
| Log(ΔVIX Index) | 0.22245*** | 0.15560*** | 0.13068*** |
| | (15.38) | (16.08) | (14.48) |
| Industry Fixed Effects | Included | Included | Included |
| N | 16,390 | 16,318 | 15,900 |
| R-squared | 7.0% | 9.0% | 8.0% |

*(see notes on following page)*

**Table 4 Notes:**
***, **, * indicates that the coefficient is statistically different from 0 at the 1%, 5%, and 10% significance level, respectively (two tailed).

#Test statistics are based on standard errors that are clustered at the 2-digit SIC level.

This table provides details on the cross-sectional variation in the change in implied volatility ("IV") surrounding management earnings forecasts. The population includes forecasts made between 1996-2006, excluding forecasts made during 5-day earnings announcement periods.

The dependent variable, $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$, is the natural logarithm of the ratio of the post-forecast IV (3 trading days following the forecast date) to the pre-forecast IV (3 trading days prior to the forecast date). The IVs are taken from OptionMetrics standardized options datasets and are equal to the average of the IVs from at-the-money puts and calls of various durations.

*Log(Market Value)* is the natural logarithm of the firm's market value of equity measured 3 trading days prior to the forecast date. *Bad News Indicator* is equal to 1 if the forecast value (or midpoint of the forecast range) was less than the existing mean analyst estimate, and zero otherwise. |*Forecast News*| is the absolute value of the difference between the forecast value and the existing analyst estimates. *Forecast Width* is the high minus low value of a range forecast, deflated by the firm's stock price 3 trading days prior to the forecast. *Forecast Width* is equal to 0 for point estimates. *Log(ΔVIX Index)* is equal to the natural logarithm of the ratio of the level of the Chicago Board Options Exchange Volatility Index on the post-forecast date to the level of that index on the pre-forecast date. *Forecast Horizon* is the number of days between the forecast date and the end of the fiscal period being forecast. *Log(Analyst Following)* is the natural logarithm of the number of analysts with earnings estimates on IBES prior to the forecast. *Analyst Dispersion* is the standard deviation of analyst estimates prior to the forecast. Industry fixed effects are included the regression and are based on 2-digit SIC codes.

**Table 5 – Univariate Long-Term Changes in Implied Volatility**

**Panel A: Full Sample of Forecasts**

| Option Duration | N | $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t statistic[#] |
|---|---|---|---|
| 30 days | 20,652 | -0.019 | -5.92*** |
| 60 days | 20,596 | -0.018 | -5.91*** |
| 91 days | 20,521 | -0.012 | -4.67*** |
| 122 days | 20,426 | -0.012 | -4.71*** |
| 152 days | 19,714 | -0.012 | -4.66*** |
| 182 days | 11,024 | -0.017 | -6.46*** |
| 273 days | 6,238 | -0.025 | -6.32*** |
| 365 days | 6,164 | -0.023 | -5.73*** |
| 547 days | 6,049 | -0.020 | -5.54*** |
| 730 days | 1,641 | 0.003 | 0.67 |

**Panel B: Forecasts Grouped by Sign of Long-Term News**

| | Good News Forecasts | | | Bad News Forecasts | | |
|---|---|---|---|---|---|---|
| Option Duration | N | $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t-statistic[#] | N | $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$ | t-statistic[#] |
| 30 days | 9,990 | -0.038 | -8.22*** | 10,646 | -0.002 | -0.63 |
| 60 days | 9,963 | -0.037 | -8.95*** | 10,617 | 0.000 | 0.09 |
| 91 days | 9,936 | -0.032 | -8.17*** | 10,569 | 0.006 | 2.04** |
| 122 days | 9,900 | -0.032 | -8.41*** | 10,510 | 0.006 | 1.71* |
| 152 days | 9,538 | -0.031 | -8.48*** | 10,161 | 0.006 | 1.86* |
| 182 days | 5,553 | -0.037 | -9.85*** | 5,462 | 0.004 | 0.92 |
| 273 days | 3,266 | -0.041 | -7.34*** | 2,972 | -0.008 | -1.68* |
| 365 days | 3,226 | -0.040 | -7.34*** | 2,938 | -0.005 | -1.05 |
| 547 days | 3,183 | -0.036 | -7.57*** | 2,866 | -0.003 | -0.71 |
| 730 days | 840 | -0.016 | -3.63*** | 801 | 0.022 | 3.98*** |

*(See notes on following page)*

**Table 5 Notes:**
***, **, * indicates that the coefficient is statistically different from 0 at the 1%, 5%, and 10% significance level, respectively (two tailed).

#Test statistics are based on standard errors that are clustered at the 2-digit SIC level.

This table shows the univariate change in implied volatility ("IV") surrounding management earnings forecasts. $\ln\left(\frac{\sigma_{\text{Post-Fcst}}}{\sigma_{\text{Pre-Fcst}}}\right)$ is the natural logarithm of the ratio of the post-forecast IV (3 trading days following the forecast date) to the pre-forecast IV (3 trading days prior to the forecast date). The IVs are taken from OptionMetrics standardized options datasets and are equal to the average of the IVs from at-the-money puts and calls of various durations. The change represents the difference between IV measured 3 trading days subsequent to the forecast and IV measured 3 trading days prior to the forecast. Panel A calculates the change for all forecasts in our sample, while Panel B groups the forecasts based on the sign of the long-term news. A forecast is considered to be a good long-term news forecast if the mean analyst earnings estimate, calculated prior to the forecast, was less than realized earnings, and a bad news forecast otherwise.

**Table 6 – Cross-Sectional Analysis of Long-Term Changes in Uncertainty**

**Dependent Variable:** $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$

| | Option Duration | | |
|---|---|---|---|
| **Independent Variable** | **30 days** | **91 days** | **152 days** |
| Forecaster | 0.00501 | 0.00951** | 0.01043*** |
| | (1.10) | (2.33) | (2.80) |
| Negative Expectations Gap Indicator | 0.00583 | 0.00979*** | 0.00964*** |
| | (1.35) | (2.87) | (3.21) |
| \|Expectations Gap\|*Negative Expectations Gap Indicator | 0.01500*** | 0.01682*** | 0.01686*** |
| | (5.27) | (7.47) | (6.54) |
| \|Expectations Gap\|*Positive Expectations Gap Indicator | 0.01164 | 0.02229*** | 0.02453*** |
| | (1.29) | (2.92) | (3.56) |
| Horizon | -0.00015*** | -0.00019*** | -0.00021*** |
| | (-7.68) | (-11.57) | (-12.11) |
| Log(Market Value) | 0.00038 | 0.00325* | 0.00375** |
| | (0.22) | (1.98) | (2.34) |
| Log(Analyst Following) | -0.00891* | -0.00718 | -0.00831** |
| | (-1.8) | (-1.66) | (-2.16) |
| Analyst Dispersion | -0.11973*** | -0.12238*** | -0.12544*** |
| | (-3.44) | (-3.77) | (-3.9) |
| Log(ΔVIX Index) | 0.40842*** | 0.35169*** | 0.32696*** |
| | (31.04) | (29.90) | (27.11) |
| Industry Fixed Effects | Included | Included | Included |
| N | 28,620 | 28,268 | 27,126 |
| R-squared | 18.0% | 18.0% | 18.0% |

*(see notes on following page)*

**Table 6 Notes:**
***, **, * indicates that the coefficient is statistically different from 0 at the 1%, 5%, and 10% significance level, respectively (two tailed).

#Test statistics are based on standard errors that are clustered at the 2-digit SIC level.

This table provides details on the cross-sectional variation in the long-term change in implied volatility ("IV") following a management earnings forecast. The population includes forecasts made between 1996-2006, excluding forecasts made during 5-day earnings announcement periods.

The dependent variable, $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$, is the natural logarithm of the ratio of the post-earnings IV (3 trading days following the earnings announcement date) to the pre-forecast IV (3 trading days prior to the forecast date). The IVs are taken from OptionMetrics standardized options datasets and are equal to the average of the IVs from at-the-money puts and calls of various durations.

*Log(ΔVIX Index)* is equal to the natural logarithm of the ratio of the level of the Chicago Board Options Exchange Volatility Index on the post-forecast date to the level of that index on the pre-forecast date. *Forecaster* is an indicator variable equal to 1 for forecasting firms and 0 for matched firms. *Negative Expectations Gap Indicator* is equal to 1 if the mean analyst estimate, prior to the forecast date, was less than the actual value of earnings, and zero otherwise. |*Expectations Gap*| is the absolute value of the difference between pre-forecast analyst estimates and realized earnings. *Horizon* is the number of days between the forecast date and the end of the fiscal period being forecast. *Log(Market Value)* is the natural logarithm of the firm's market value of equity measured 3 trading days prior to the forecast date. *Log(Analyst Following)* is the natural logarithm of the number of analysts with earnings estimates on IBES prior to the forecast. *Analyst Dispersion* is the standard deviation of analyst estimates prior to the forecast. Industry fixed effects are included the regression and are based on 2-digit SIC codes.

**Table 7 – Cross-Sectional Analysis of Long-Term Changes in Uncertainty**

**Dependent Variable:** $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$

| | Option Duration | | |
|---|---|---|---|
| **Independent Variable** | **30 days** | **91 days** | **152 days** |
| Forecaster*Positive Expectations Gap Indicator | -0.0045 | -0.00299 | -0.00168 |
| | (-0.69) | (-0.54) | (-0.35) |
| Forecaster*Negative Expectations Gap Indicator | 0.01571*** | 0.02360*** | 0.02402*** |
| | (3.63) | (6.70) | (7.21) |
| Negative Expectations Gap Indicator | -0.00443 | -0.00371 | -0.00342 |
| | (-0.76) | (-0.93) | (-1.09) |
| \| Expectations Gap\|*Negative Expectations Gap Indicator | 0.01488*** | 0.01667*** | 0.01670*** |
| | (5.24) | (7.42) | (6.48) |
| \| Expectations Gap\|*Positive Expectations Gap Indicator | 0.01139 | 0.02197*** | 0.02420*** |
| | (1.26) | (2.88) | (3.51) |
| Horizon | -0.00015*** | -0.00020*** | -0.00021*** |
| | (-7.69) | (-11.6) | (-12.11) |
| Log(Market Value) | 0.00042 | 0.00331** | 0.00378** |
| | (0.25) | (2.00) | (2.37) |
| Log(Analyst Following) | -0.00927* | -0.00764* | -0.00874** |
| | (-1.86) | (-1.77) | (-2.28) |
| Analyst Dispersion | -0.11522*** | -0.11653*** | -0.11948*** |
| | (-3.31) | (-3.61) | (-3.74) |
| Log(ΔVIX Index) | 0.40829*** | 0.35151*** | 0.32680*** |
| | (30.84) | (29.76) | (26.99) |
| Industry Fixed Effects | Included | Included | Included |
| N | 28,620 | 28,268 | 27,126 |
| R-squared | 18.0% | 18.0% | 18.0% |

*(see notes on following page)*

**Table 7 notes:**
***, **, * indicates that the coefficient is statistically different from 0 at the 1%, 5%, and 10% significance level, respectively (two tailed).

#Test statistics are based on standard errors that are clustered at the 2-digit SIC level.

This table provides details on the cross-sectional variation in the long-term change in implied volatility ("IV") following a management earnings forecast. The population includes forecasts made between 1996-2006, excluding forecasts made during 5-day earnings announcement periods.

The dependent variable, $\ln\left(\frac{\sigma_{\text{Post-Earns}}}{\sigma_{\text{Pre-Fcst}}}\right)$, is the natural logarithm of the ratio of the post-earnings IV (3 trading days following the earnings announcement date) to the pre-forecast IV (3 trading days prior to the forecast date). The IVs are taken from OptionMetrics standardized options datasets and are equal to the average of the IVs from at-the-money puts and calls of various durations.

*Log(ΔVIX Index)* is equal to the natural logarithm of the ratio of the level of the Chicago Board Options Exchange Volatility Index on the post-forecast date to the level of that index on the pre-forecast date. *Forecaster* is an indicator variable equal to 1 for forecasting firms, and 0 for matched firms. *Negative Expectations Gap Indicator* is an indicator variable equal to 1 when the pre-forecast mean analyst estimate was greater than realized earnings, and 0 otherwise. *Positive Expectations Gap Indicator* is equal to 1 if the mean analyst estimate, prior to the forecast date, was less than the actual value of earnings, and zero otherwise. |*Expectations Gap*| is the absolute value of the difference between pre-forecast analyst estimates and realized earnings. *Horizon* is the number of days between the forecast date and the end of the fiscal period being forecast. *Log(Market Value)* is the natural logarithm of the firm's market value of equity measured 3 trading days prior to the forecast date. *Log(Analyst Following)* is the natural logarithm of the number of analysts with earnings estimates on IBES prior to the forecast. *Analyst Dispersion* is the standard deviation of analyst estimates prior to the forecast. Industry fixed effects are included the regression and are based on 2-digit SIC codes.