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 tend to increase short-term volatility but have little effect on long-term volatility. We also find that when managers issue forecasts that convey bad news relative to analysts' expectations, both short-term and long-term return volatility increase, and that these results are more pronounced when firms do not issue forecasts on a regular basis. Our results suggest that in most instances disclosure has little affect on long term measures of investor uncertainty but that it can sometimes increase uncertainty when managers announce negative news.

1. Introduction

There is a large accounting literature on the voluntary disclosure of earnings forecasts by managers. Most empirical research in this area examines managers' incentives to provide earnings forecasts, properties of those forecasts, and how market participants respond to the forecasts. Most studies focus on the short-run reaction to management forecasts, measured as changes in stock prices or analysts' forecast revisions, and how this reaction varies as a function of forecast properties. These studies generally find that forecasts cause analysts and investors to revise their expectations of future earnings.

Our interest is in whether managers' voluntary disclosures affect uncertainty about underlying firm value. In contrast to the large volume of work on the informativeness of management disclosures, few papers address how disclosure affects uncertainty. To address this question, we investigate whether managers' earnings forecasts affect investors' assessments of uncertainty about firm value, measured as implied stock return volatilities from exchange-traded option prices. Our research is motivated by whether more forthcoming disclosure lowers investor uncertainty about firm value.

On one hand, it may seem clear that simply changing the timing of earnings disclosures cannot affect long run measures of uncertainty about firm fundamentals.[1] For example, Ross (1989) shows that the rate or manner of information arrival is irrelevant for asset pricing as long as it does not affect underlying cash flows. On the other hand, however, it also seems intuitive that certain types of earnings disclosures, especially those that are unexpected, may cause investors to change their assessments of firm or manager type, potentially increasing their

[1] We view earnings guidance as accelerating the timing and increasing the frequency of disclosures about earnings.

uncertainty about underlying value.[2] Perhaps more generally, it also seems plausible that increasing the number of observations drawn from the firm's underlying earnings series could lower investors' uncertainty about the parameters of that distribution.

The use of implied volatilities from options prices has several advantages for assessing the effect of voluntary disclosure on uncertainty. First, implied volatilities provide a relatively 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 time to expiration. The availability of long-maturity options thus allows us to directly assess market expectations about the uncertainty associated with firm value over a relatively long horizon.

Second, data on implied volatilities provide a rich source of information about investors' expectations about future stock volatility. Since two early studies by Patell and Wolfson (1979, 1981) little disclosure-related research of which we are aware uses implied volatilities. In contrast to historic volatilities derived from realized stock returns, implied volatilities provide a direct measure of investors' *expectations* of future volatility and so provide a natural way of measuring how management disclosures affect uncertainty. Because exchange-traded options are now listed on large samples of stocks and are actively traded, implied volatilities no longer suffer from illiquidity and non-trading problems. In addition, we utilize implied volatilities from *standardized* options which can be interpreted as implied volatilities from an at-the-money

[2] For example, if managers disclose that large write-downs will be forthcoming so that earnings will be substantially lower than expected, investors may revise their assessments of the nature of the firm's business and/or quality of its management such that their uncertainty about underlying firm profitability increases. Banks' recent pre-disclosures about write-downs related to the subprime crisis could be examples of this in that they shook investors' confidence in the banks' ability to properly measure and manage the risk of their operations.

options with constant duration. By using standardized options, we avoid many of the estimation issues inherent in using implied volatilities from options prices.[3]

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 (we show that patterns of implied volatility around such "bundled" forecasts are different from those around unbundled forecasts). We first look at short-window changes in uncertainty and show that, on average, expected volatility increases (for all option durations) after forecasts are issued. This increase is driven by forecasts that convey bad news, especially when the magnitude of that news is large. Good news forecasts are associated with modest decreases in uncertainty. We also compare sporadic forecasts to forecasts issued by firms that regularly issue management earnings forecasts and find that sporadic forecasts lead to larger increases (or smaller decreases) in uncertainty. These results are robust across all option durations.

We then investigate whether the announcement of *realized* earnings eliminates the short-window effects of providing a *forecast* of those earnings. Specifically, we compare implied volatilities measured just before the forecast release to implied volatilities just after the corresponding earnings announcement. This allows us to measure the overall change in uncertainty due to the firm's earnings disclosure strategy. To control for changes in uncertainty attributable to the normal earnings disclosure process (absent earnings forecasts) we use a non-forecast control sample and match on the basis of the pre-forecast earnings expectations gap.

[3] Implied volatilities 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).

These long-window tests provide evidence of an overall decline in implied volatility from the period before the forecast date (or pseudo-forecast date) to the period after earnings are announced. This decline occurs regardless of whether managers provide earnings forecasts, consistent with earnings announcements generally resolving investor uncertainty about firm profitability. Firms that issue forecasts experience a smaller reduction in uncertainty than firms that do not, and, similar to the short-window results, this effect is driven by forecasts that convey adverse news. This result is stronger for the subsample of sporadic (non-routine) forecasts, which we also find are more likely to convey extreme bad news. For these observations the forecast effect largely offsets the overall decline in volatility, so that there is little net change in volatility.

Together, these findings suggest that while forecasts generally increase short term market uncertainty in the period after their release, they have little effect on uncertainty in the longer run, once earnings are announced. We do find, however, that certain forecasts – principally those that convey negative news and are made by firms that do not normally provide forecasts – can increase longer run market uncertainty, presumably because they change investors' views about the nature of the underlying firm and/or its management.

We discuss related literature and hypotheses next. 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

Our primary research question is whether managers' voluntary disclosures affect investors' assessments of uncertainty about firm value. Our goal is to study the effect of disclosure *per se*, rather than whether disclosures that provide information about risk cause

investors to change their assessments about the variability of firm value.[4] This goal motivates our focus on the voluntary disclosure of earnings forecasts. Because firms must report earnings periodically (each quarter in the U.S.), questions about the disclosure of earnings forecasts are questions about the *timing* of the disclosure of earnings news and not about whether it is disclosed. Thus, we are interested in whether the provision of more frequent information about earnings reduces investor uncertainty about the underlying distribution of earnings (or firm value).

In many theory models, the mean and variance of the liquidating value of the firm are fixed and common knowledge (e.g., Verrecchia 1983). In this environment, any disclosure with information content (i.e., precision greater than zero) reduces uncertainty about firm value. At worst, the variance of the error term can be infinite and the disclosure will have no affect on investor beliefs. Alternatively put, consider a model in which a firm has an unknown liquidating value u, which investors believe has a mean y and precision (the inverse of variance) h. Most disclosure research studies the effect of disclosure on stock price, or investors' beliefs about y. In contrast, we are interested in the effect of disclosure on investors' uncertainty about value, or h^{-1}.

Our main predictions can be thought of in terms of models of investor learning about underlying profitability, as in, for example, Pastor and Veronesi (2003) or Lewellen and Shanken (2002). In these models, investors are uncertain about the parameters of the distribution of earnings (or cash flows). This uncertainty, along with the underlying variability of the firm's

[4] For example, Jorgensen and Kirschenheiter (2003) develop a model that examines whether managers' disclosures about risk (related to derivatives transactions) affect their firms' stock prices while Hughes and Pae (2004) examine managers' incentives to voluntarily disclose the precision of their information about firm projects. In both cases, managers are explicitly considering whether to directly provide information that affects investors' uncertainty about the variability of the firm's underlying cash flows (either estimates of that variability or information on the precision of their information about cash flows).

earnings, increases return volatility. Because more frequent disclosure of earnings news is likely to lower this uncertainty, it also lowers return volatility. In other words, by providing investors with "more balls from the urn", earnings guidance increases the rate at which investors learn about underlying firm profitability, lowering uncertainty.

Our interest is *not* in either the short-run effects of information releases on market liquidity (as in, say, Kim and Verrecchia, 1994), or in how voluntary disclosure affects investors' incentives to acquire private information about firm value (McNichols and Trueman, 1994). Nor is it the case that we think of disclosure as having "real" effects, as in Verrecchia and Weber (2007). Verrecchia and Weber develop a model in which disclosure affects market liquidity because it is directly associated with subsequent changes in the variability of profitability.

It is also possible that disclosure affects asset prices in settings where investors are uncertain about parameter values that affect security prices. In models such as Barry and Brown (1985) and Coles, Loewenstein and Suay (1995), investor information risk is non-diversifiable and so affects the stock's beta and expected return. Thus, in addition to providing information about firm profitability, it is possible that more frequent disclosure of earnings news reduces information risk and so allows investors to estimate the relevant asset pricing parameters with greater precision.[8]

Relatively little empirical work in accounting addresses the relation between disclosure and investor uncertainty; most empirical disclosure research provides evidence on how the market responds when managers voluntarily disclose earnings forecasts. This research finds that management forecasts affect stock prices and analysts' earnings forecasts. The stock price response to earnings forecasts is positively related to unexpected forecast news, and is stronger

[8] We do not take a strong position regarding whether this information risk is non-diversifiable (e.g., see Clarkson et al., 1996) and hence whether information risk is priced.

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 managers' forecasts are viewed as credible disclosures about expected earnings and so about firm value.

Brown, Harlow, and Tinic (1988) investigate what they refer to as the uncertain information hypothesis, under which stock return variability increases following announcements of major unanticipated events. To test this idea, they study "events" defined by large changes in stock prices. They find that systematic risk increases following these events and that the increases are larger for price declines. They also find that a considerable portion of the increased systematic risk is transitory (consistent with the notion that major surprises create uncertainty about a firm's prospects that requires time to resolve). This evidence is consistent with our discussion in that large unanticipated information releases potentially increase investor uncertainty and that this uncertainty is resolved as more information is acquired (for example, if no subsequent shocks occur, investors are more likely to view the extreme price movements as transitory).

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. Both of these studies, however, analyze variables that measure heterogeneity of investor beliefs (i.e., information

asymmetries between market participants) rather than variables that capture investor uncertainty about underlying firm profitability. The Coller and Yohn result is likely to be attributable to an increase in adverse selection due to an increase in information asymmetry among market participants, as opposed to an overall increase in investor uncertainty about firm profitability.

There is evidence that return volatility varies in predictable ways around expected information releases. Patell and Wolfson (1979, 1981) use implied volatilities from options prices to show that volatility increases in the period before earnings announcements and declines thereafter. This is expected if these announcements are both predictable and informative, so that investors anticipate the increase in volatility at the time of the announcement. Isakov and Perignon (2001) show that the decline in implied volatility following earnings releases is larger for positive news than negative news. Ederington and Lee (1996) study changes in volatility surrounding the release of macroeconomic news, and find that scheduled news releases such as employment reports are followed by declines in the implied volatility of currency contracts while the opposite is true for unscheduled releases.

Because our interest is in the effect of management earnings forecasts on investor uncertainty, our empirical tests examine changes in implied volatility before and after these events. Because managers have increasingly provided earnings forecasts concurrent with earnings announcements,[10] observed changes in volatility around these forecasts include changes in volatility normally associated with earnings releases, so that analyzing these "bundled" forecasts will make it difficult for us to uncover the effect of the forecast releases on market uncertainty. Consequently, our tests focus on "unbundled" forecasts that are separate from earnings releases.

[10] For example, see Anilowski et al. (2007).

2.2. Changes in Uncertainty around Forecast Releases

Our first set of hypotheses relates to changes in market uncertainty immediately surrounding management earnings forecasts – we compare implied volatilities observed before and after the release of management forecasts. As discussed above, for most tests we restrict attention to management forecasts released separately from earnings announcements. This means that in most cases the forecast date will not be predictable in advance so that we do not expect an increase in volatility prior to the forecast date. To provide some empirical measure of whether the event date is predictable, we perform our analyses separately for forecasts released by firms that are "regular" and "sporadic" forecasters.[11] We expect that forecasts we classify as sporadic are less likely to have been anticipated by market participants. Conversely, if firms release forecasts routinely investors are more likely to anticipate their timing, in which case we might expect an increase in implied volatility prior to the event followed by a decline in implied volatility after the event, similar to what Patell and Wolfson (1979, 1981) find for earnings announcements.

If forecasts are largely unanticipated, we expect little or no increase in implied volatility before the announcement. However, we might expect some decline in short duration implied volatility after the announcement if forecasts resolve uncertainty about the firm's earnings news. That is, because earnings forecasts accelerate the release of earnings news that would otherwise be released on the earnings announcement date (typically by several weeks or months, depending on whether the earnings forecast relates to quarterly or annual earnings), and because investors will likely have different expectations about what that news will be, earnings forecasts accelerate the reduction of uncertainty about current period earnings that would normally occur after the

[11] We classify forecasts as having been issued by "regular" forecasters if, prior to calendar quarter of the current forecast, the firm issued forecasts in at least 3 of the 4 preceding calendar quarters. Forecasts not meeting this criterion are defined as having been issued by "sporadic" forecaster.

earnings announcement. Consequently, we expect to observe a decline in short duration implied volatility after the forecast is released as investors' uncertainty about this period's earnings news is reduced. Further, we might expect that this effect will also apply to long duration implied volatility if the forecast reduces investors' uncertainty about the firm's underlying long run profitability and/or reduces investors' information risk.

An alternative possibility is that the forecast announcement, to the extent that it is a surprise to investors (either because the forecast itself is a surprise or because the news it conveys is a surprise), *creates* uncertainty and therefore increases return volatility. There are at least two ways this might occur, both of which imply an increase in short run but not long run volatility. First, it is possible that the unexpected nature of the news increases information asymmetry in the market and so increases the volatility of prices in the short run (e.g., see Kim and Verrecchia, 1994). Second, apart from short run liquidity effects, it is also possible that investors' uncertainty about underlying firm profitability increases as a result of the forecast disclosure. In theory, it is possible that this increase in uncertainty occurs with respect to both short run and long run uncertainty, although we expect it is more pronounced in the short run. That is, unexpected news about current period earnings may increase rather than decrease investor uncertainty about current period profitability. For example, the unexpected revelation of current period earnings news may cause investors to wonder about whether more surprises will be forthcoming. Such effects do not characterize earnings announcements because those announcements, by definition, completely resolve uncertainty about current period earnings. This type of effect is less likely to be long run in nature; that is, as an empirical matter we expect these surprises to be short run in nature. However, if such disclosures were to reveal something permanent about the firm's underlying profitability, there would also be an effect on longer run

uncertainty.[12] Consequently, we look at implied volatilities for different option durations to evaluate whether any observed increases in uncertainty are temporary or sustained.

Because we are unsure about which of these effects are likely to be more important, our first hypothesis is non-directional.

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

We expect different results for regular and sporadic forecasts. By definition, sporadic forecasts are non-routine and unpredictable. Consequently, they are more likely to be driven by unexpected events and so are more likely to increase investor uncertainty (because, for example, investors are uncertain about why management is releasing the forecast). Moreover, although these earnings forecasts accelerate the revelation of earnings news, they may cause investors to wonder about whether this revelation also increases the likelihood of future earnings surprises. All of this means that we expect that sporadic forecasts are more likely to result in increases in uncertainty than regular forecasts, similar to Brown, Harlow and Tinic (1988).

It also seems natural to expect that these effects will vary with the magnitude of the earnings surprise. If managers release earnings news that is largely in-line with investors' expectations ("confirming" forecasts), it seems likely that investor uncertainty about current period earnings will be reduced, so that short horizon implied volatilities will decline after the forecast is released. This prediction is consistent with the results in Clement et al. (2003). In addition, long horizon implied volatilities may also decline after these forecasts are released if the forecast disclosure increases the precision of investors' conditional expectation about the

[12] For example, the announcement could cast doubt on the quality of management, similar to the argument in Trueman (1986).

uncertainty of underlying firm profitability; that is, the additional disclosure may accelerate investors' learning about firm profitability.

Large surprises are more likely to increase investor uncertainty, especially in the short run. Large surprises create uncertainty in a number of ways. First, as discussed above, larger surprises are likely to result in larger increases in information asymmetries across investors, and hence to larger increases in short-term volatility in securities prices. Second, larger surprises may create greater uncertainty in the sense that investors will be unsure about how to interpret the surprise. For example, investors will not know whether the surprise has implications for short-run earnings, long-run earnings, or both (i.e., they will not know whether the shock is transitory or permanent). This leads to our second hypothesis.

H2: Forecasts conveying larger surprises result in smaller decreases (or larger increases) in uncertainty than forecasts conveying smaller surprises.

Finally, we examine positive and negative surprises separately because there are reasons to expect that changes in volatility around information releases are asymmetric. First, "volatility feedback" and leverage effects (e.g., Black, 1976; French et al., 1987; Campbell and Hentschel, 1992) predict that volatility increases more following bad news than good news. The leverage effect simply posits that, in market value terms, leverage increases after stock price declines, causing an increase in equity volatility. There is strong empirical support for this idea. Under volatility feedback, a shock to stock price increases stock volatility which in turn increases expected returns (because the increase in volatility is persistent).[13] We might therefore expect that short duration increases in volatility are larger for bad news than for good news.

[13]There is some evidence that increases in implied volatility increase expected returns, suggesting that increases in uncertainty are priced. Banerjee et al. (2007) show a positive relation between VIX levels and future S&P 500 returns, even after controlling for the Fama and French (1993) factors and the Carhart (1997) momentum factor.

Second, it may be that the inference investors draw from good and bad news differs based on managers' incentives to reveal the news. Evidence suggests that managers only disclose bad news when they know for sure that current period earnings news is adverse and decide, for legal or reputational reasons, not to postpone its disclosure by waiting for the earnings announcement. It is less obvious why managers disclose good earnings news early; they may even release good news by "leaking" it to market participants selectively using means other than formal disclosures (e.g., see Skinner, 1994; Soffer et al., 2000; Kothari et al., 2008). Consistent with this, there is evidence that the stock price reaction to good news forecasts tends to be smaller than that to bad news forecasts (e.g., Hutton et al., 2003). Another related possibility is that managers' predisclosures of bad news indicate that the negative earnings news is relatively persistent, which implies it creates greater uncertainty than otherwise similar good news (Kasznik and Lev, 1995).

These arguments lead us to expect that investor uncertainty increases more after managers' earnings forecasts reveal negative news than positive news. Moreover, these arguments all tend to suggest that short duration implied volatility will increase more after forecasts that reveal bad news than for forecasts that reveal good news. On the other hand, our main argument implies that long duration implied volatility is only likely to increase more given negative earnings news if that news is more likely to create uncertainty about the firm's true underlying profitability than otherwise similar good news. This could occur if the disclosure causes investors to be uncertain about whether the underlying "regime" has changed, similar to explanations for why return volatility is more likely to be persistently high when times are bad than when times are good (e.g., Schwert, 1989).

Diavatopoulos et al. (2007) find a positive relation between implied volatility and future returns at the individual firm level.

Finally, to the extent that we believe that bad news creates uncertainty while good news resolves uncertainty, these effects will be more pronounced if they are related to whether the forecast is regular than sporadic. In other words, if negative economic shocks are likely to be larger and more unexpected than positive economic shocks, negative news is more likely to be revealed through sporadic announcements while good news is more likely to be revealed through routine announcements (when the firm has a policy of providing earnings guidance, it will report earnings forecasts regardless of the nature of the news, whereas bad news forecasts are more likely to be triggered by adverse events that managers are effectively forced to disclose). This leads to the following prediction.

H3: Forecasts conveying bad news result in smaller decreases (or larger increases) in uncertainty than forecasts conveying good news.

2.3. Changes in Uncertainty after Earnings are Announced

The arguments in section 2.2 relate to what we expect about changes in investor uncertainty (implied volatilities) from the period immediately before a management forecast is released to the period immediately after a forecast is released. We also examine how uncertainty changes from the period immediately before an earnings forecast to the period after earnings are announced. Once earnings are announced, uncertainty about current period profitability is resolved. Consequently, the only uncertainty that should persist is uncertainty created by the earnings disclosure about underlying (long run) firm profitability. By comparing the two sets of results, we should be able to get an empirical assessment of the extent to which changes in investor uncertainty are attributable to uncertainty about current period earnings (which should be resolved once earnings are announced) or underlying firm profitability. We expect that short run effects of earnings forecasts on uncertainty should have largely dissipated once earnings for

the period are announced, so that the comparison of volatility before the forecast to volatility after earnings are announced should be informative about longer run uncertainty effects but not short run effects.

3. Sample Selection and Research Design

3.1. Implied Volatility as a Proxy for Uncertainty

Our proxy for investor uncertainty is the implied standard deviation ("ISD") derived from prices of exchange-traded equity options. The use of ISDs 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 volatility. Second, ISDs 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 reflect changes in uncertainty gradually over time.

We obtain implied volatilities from the *OptionMetrics* Standardized Options dataset. These ISDs are derived from hypothetical at-the-money options with durations that range from short (30 days) to long (365 and 730 days). The ISDs are based on implied volatilities derived from available options actually traded on the firm's stock.[14] Standardized options have two advantages over the use of traded options for estimating ISDs. First, standardized options are constructed to be at-the-money, which reduces measurement error problems that arise from using options that vary in the extent to which they are in or out of the money (e.g., see Hentschel,

[14] 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.

2003). Second, because duration is held constant, our ISD estimates are not affected by predictable changes in volatility due to variation in the option's time to maturity.[15]

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 data on the CRSP daily stock file, analyst coverage on IBES, and standardized option data on *OptionMetrics*. The *OptionMetrics* criterion is the most restrictive; we lose approximately 25% of forecast observations because there are no options data (this occurs largely because exchange-traded options are not listed on these stocks). After excluding forecasts issued at the time of earnings announcements, our sample contains 23,474 forecasts.

3.3. Measuring Changes in Uncertainty

We measure investor uncertainty at three points in time: just before the forecast is issued, just after the forecast is issued, and just after earnings are announced. First, to evaluate the effect of the management forecast on volatility, we compare the ISD just after the forecast date ($\sigma_{Post\text{-}Fcst}$, measured 3 trading days after the forecast date) to that just before the forecast date ($\sigma_{Pre\text{-}Fcst}$, measured 3 trading days prior to the forecast date).

Second, to evaluate the effect of the forecast on longer term uncertainty, we compare the ISD just after the earnings announcement ($\sigma_{Post\text{-}Earns}$, measured 3 trading days after the earnings announcement) to that just before the forecast date ($\sigma_{Pre\text{-}Fcst}$). Because this can be a relatively long period of time, it is unreasonable to assume that the only factor affecting uncertainty over this window is the forecast. For example, under the "expectations adjustment hypothesis"

[15] Because options have fixed maturities, it is usually 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 after that forecast. Rather, the best one could do is to compare an option with 30 days remaining to the same option with 30-*n* days remaining which means that the volatility comparison is confounded by a declining time to maturity, a problem that is especially severe as the option approaches its maturity date (see Patell and Wolfson, 1979, 1981).

(Ajinkya and Gift, 1984; King et al., 1990), managers issue earnings forecasts when investors' earnings expectations differ from their own, so that firms issuing forecasts are more likely to be those for which expectations gaps are relatively large. This means that observed changes in volatility could be due to factors that cause the forecast to be issued rather than the forecast itself.

One way of addressing this concern is to partition our sample into regular and sporadic forecasts, as we discuss above. If a firm provides forecasts on a regular basis it is more difficult to attribute the forecast to characteristics of a given period's earnings news. Conversely, sporadic forecasts may *only* be issued when the firms' earnings news is unusual in some fashion, which makes it harder to attribute the change in uncertainty to the forecast. This makes results for the regular forecasts more interpretable than those for the sporadic forecasts.

In addition, we construct a control group of non-forecast observations that had similar differences between management and investor earnings expectations ("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 earnings subsequently announced by the firm and deflate the difference by the pre-forecast stock price, resulting in our measure of the expectations gap. For each such observation, we then select a control observation that, as of the date of the forecast, had an expectations gap for the fiscal period in question closest to that of the forecast observation. For that control observation, we compare the ISD prior to the forecast date, $\sigma_{\text{Pre-Fcst}}$, to the ISD after the control firm's earnings announcement, $\sigma_{\text{Post-Earns}}$.[17] (The timeline is illustrated in Figure 1.) By including this group of control

[17] 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-

observations in our tests, we can more easily attribute differences between the two groups to the fact that the sample firms issued an earnings forecast.

4. Empirical Results

4.1. Descriptive Statistics

Table 1 presents basic features of the data. Panel A shows the percentage of firms in each CRSP size decile for which *OptionMetrics* has standardized options data in each year. Because options trading activity tends to increase with the size of the underlying firm, the options exchanges list larger firms – roughly 80% of firms in the largest size decile have options data during the sample period compared to than 2% of firms in the two smallest size deciles. The steady increase in the number of stocks listed on options exchanges over the sample period is also evident in Panel A. Panel B presents data on options duration and shows that there is an inverse relation between availability of options data and option duration. 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 only 30.2% have data for 365-day standardized options.

Table 2 describes characteristics of the firms issuing forecasts and of the forecasts themselves. As expected, the firms are large, with a mean (median) pre-forecast market value of $9.4 billion ($1.6 billion) and have relatively high analyst following (the median firm has nine analyst estimates outstanding prior to the forecast). The variable of primary interest, implied volatility, has a mean (median) value of 49.5% (43.0%) prior to the forecast date. These

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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%.

characteristics reflect the options exchanges' natural tendency to list options on larger firms with more volatile stock returns.

Consistent with previous research, the management forecasts 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.[18] The mean (median) "expectations gap" (realized earnings minus analyst expectations prior to the forecast deflated by stock price), is -1.20% (-0.01%), and the average (median) 3-day abnormal return centered on the forecast announcement date is -3.40% (-1.08%).

In Panel B, we partition the sample of forecasts into regular and sporadic forecasts based on whether the forecast firm issued management earnings forecasts in at least 3 of the previous 4 calendar quarters. Based on this categorization, 50% of our forecasts are classified as regular and 50% are classified as sporadic. We find that proportionately more of the sporadic forecasts convey bad news than regular forecasts – 63% of the sporadic forecasts convey bad news compared to 52% of the regular forecasts. This is consistent with our earlier suggestion that bad news is more likely to trigger a one-off voluntary disclosure than good news. Table 2 also provides evidence on how sporadic forecasts differ from regular forecasts as well as the characteristics of the firms that make the two types of forecast. Consistent with what we might expect, sporadic forecasts tend to be made by smaller, more volatile firms (regular forecasts are issued by larger, stable firms), are shorter in horizon (median horizon of 18 days for sporadic forecasts versus 35 days for regular forecasts), and generate substantially more negative market reactions (mean (median) reaction of -5.52% (-2.55%) for sporadic forecasts versus -1.32% (-.24%) for regular forecasts).

[18] 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.

Because our goal is to investigate the effect of earnings forecasts on volatility, we exclude forecasts made during earnings announcement periods, which we define as the 5 trading days centered on the earnings announcement date. To provide evidence on differences between the effect of "bundled" and "non-bundled" forecasts on volatility, Figure 2 plots average daily implied volatilities (scaled by the firm's average implied volatility over a 30-day period) for 10 days before and after the release date. Volatilities for the bundled forecasts are shown by the solid line while volatilities for the unbundled forecasts are shown by the dashed line.[19] Not surprisingly, the pattern of ISD changes in the period around earnings forecasts bundled with earnings announcements is similar to that previously reported around earnings announcements (e.g., see Patell and Wolfson, 1979, 1981; Isakov and Perignon, 2001). Implied volatilities increase in the period before the earnings/forecast announcement date and decline thereafter.

Implied volatilities around non-bundled forecasts exhibit a different pattern. As expected if these forecasts are unanticipated, there is little evidence of an increase in implied volatility before the forecast date. However, there is an increase in implied volatility following the forecast, suggesting that these 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. We restrict our analysis to non-bundled forecasts for the remainder of the paper.

4.2 Changes in Uncertainty around Forecast Releases

We first investigate how volatility changes around the time of management earnings forecasts. The results of these tests 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 (formed

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

using the market-adjusted stock return for the 3-day forecast period). For the overall sample in Panel A, there is a statistically significant increase in implied volatilities in the period immediately after the forecast is issued for options of all maturities although the magnitude of this effect is stronger for the short duration options (increase of 3.1%) and declines monotonically with duration (the increase is around 1% for durations of 365 days or more). This result is consistent with our prediction that volatility increases after earnings guidance is issued but that the effect dissipates over time.

The results in Panel B of Table 3 show that the overall increase in volatility is driven by forecasts that convey bad news and that volatility declines after forecasts that convey good news. There is a substantial increase in volatility after forecasts that convey bad news. On average, for the bad news forecasts short duration (30 day) volatility increases 6.4% in the period after forecast release. The magnitude of this increase again declines monotonically as option duration increases, to 2.6% for options with durations of 547 and 730 days. All of these increases are statistically significant. In comparison, volatility declines modestly, by 1% to 1.5%, for the good news forecasts with the largest effects again at shorter duration (these changes are also highly 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.[20]

We next investigate the determinants of the changes in implied volatility. Table 4 reports the results of regressing the log change in implied volatility (as reported in Table 3), on various

[20] We have compiled the results in Panel B of Table 3 separately for the regular and sporadic forecasts. As might be expected, the increase in volatility after the bad news forecasts is more pronounced for sporadic than regular forecasts, although both subsamples display the same pattern of relatively large increases in volatility at short duration and smaller increases as duration increases. Conversely, the decline in volatility evident for the good news forecasts is larger and more stable for the regular forecasts than for the sporadic forecasts. Overall then, we find that the increase in volatility after bad news forecasts is most pronounced for the sporadic forecasts (for which the negative news is more pronounced) while the decrease in volatility evident for the good news forecasts is most pronounced for regular forecasts.

market, firm, and forecast characteristics. To test our hypotheses about the sign and magnitude of the forecast news, we regress this variable on a bad news indicator variable and on 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, analyst following, analyst forecast dispersion, and market volatility (measured using the VIX volatility index).[21] To economize on the numbers reported in tables, we report these regressions for option durations of 30, 91, and 152 days.

Consistent with the univariate results in Table 3, the results in Table 4 indicate that firms that issue bad news forecasts experience greater increases in uncertainty; the coefficients on the bad news indicator variables are positive and significant for all three durations, and range from .023 to .019. The coefficient on the bad news/magnitude interaction is also positive and significant, consistent with the prediction that the increase in uncertainty associated with negative news increases with the magnitude of the news. In contrast, the coefficient on the good news/magnitude interaction is insignificant, which means that there is no evidence of a relation between the change in uncertainty and the magnitude of good news forecasts.

The control variables generally have the signs we expect. Not surprisingly, the most influential variable is the contemporaneous log change in market volatility, which is strongly positively associated with firm-level changes in volatility. We also find that higher levels of analyst following and analyst dispersion are associated with larger reductions (or smaller increases) in uncertainty. Less precise (wider) forecasts are associated with smaller increases in implied volatility while firm size is positively related to increases in volatility. Overall, the regressions explain around 6%-8% of the variation in the changes in volatility.

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

We also estimate these regressions separately for the regular and sporadic forecaster subsamples (not reported in tables). There are several notable features of these results. First, for regular forecasts the bad news indicator variables are positive and significant (ranging from .012 for the 30 day duration to .013 for the 91 day duration), as are the bad news/magnitude interaction terms. For sporadic forecasts, the bad news indicator is also positive and significant but larger (ranging from .039 at 30 days to .036 at 91 days) than for the regular forecaster regressions at all durations. The bad news/magnitude terms are again positive and significant at about the same level as for regular forecasts. These differences largely confirm impressions from the univariate results.

Overall, the results in Tables 3 and 4 demonstrate that, on average, implied volatility (our proxy for uncertainty) increases after management earnings forecasts are released, 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. This effect is more pronounced at shorter durations. In addition, the effect is about twice as large for sporadic forecasts as for regular forecasts.

4.3 Changes in uncertainty after earnings releases

We next address how volatility changes from the period just before earnings forecasts are released, $\sigma_{\text{Pre-Fcst}}$, to the period just after earnings are announced, $\sigma_{\text{Post-Earns}}$. This change should reflect the overall effect of the company's earnings disclosure strategy. Table 5 presents univariate evidence while Tables 6 and 7 report regressions that also include observations for the (non-forecast) control group that are matched to the forecast observations based on the magnitude of the expectations gap (the difference between the earnings realization and analysts' earnings forecast prior to the release of any earnings forecast).

The results in Table 5 indicate that, overall, there is a decline in volatility during the full period over which earnings news is released. The magnitude of this effect varies somewhat across option durations – the decline is 1.8%-1.9% for the shorter durations, and increases to 2.3%-2.5% at longer durations, with smaller declines in between (all of the changes are statistically significant). This is evidence that, in spite of the increase in volatility after forecasts, overall the firm's earnings disclosure strategy does not increase volatility and may actually reduce volatility. The effects again vary for good and bad news forecasts.[22] For the good news forecasts the decline in volatility is more pronounced, and ranges from 3.7%-3.8% for the short durations to around 3.6%-4.0% at the longer durations (up to 547 days), with somewhat smaller declines in between. For the bad news forecasts there is little evidence of any change in volatility, implying that the increases evident in Tables 3 and 4 reverse themselves after earnings are released. The results again vary somewhat across the samples of regular and sporadic forecasts (not reported in tables).[23]

The results in Table 5 do not tell us whether uncertainty would have decreased in the absence of a forecast. Market participants may have had uncertainty about the earnings realization that is resolved when the firm announces earnings, regardless of whether the firm issues a forecast. To address this issue, we include the set of (non forecast) control observations in regressions in an attempt to determine the effect of forecast issuance on uncertainty. The results of these regressions are shown in Tables 6 and 7.

[22] In this table, we measure earnings news based on the consensus analyst earnings estimate before the forecast relative to actual earnings.

[23] For the regular forecasts, there is evidence of a decline in volatility that is more pronounced than that for the overall sample (in the 3%-4% range). This decline is more pronounced for good news forecasts (4%-5% decline) but is also evident for the bad news forecasts (1.2%-2.5%). Conversely, for the sporadic forecasts there is some evidence of an increase in volatility for the bad news forecasts of around 2%-3% and a smaller decline in volatility for the good news forecasts (1%-2%).

The dependent variable in these regressions is the change in volatility reported in Table 5. The independent variable of interest is *Forecaster*, which equals 1 for forecast observations and 0 for non-forecast observations. 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. The regressions in Table 6 show that the forecaster variable is positive and significant for the longer duration options, indicating that the decline in volatility is smaller when the firm releases earnings forecasts (the coefficients are .009 for the 91-day options and .010 for the 152-day options, with t-statistics of 2.29 and 2.56, respectively).[24]

The evidence in Table 6 also shows that volatility declines less (or increases more) when the earnings news is negative (although this result is not significant for the 30 day duration options) and that this effect increases with the size of the earnings surprise. In these regressions, the magnitude of the earnings news is also significant for the good news/magnitude variable, indicating that the decline in volatility is less pronounced (or the increase larger) when the magnitude of the earnings news is larger, regardless of sign. These results hold for both forecast and non-forecast observations. The coefficients on the control variables are largely consistent with those reported in Table 4.

We have also estimated these regressions separately for the regular and sporadic forecast subsamples (not reported in tables). The results show that the forecaster effects are driven largely by the sporadic forecast subsample. The coefficient on the forecaster variable is generally insignificant for the regular forecast sample (significant at the 10% level for options of 273, 547, and 730 day durations) but generally positive and significant for the sporadic forecast sample. These results suggest that regular forecasts have little effect on uncertainty after we

[24] The 152-day standardized option is the longest-duration option for which we have a relatively large sample size. Moving to the next longest duration option, the 182-day option, results in a decrease in sample size (based on the Table 6 regression) of 60%.

control for other attributes of the earnings news, but that the sporadic forecasts tend to increase uncertainty, offsetting the general reduction in uncertainty.

In Table 7 we modify the regression specification to allow the *Forecaster* indicator to take on different values for positive and negative earnings news. In these regressions, the coefficient on the good news/forecaster variable is insignificant at all durations, indicating that the provision of good news forecasts has little effect on overall volatility. Conversely, the bad news/forecaster variable is positive and significant at all durations, with coefficients that are larger and more significant at longer durations (the coefficient increases from .013, t = 2.86, for 30 days to .023, t = 6.51, for 152 days). Moreover, the magnitude of the coefficient suggests that when firms forecast and the news is bad, there is an overall increase in volatility which is stronger at longer durations.

Once again, we replicate these results for the regular forecaster and sporadic forecast subsamples (not reported in tables). The results for both regular and sporadic forecasters show that, as in Table 7, there is an increase in volatility when forecasting firms report bad news, but this effect is more pronounced for sporadic forecasts. (Coefficients range from 1.4%-3.5% for sporadic forecasts and from 1.3%-2.9% for regular forecasts). Overall, these results confirm earlier impressions that the increase in volatility due to bad news forecasts is primarily driven by sporadic forecasts, although there is also evidence of a similar effect for regular forecasts.

5. Conclusion

We study how managers' earnings forecast disclosures affect market uncertainty about firm value. In spite of the large theoretical and empirical literature on managers' earnings forecasts, there is little research on how management earnings forecasts affect investor

uncertainty about firm fundamentals. This omission is significant, because it seems reasonable to expect that an important goal of disclosure generally is to reduce investor uncertainty.

We examine a sample of management earnings forecasts issued at times other than earnings announcements (when forecasts are issued with earnings announcements it is difficult to separately measure the effect of forecasts on volatility). We use implied volatilities derived from equity options prices to measure uncertainty, and compare volatility measured just before the forecast is released, just after the forecast is released, and just after earnings are announced. This enables us to measure changes in volatility around the time of the forecast release (the short run effect of the forecast) and from before the forecast to after earnings are announced (the effect of the forecast on longer-run uncertainty). We use data for options of various maturities to assess the relative permanence of the changes in uncertainty.

When we look at the effects of forecasts on short run market volatility, we find an overall increase in volatility. This effect is more pronounced when the forecast news is negative, suggesting that negative forecast news increases market uncertainty more than otherwise similar positive forecast news, especially when firms only forecast sporadically.

We also find, however, that these short term effects around earnings forecasts largely reverse by the period after earnings are announced. In general (whether the firm forecasts or not), there is a decline in market uncertainty from the period before earnings news is disclosed to the period after earnings news is released, consistent with earnings news resolving uncertainty. In addition, we find that when managers have good earnings news, issuing earnings guidance has little effect on this overall decline in uncertainty. However, when the earnings news is adverse the decline in volatility is smaller when management releases an earnings forecast, especially when that forecast is released by firms that do not normally release earnings forecasts. These

effects are more pronounced at longer duration, suggesting that negative forecasts generally increase investors' uncertainty about firm value, perhaps because investors become less confident in their prior beliefs about underlying firm or manager type.

Overall, our evidence is largely consistent with expectations in that we observe that management forecast disclosures increase market uncertainty in the short run when the news is adverse and/or the firm issues forecast sporadically. In the longer run, market uncertainty generally declines after earnings are announced regardless of whether there is a preceding earnings forecast. This decline is mitigated when the firm issues a forecast that conveys negative news, suggesting either that these forecasts are triggered by a shock to firm fundamentals which increases investor uncertainty and/or that the release of the negative news creates more uncertainty about underlying firm profitability.

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Figure 1 – Event Timeline

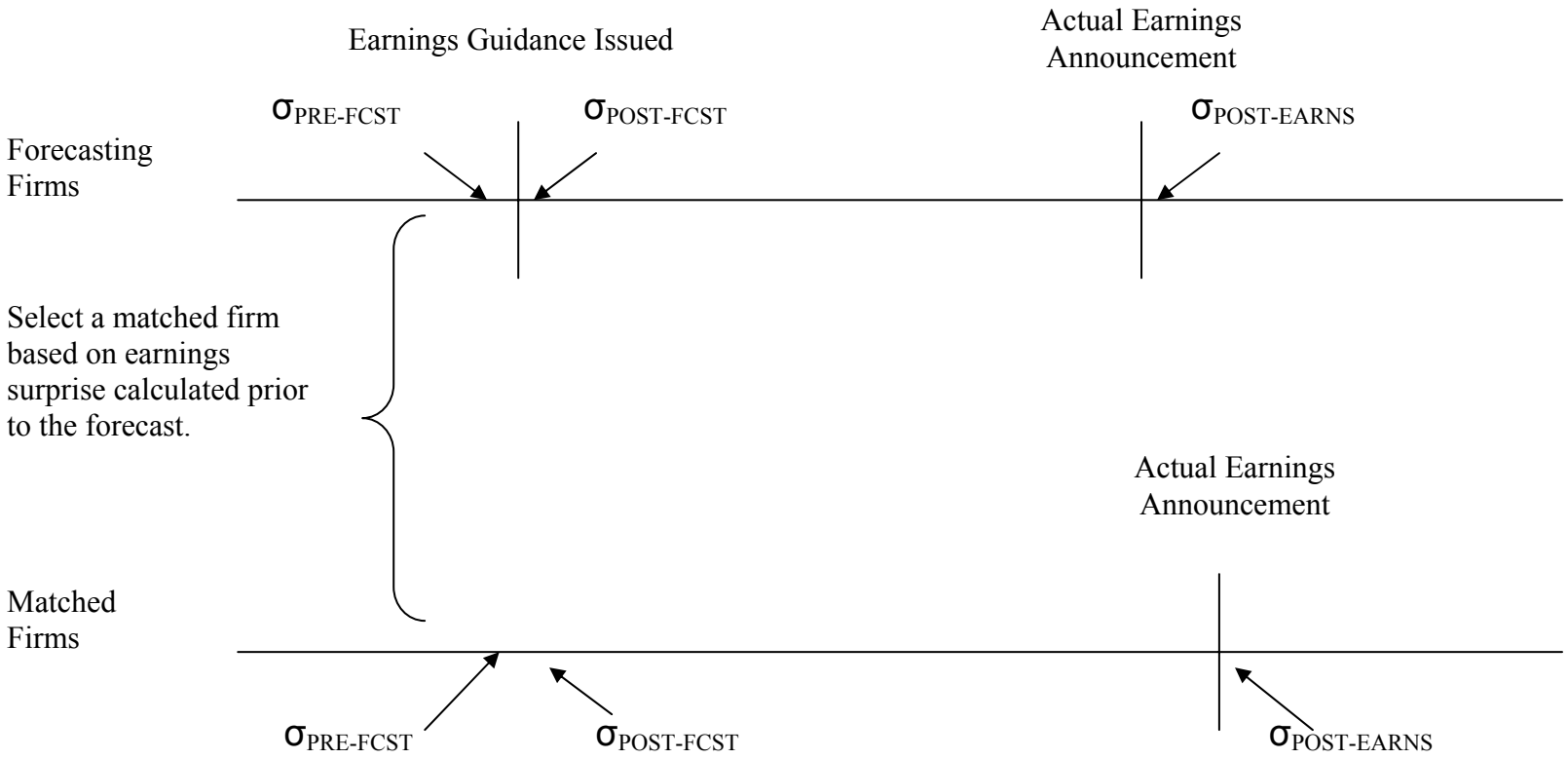

Figure 1 Notes:
This figure illustrates the event dates in our sample. For the forecasting firms, we measure implied volatility at 3 points in time: 3 trading days prior to the forecast issuance, 3 trading days following the forecast, and 3 trading days following the earnings announcement to which the 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

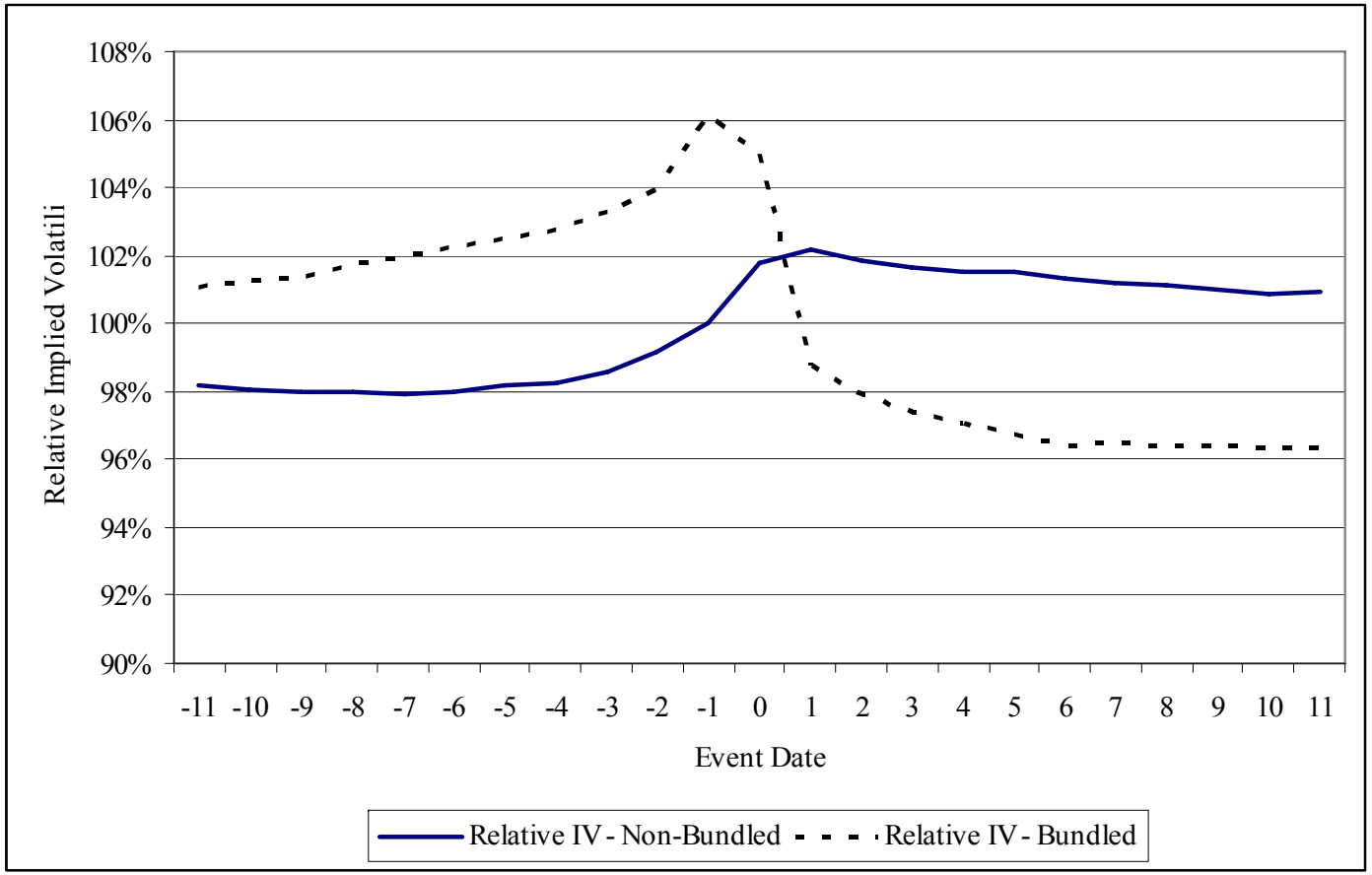

Figure 2 Notes:
This figure illustrates the pattern of implied volatility surrounding management earnings forecasts. The plotted values ("Relative IV") are equal to the daily implied volatility for a particular firm, divided by the average volatility for that firm over the 30- day period surrounding 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

Panel A: All Non-Bundled Forecasts

Variable	N	Mean	Median	25th Percentile	75th Percentile
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 Horizon (days)	23,474	95.0	25.0	-2.0	156.0
Forecast News	16,633	-0.30%	-0.04%	-0.33%	0.04%
% 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%

(see notes following Panel B)

Panel B: Regular vs. Sporadic Forecasters

Regular Forecasters (Non-Bundled Forecasts)

Variable	N	Mean	Median	25th Percentile	75th Percentile
Market Value	11,840	12,557	2,515	883	8,940
Pre-Forecast Gap in Analyst Expectations	10,477	-0.82%	0.03%	-0.26%	0.18%
Pre-Forecast Implied Volatility	11,840	40.9%	36.4%	27.4%	49.5%
Analyst Following	11,565	12.1	11.0	7.0	16.0
Forecast Horizon (days)	11,840	106.6	35.0	3.0	186.0
Forecast News	9,613	-0.17%	-0.02%	-0.17%	0.05%
% Annual Forecasts	11,840	43.8%			
Stock Return, 3-day Forecast Period	11,840	-1.32%	-0.24%	-4.57%	3.29%
Ex post Forecast Error	8,725	-0.09%	0.04%	-0.02%	0.17%

Sporadic Forecasters (Non-Bundled Forecasts)

Variable	N	Mean	Median	25th Percentile	75th Percentile
Market Value	11,634	6,220	1,042	414	3,327
Pre-Forecast Gap in Analyst Expectations	10,479	-1.57%	-0.14%	-0.94%	0.09%
Pre-Forecast Implied Volatility	11,634	58.3%	52.6%	37.9%	72.7%
Analyst Following	10,777	9.6	8.0	5.0	13.0
Forecast Horizon (days)	11,634	83.2	18.0	-4.0	116.0
Forecast News	7,020	-0.47%	-0.11%	-0.61%	0.02%
% Annual Forecasts	11,634	32.2%			
Stock Return, 3-day Forecast Period	11,634	-5.52%	-2.55%	-12.20%	2.62%
Ex post Forecast Error	7,222	-0.23%	0.00%	-0.07%	0.11%

(see notes on following page)

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.

Panel B presents the same descriptive statistics when forecasts are classified as either "Regular" or "Sporadic". Forecasts are classified as Regular if the forecasting firm issued a forecast in at least 3 of the 4 calendar quarters preceding the current forecast quarter, and are otherwise classified as Sporadic.

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		
	30 days	**91 days**	**152 days**
Bad News Indicator	0.023 ***	0.022 ***	0.019 ***
	(6.89)	(8.49)	(8.16)
|Forecast News - Bad|	2.476 ***	2.652 ***	2.532 ***
	(5.67)	(6.75)	(6.95)
|Forecast News - Good|	0.006	-0.12	-0.006
	(0.01)	(-0.25)	(-0.01)
Forecast Width	-1.377 ***	-1.6 ***	-1.686 ***
	(-3.40)	(-4.92)	(-5.49)
Log(ΔVIX Index)	0.222 ***	0.155 ***	0.13 ***
	(15.32)	(15.64)	(14.17)
Forecast Horizon	0	0	0
	(-1.64)	(-1.41)	(-0.37)
Log(Market Value)	0.004 **	0.003 **	0.002 *
	(2.50)	(2.43)	(1.94)
Log(Analyst Following)	-0.018 ***	-0.015 ***	-0.014 ***
	(-7.90)	(-7.35)	(-7.43)
Analyst Dispersion	-0.107 ***	-0.074 ***	-0.07 ***
	(-4.12)	(-4.16)	(-4.70)
Intercept	0.029 **	0.024 ***	0.023 ***
	(2.36)	(3.06)	(3.14)
N	16,390	16,318	15,900
R-squared	0.06	0.078	0.073

(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.

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	0.004	0.009**	0.010**
	(0.79)	(2.29)	(2.56)
Log(ΔVIX Index)	0.406***	0.350***	0.328***
	(32.16)	(30.68)	(28.11)
Negative Expectations Gap Indicator	0.006	0.009***	0.009***
	(1.53)	(2.71)	(3.10)
|Expectations Gap|*Negative Expectations Gap Indicator	0.016***	0.018***	0.018***
	(7.21)	(10.21)	(9.91)
|Expectations Gap|*Positive Expectations Gap Indicator	0.010	0.021***	0.024***
	(1.29)	(3.22)	(4.02)
Horizon	-0.000***	-0.000***	-0.000***
	(-7.87)	(-12.10)	(-12.82)
Log(Market Value)	0.002	0.004**	0.004**
	(1.41)	(2.49)	(2.61)
Log(Analyst Following)	-0.011**	-0.007	-0.007*
	(-2.10)	(-1.44)	(-1.69)
Analyst Dispersion	-0.093**	-0.109***	-0.117***
	(-2.61)	(-3.33)	(-3.52)
Intercept	-0.001	-0.023**	-0.025***
	(-0.10)	(-2.64)	(-3.33)
N	30,242	29,860	28,586
R-squared	0.173	0.18	0.178

(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.

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	-0.005	-0.003	-0.002
	(-0.63)	(-0.54)	(-0.43)
Forecaster*Negative Expectations Gap Indicator	0.013***	0.022***	0.023***
	(2.86)	(6.71)	(6.51)
Log(ΔVIX Index)	0.406***	0.350***	0.328***
	(31.97)	(30.55)	(27.99)
Negative Expectations Gap Indicator	-0.003	-0.004	-0.004
	(-0.45)	(-1.03)	(-1.18)
| Expectations Gap|*Negative Expectations Gap Indicator	0.016***	0.018***	0.018***
	(7.18)	(10.11)	(9.78)
| Expectations Gap|*Positive Expectations Gap Indicator	0.010	0.021***	0.024***
	(1.28)	(3.21)	(4.01)
Horizon	-0.000***	-0.000***	-0.000***
	(-7.88)	(-12.15)	(-12.85)
Log(Market Value)	0.003	0.004**	0.004**
	(1.44)	(2.52)	(2.64)
Log(Analyst Following)	-0.012**	-0.007	-0.008*
	(-2.16)	(-1.55)	(-1.80)
Analyst Dispersion	-0.089**	-0.102***	-0.110***
	(-2.51)	(-3.16)	(-3.36)
Intercept	0.003	-0.016*	-0.018**
	(0.29)	(-1.76)	(-2.31)
N	30,242	29,860	28,586
R-squared	0.173	0.181	0.179

(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.