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Investor Sentiment and Corporate Disclosure

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ABSTRACT

This paper investigates how firms react strategically to investor sentiment via their disclosure policies in an attempt to influence the sentiment-induced biases in expectations. Proxying for sentiment using the Michigan Consumer Confidence Index, we show that during low-sentiment periods, managers increase forecasts to "walk up" current estimates of future earnings over long horizons. In contrast, during periods of high sentiment, managers reduce their long-horizon forecasting activity. Further, while there is an association between sentiment and the biases in analysts' estimates of future earnings, management disclosures vary with sentiment even after controlling for analyst pessimism, indicating that managers attempt to communicate with investors at large, and not just analysts. Our study provides evidence that firms' long-horizon disclosure choices reflect managers' desire to maintain optimistic earnings valuations.

1. *Introduction*

A central feature of the literature in behavioral finance is the existence of investor sentiment—a phenomenon that biases expectations of future firm performance. This literature has studied how firms vary their financing

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and investment decisions in response to investor sentiment and its possible effect on market prices.[1] In this paper, we investigate whether firms attempt to *influence* sentiment-driven expectations by strategically varying their disclosure policies.

During periods of low sentiment, market participants—both financial analysts and investors—are likely to be pessimistic about future prospects and hence undervalue firms. We hypothesize that when investor sentiment is low, managers increase voluntary disclosures of future earnings to the market in an attempt to correct the pessimistic outlook, either of analysts or more generally of investors at large. In contrast, we hypothesize that when investor sentiment is high, managers reduce voluntary disclosure about their firms' future earnings, remaining silent in an attempt to maintain the high sentiment and the associated optimistic valuation of firms. Thus, we predict that disclosure policy will adjust in response to investor sentiment, with the amount of disclosure negatively associated with the level of sentiment.

Importantly, we expect this strategic adjustment in disclosure policy—increasing disclosure during low sentiment periods and remaining relatively silent during high sentiment periods—to be particularly prominent amongst management disclosures regarding long-horizon earnings. Over shorter horizons, disclosure policy is greatly affected by the disciplining effect of imminent earnings announcements. A large number of studies discuss the effect of managers' incentives to avoid reporting negative surprises at the time of earnings announcements on their short-horizon disclosure choices (see, e.g., Skinner [1994], Soffer, Thiagarajan, and Walther [2000], Matsumoto [2002], Richardson, Teoh, and Wysocki [2004]). According to this literature, during periods of high sentiment, rather than remaining silent, managers are expected to issue disclosures that reduce optimistic market expectations of short-horizon earnings. Thus, managers' desire to preserve high sentiment over the short horizon is ambiguous, and we expect that the strategic adjustment of disclosure to sentiment is concentrated amongst long-horizon disclosures.

To measure corporate disclosure, we use management earnings forecasts from the First Call database. Since these forecasts are voluntary and their issuance is not subject to regulation, they provide managers the flexibility to strategically vary disclosure in response to prevailing sentiment. Further, such forecasts are shown to have informational content, as market prices react to their announcement (see, e.g., Ajinkya and Gift [1984], Waymire [1984], Baginski, Conrad, and Hassell [1993]).[2]

Our measure of investor sentiment is the Michigan Consumer Confidence Index. This monthly index is calculated by the Michigan Consumer Research Center and is based on survey responses to queries about

[1] See, for example, Hirshleifer [2001] and Baker, Ruback, and Wurgler [2007] for a survey.
[2] See section 3 for further discussion.

current and expected financial and economic well-being.[3] Variation in the Michigan Consumer Confidence Index serves as a proxy for temporal variation in firm-level mispricing—either actual mispricing due to limited arbitrage or perceived mispricing by managers. It is managers' reaction to this firm-level mispricing that is expected to generate a relation between the Consumer Confidence Index and firms' voluntary disclosure policy.

Consistent with our hypothesis of firms utilizing corporate disclosure as a means of influencing investor sentiment, we find that during periods of high sentiment, managers reduce the frequency of long-horizon earnings forecasts to the market, while during low-sentiment periods they increase the frequency of these forecasts. Further, as we predict, the increased forecasts during low sentiment periods tend to walk up analyst earnings estimates in that they are, on average, greater than prevailing consensus analyst estimates of future earnings.

Managers' attempt to increase earnings estimates via their disclosures during low sentiment periods can be interpreted in two ways. First, managers could be using their disclosure policy to adjust market expectations of future earnings upwards in the face of firm undervaluation during low-sentiment periods. Second, irrespective of any firm undervaluation, managers could simply be trying to correct a pessimistic bias in analyst earnings estimates during periods of low sentiment. Indeed, we present evidence of just such a bias in analyst estimates, by documenting a positive association between investor sentiment and analyst errors, where the latter is defined as the scaled difference between analyst earnings estimates and realized earnings.

To examine whether managers' disclosure choices solely reflect their desire to correct analyst biases, we directly control for variation in analysts' pessimism regarding future earnings. Our evidence indicates that, as expected, managers do indeed adapt their disclosure policies in response to analyst pessimism. More importantly, even after controlling for analyst pessimism, managers' voluntary disclosures still respond to sentiment, suggesting that they attempt to communicate with investors in general, and not just analysts.

Taken together, our results demonstrate how managers react strategically to sentiment via their disclosure policies. While much of the work in behavioral corporate finance is dedicated to analyzing how firms respond to investor sentiment in setting corporate policy, our paper emphasizes the existence of an alternate direction of causality. Specifically, managers may set corporate policy—and in particular, disclosure policy—to influence sentiment.

The rest of the paper is organized as follows. Section 2 discusses related literature. Section 3 describes our data sources and variable definitions,

[3] Qiu and Welch [2005] validate the Consumer Confidence index as a measure of sentiment by showing that it is correlated with the UBS/Gallup survey of investors' expectation of future market performance. See section 2 for further discussion. In an analysis presented in section 6.1, we find that the Consumer Confidence is associated positively with the optimistic bias in financial analysts' estimates of future earnings.

while section 4 discusses our research design and descriptive statistics. In section 5, we present our primary results that test the association between sentiment and voluntary disclosure over longer horizons. Section 6 describes additional analyses, including results on the association of sentiment with the optimism in analyst estimates, as well as with voluntary disclosure over short horizons. Section 7 concludes.

2. *Related Literature*

This paper investigates how managers react strategically to sentiment via their disclosure policies in an attempt to influence the sentiment-induced bias in expectations. As such, it is related to literature that examines the link between investor sentiment and corporate policies such as those involving acquisitions, financing, and investments (see, e.g., Shleifer and Vishny [2003], Baker and Wurgler [2000], Baker, Stein, and Wurgler [2003]). Our work stands in contrast to these previous studies in that we analyze how firms try to *influence* sentiment—preserving it when it is high and increasing it when it is low—rather than exploit sentiment via their corporate policies.

Our study is also related to the large body of research investigating strategic corporate disclosure. Examples include Frankel, McNichols, and Wilson [1995] and Lang and Lundholm [2000] who show that managers release good news prior to raising external finance. Yermack [1997] and Aboody and Kasznik [2000] show that managers accelerate bad news and withhold good news in the period immediately preceding option grant dates to lower the exercise price of the options and increase the value of their option grant portfolio. Miller [2002] argues that managers strategically vary the horizon of their disclosures in response to their private information about future earnings changes. Kothari, Shu, and Wysocki [2006] present evidence suggesting that managers disclose good news early and delay disclosure of bad news. To the extent that we document a systematic effect of economy-wide sentiment on corporate disclosure choices, our paper is also an addition to the relatively small body of literature that has investigated the link between disclosure choices and macro-level variables (see, e.g., Anilowski, Feng, and Skinner [2007]).

While clearly not purporting to exhibit a violation of market efficiency, our work is related to numerous previous studies in behavioral finance. These studies employ measures of sentiment, such as the closed-end fund discount and the Michigan Consumer Confidence Index, to capture the degree of investor optimism, examining the relation between sentiment and future market returns, small-firm return spreads and return spreads across stocks with varying institutional ownership (see, e.g., Lee, Shleifer, and Thaler [1991], Baker and Wurgler [2006], Qui and Welch [2005], Lemmon and Portniaguina [2006], Fisher and Statmen [2002]).

Qiu and Welch [2005] examine a number of measures of investor sentiment, including the Michigan Consumer Confidence Index, and relate them to a measure of investor optimism published by UBS/Gallup.

Supporting the use of the Michigan Consumer Confidence Index as a proxy for sentiment, they find that over the sample period 1999 to 2002, the measure correlates well with investors' optimism about future marketwide performance as measured by responses rating future market performance on a scale of one to five.

Finally, our finding that analyst optimism is correlated positively with investor sentiment is consistent with La Porta [1996], who documents a negative association between analysts' long-term growth estimates and future risk-adjusted returns. Consistent with equity overvaluation, La Porta [1996] finds that high analyst expectations of future earnings growth are associated with poor future equity returns. These results are further corroborated in Dechow and Sloan [1997].

3. Data Sources and Variable Definitions

3.1 SENTIMENT

Our proxy for investor sentiment is based on the monthly Consumer Confidence Index constructed by the Michigan Consumer Research Center. This measure is based on a survey that grades respondents' perceptions of financial well-being, state of the economy, and general consumer spending on a scale of one to five, and generates a monthly score based on a linear combination of the responses. We construct a quarterly measure of sentiment, *SENT*, by averaging the Consumer Confidence Index across the three months in every quarter.[4]

3.2 DISCLOSURE

We analyze voluntary disclosure using data on management forecasts of future earnings available on the First Call database. Such forecasts represent a completely voluntary form of disclosure to the market in that there are no regulations governing their issuance or structure. Prior studies, for example, Ajinkya and Gift [1984], Waymire [1984], Baginski, Conrad, and Hassell [1993], document the role of management forecasts in conveying information, showing that market prices react to their issuance. This literature also shows that management forecasts appear to reduce uncertainty and induce homogeneity in market expectations about future earnings.[5]

Our sample of management forecasts begins in 1996, due to the widespread availability of management forecasts on the First Call Company Issued Guidelines (CIG) database starting from that year, and extends over 36 quarters to the end of 2004. During any given year, managers issue forecasts for quarterly as well as annual earnings per share (EPS). Since our objective is to measure overall disclosure in any given quarter, both quarterly and annual management EPS forecasts are included in the sample.

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[4] For ease of presentation, the published confidence index is divided by 100.

[5] See also Pownall, Wasley, and Waymire [1993], Jennings [1987], and Coller and Yohn [1997].

For every quarter in our sample, we calculate the number of long-horizon management earnings forecasts issued by each firm. Any management forecast issued more than 90 days before the estimate period end date is classified as a long-horizon forecast. For example, any earnings forecast issued during or prior to September 2006 regarding earnings for the year ended December 31, 2006 is considered a long-horizon forecast. The sample mean number of days between the forecast date and the forecast period end date is 260.

In our empirical analysis, we also distinguish between management forecasts based on their relationship to prevailing consensus analyst estimates (obtained from I/B/E/S). Forecasts that are greater than consensus analyst estimates are referred to as walk-up forecasts, while those that are lower than consensus estimates are referred to as walk-down forecasts. Consensus analyst estimates are defined as the median of all analysts' final outstanding earnings estimates prior to the management forecast. To ensure that "stale" analyst estimates do not affect our conclusions, we exclude any analyst estimate that is more than three quarters old in calculating the consensus. Our results are qualitatively similar when we exclude analyst estimates that are outstanding for more than two quarters at the time of the management forecast.[6]

In releasing earnings forecasts, managers often indicate a range of earnings values, instead of a specific point estimate. If a range forecast is "two-sided" in that it specifies maximum and minimum values, we classify the forecast as a walk-up (walk-down) forecast when the midpoint of the range is greater (lower) than the median consensus analyst estimate.

A one-sided range forecast that only specifies a maximum value is classified as a walk-down forecast if the median consensus estimate is above the maximum value. Otherwise, it is classified as neither a walk-up nor a walk-down forecast. For example, a management forecast indicating that earnings are expected to be less than $2.00 a share is classified as a walk-down forecast if the median analyst estimate is above $2.00, and is not classified either as a walk-up or walk-down forecast if the median estimate is below $2.00. Similarly, a one-sided range forecast that only specifies a minimum value is classified as a walk-up forecast if the median consensus estimate is below the minimum value.

4. Research Design and Descriptive Statistics

In our main analysis investigating the relation between corporate disclosure and sentiment we examine the association between management

[6] Excluding analyst estimates that are more than two quarters old greatly reduces the number of available estimates to calculate the consensus estimate and hence affects the power of the tests.

earnings forecasts and the Consumer Confidence Index using the following baseline specification:

$$FREQ_{it} = a + \beta * SENT_{t-1} + \gamma * X_{t-1} + \delta * Z_{it-1} + \varepsilon_{it}. \quad (1)$$

The dependent variable, $FREQ_{jt}$, is the quarterly long-horizon earnings forecast frequency, that is, the number of long-horizon management forecasts issued by firm i in quarter t.[7] $SENT_{t-1}$ is the average Consumer Confidence Index during quarter $t-1$. X_{t-1} represents a vector of quarterly control variables that includes the seasonally adjusted percentage change in gross domestic product (GDP) in quarter $t-1$ (*GDPCHG*), gross returns on the value-weighted market index over the 12 months prior to the beginning of quarter t (*PASTMARKET*), and the volatility of gross market returns during the 12 months prior to the beginning of quarter t (*MARKETVOL*). All return data are taken from the Center for Research in Security Prices, while data on GDP growth are taken from the Bureau of Labor Statistics.

Z_{it-1} represents a vector of firm-quarter control variables that includes the natural logarithm of firms' market value of equity (*SIZE*), their book-to-market ratio (*BTM*), firms' gross market return over the past 12 months (*RET*), as well as each firm's standard deviation of monthly returns over the past 12 months (*RETVOL*). We also include as control variables lagged capital expenditures as a percentage of assets (*CAPEX*) and lagged return on assets (*ROA*). All these firm-level control variables are winsorized at the 1% level to reduce the effect of outliers. In addition, we include binary indicator variables for firms reporting losses in any of the previous four quarters (*LOSS*), and for firm-quarters containing equity issues (*ISSUE*), as equity issues affect disclosure policy.

For consistency with previous literature, we further include the number of analysts following each firm (*ANALYSTN*) and each firm's institutional ownership percentage (*INSTOWN*). Analyst following for a firm in a given quarter is defined as the number of analysts that have one-quarter-ahead earnings estimates outstanding for that quarter's earnings. Institutional ownership is taken from Thomson Financial's *13f* filings database, and is winsorized at the 1% level. Finally, we include as controls a linear time-trend variable (*TREND*) as well as an indicator variable (*REG_FD*) that is set equal to one for all quarters after and including the fourth quarter of 2000, when Regulation Fair Disclosure (FD) was introduced.[8]

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[7] For robustness, we also use the number of long-horizon forecasts as a percentage of the total forecasts issued by a firm. The ratio is set equal to zero for sample firm-quarters where no forecasts are issued. Our primary results are robust to this specification.

[8] Regulation FD becomes effective in the last quarter of 2000 and forbids the private release of information by managers to selected members of the investment community such as financial analysts. It is argued that this regulation positively affects the frequency of public management forecasts (Anilowski, Feng, and Skinner [2007]).

To address potential concerns about First Call's expanding coverage of disclosing firms over time, our sample includes all firm-quarters that follow the initial appearance of the corresponding firm in the First Call CIG database. Within this sample, any firm-quarter without a management forecast in the CIG database is assigned a zero forecast frequency. Data on control variables are obtained from Compustat and I/B/E/S. The final sample consists of 46,332 firm-quarters, with 3,459 distinct firms over the period 1996 to 2004.[9]

Descriptive statistics for the firm-level variables are presented in table 1 for both samples. The mean quarterly frequency of long-horizon forecasts in the sample is 0.33. Consistent with previous literature, walk-down management earnings forecasts are generally more prevalent than walk-up forecasts (0.20 as compared to 0.13). The mean firm size is $3.7 billion, with the median at $695 million. The mean book-to-market ratio is 0.56, while the mean *ROA* is 1%. The mean institutional ownership of the firms in the sample is 57%, while the average firm is followed by approximately seven analysts.

Table 2, panel A presents the correlations between the macroeconomic factors and other quarterly variables over the sample period. As expected, the Consumer Confidence Index, *SENT*, is significantly positively associated with lagged GDP change and past market returns. In addition, the index is, on average, declining over the time period, and is particularly low after the imposition of Regulation FD, as its negative correlations with *TREND* and *REG_FD* indicate. Panel B of table 2 reports the correlations between the firm-quarter control variables used in the analysis.

5. *Sentiment and Voluntary Disclosure*

In this section, we analyze the relation between management disclosure choices and prevailing investor sentiment. When investor sentiment (as proxied by the Michigan Consumer Confidence Index) is high, we hypothesize that management reduces voluntary long-horizon disclosure and remains silent in an attempt to maintain the high sentiment. In contrast, when sentiment is low, management increases disclosure in an attempt to walk up long-horizon expectations. We thus expect the frequency of management forecasts of earnings over long horizons to be associated negatively with sentiment. Further, this association should primarily be driven by management forecasts that attempt to walk up long-horizon expectations.

[9] For robustness, we also consider a second sample of firms that includes all firm-quarters as long as the corresponding firm issues at least one management forecast over the entire sample period (1996 to 2004). This secondary-firm sample consists of 61,909 firm-quarters, with the same 3,459 distinct firms as in the primary sample. Our results are robust to using this alternate sample.

TABLE 1
Descriptive Statistics

	$N = 46{,}332$ Firm-Quarters		
	Mean	Median	Standard Deviation
FREQ	0.33	0.00	0.71
FREQ_WU	0.13	0.00	0.44
FREQ_WD	0.20	0.00	0.54
MKTCAP	3,693.99	694.90	9,392.03
BTM	0.56	0.45	0.45
ROA	0.01	0.01	0.04
RET	1.20	1.06	0.76
RETVOL	0.15	0.13	0.09
ISSUE	0.02	0.00	0.14
ANALYSTN	6.92	5.00	6.27
INSTOWN	0.57	0.60	0.23
LOSS	0.24	0.00	0.43
CAPEX	0.04	0.02	0.05

This table provides pooled descriptive statistics for the sample of all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. *FREQ* represents the number of long-horizon management earnings forecasts for firm i in quarter t. Long-horizon forecasts are those made prior to 90 days before the forecast period end date. *FREQ_WU* is the number of long-horizon, walk-up earnings forecasts issued by firm i in quarter t. *FREQ_WD* is the number of long-horizon, walk-down earnings forecasts issued by firm i in quarter t. *MKTCAP* is the beginning of quarter market value of firm equity, *BTM* is the beginning of quarter firm book-to-market ratio, and *ROA* is the lagged return on assets. *RET* is the gross firm stock return over the prior 12 months, while *RETVOL* is the volatility of the gross return over the same period. *ISSUE* is an indicator variable that is set to one for firms that issued equity in the contemporaneous quarter. *ANALYSTN* is the number of analysts following a firm, and *INSTOWN* is the percentage of firm equity owned by institutions. *LOSS* is an indicator variable set to one for firms reporting losses in any of the previous four quarters. *CAPEX* is lagged capital expenditures as a percentage of assets.

5.1 PRIMARY RESULTS

In table 3, we examine whether managers issue earnings forecasts in a way which is systematically related to the Consumer Confidence Index, as hypothesized above. Column 1 of table 3 presents the results of running a regression of the frequency of quarterly long-horizon management earnings forecasts, *FREQ*, on our measure of sentiment, *SENT*, and our standard control variables. As can be seen, consumer confidence (*SENT*) is significantly negatively related to long-horizon forecast frequency. This is consistent with our hypothesis that managers increase long-horizon forecast frequency during periods of relatively low sentiment and reduce forecast frequency during periods of relatively high sentiment. The coefficient on *SENT* implies that a one-standard-deviation decrease in *SENT* is associated with an increase of 0.045 in the number of quarterly long-horizon forecasts. This effect is economically significant as it represents a 13.6% increase above the mean quarterly long-horizon forecast frequency of 0.33.

Continuing with our analysis of disclosure and sentiment, we expect that over the long horizon, management disclosure policy reflects a desire to strategically maintain optimism about future earnings. Therefore, the increased forecast frequency during low-sentiment periods should

TABLE 2
Correlations

Panel A: Quarterly variables

	SENT	*GDPCHG*	*PASTMARKET*	*MARKETVOL*	*REG_FD*	*Trend*
SENT	1.00					
GDPCHG	**0.30**	1.00				
PASTMARKET	**0.47**	**0.52**	1.00			
MARKETVOL	0.16	−0.14	**−0.49**	1.00		
REG_FD	**−0.61**	**−0.50**	**−0.52**	0.06	1.00	
Trend	**−0.40**	−0.25	**−0.46**	0.22	**0.87**	1.00

Panel B: Firm-quarter variables

	SIZE	*BTM*	*ROA*	*RET*	*RETVOL*	*ISSUE*	*ANALYSTN*	*INSTOWN*	*LOSS*	*CAPEX*
SIZE	1.00									
BTM	**−0.23**	1.00								
ROA	**0.12**	**−0.21**	1.00							
RET	**0.04**	**−0.34**	**0.21**	1.00						
RETVOL	**−0.20**	**0.09**	**−0.32**	**0.07**	1.00					
ISSUE	**−0.01**	**−0.05**	0.00	**0.12**	**0.01**	1.00				
ANALYSTN	**0.48**	**−0.22**	**0.09**	0.00	**−0.10**	**0.01**	1.00			
INSTOWN	**0.09**	**−0.17**	**0.21**	**0.08**	**−0.26**	−0.01	**0.26**	1.00		
LOSS	**−0.13**	**0.23**	**−0.66**	**−0.18**	**0.36**	**−0.01**	**−0.08**	**−0.20**	1.00	
CAPEX	**−0.02**	**−0.05**	**0.06**	−0.01	**0.01**	**0.01**	**0.04**	**−0.04**	**−0.04**	1.00

Panel A presents correlations among the quarterly variables over the 36 quarters between 1996 and 2004. *SENT* is the quarterly average Michigan Consumer Sentiment Index. *GDPCHG* is the lagged seasonally adjusted percentage change in gross domestic product. *PASTMARKET* is the gross value-weighted market index return over the prior 12 months, and *MARKETVOL* is the volatility of the gross market returns in the prior 12 months. *REG_FD* is an indicator variable set equal to one for all quarters after and including the fourth quarter of 2000. For every quarter, *Trend* equals the number of quarters elapsed since the beginning of the sample, inclusive of the current quarter. The correlations marked in bold are significant at least at the 5% level.

Panel B provides pooled correlations for the sample of 46,332 firm-quarters over the period 1996 to 2004, which includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. *SIZE* is the natural logarithm of the beginning of quarter market value of firm equity, *BTM* is the beginning of quarter firm book-to-market ratio, and *ROA* is the lagged return on assets. *RET* is the gross firm stock return over the prior 12 months, while *RETVOL* is the volatility of the gross return over the same period. *ISSUE* is an indicator variable that is set to one for firms that issued equity in the contemporaneous quarter. *ANALYSTN* is the number of analysts following a firm, and *INSTOWN* is the percentage of firm shares owned by institutions. *LOSS* is an indicator variable set to one for firms reporting losses in any of the previous four quarters. *CAPEX* is lagged capital expenditures as a percentage of assets. The correlations marked in bold are significant at least at the 5% level.

reflect managers' desire to adjust earnings expectations upwards. To test this hypothesis, we examine the association between sentiment and the frequency of long-horizon management forecasts that walk consensus analyst estimates up versus those that walk them down. We predict that the increased forecast frequency during low-sentiment periods demonstrated in column 1 of table 3 is primarily due to an increase in the long-horizon walk-up forecast frequency.

Column 2 and column 3 of table 3 present the results of running regressions testing the association of sentiment with the quarterly walk-up forecast frequency, *FREQ_WU*, and separately, its association with the quarterly walk-down forecast frequency, *FREQ_WD*. Consistent with our hypotheses, the negative relation between sentiment and long-horizon forecast frequency exhibited in column 1 is indeed entirely driven by variation in the frequency of walk-up, rather than walk-down, forecasts. The coefficient on *SENT* in column 2 implies that a one-standard-deviation decrease in *SENT* is associated with a 0.043 increase in *FREQ_WU*. This is economically significant as it represents 33% of the mean long-horizon walk-up forecast frequency of 0.13. In

TABLE 3

Regressions of Long-Horizon Management Earnings Forecast Frequency on Investor Sentiment

	Column 1: *FREQ*	Column 2: *FREQ_WU*	Column 3: *FREQ_WD*
SENT	−0.475	−0.452	0.022
	(7.13)**	(10.81)**	(0.40)
GDPCHG	0.001	−0.002	0.003
	(0.28)	(1.88)*	(1.98)*
PASTMARKET	0.069	0.102	−0.045
	(2.25)**	(5.42)**	(1.81)*
MARKETVOL	1.913	1.097	0.748
	(5.59)**	(5.28)**	(2.65)**
SIZE	0.132	0.037	0.091
	(13.87)**	(6.56)**	(11.48)**
BTM	0.002	0.003	0.001
	(0.17)	(0.33)	(0.13)
ROA	0.075	0.042	0.039
	(0.73)	(0.72)	(0.46)
RET	−0.002	0.012	−0.013
	(0.51)	(3.83)**	(3.36)**
RETVOL	−0.218	−0.068	−0.119
	(3.79)**	(2.11)**	(2.57)**
ISSUE	−0.011	−0.011	0.005
	(0.42)	(0.75)	(0.21)
ANALYSTN	0.008	0.003	0.006
	(6.55)**	(3.77)**	(5.79)**
INSTOWN	−0.091	−0.038	−0.052
	(2.56)**	(1.69)*	(1.78)*
LOSS	−0.018	−0.015	−0.004
	(1.98)**	(2.78)**	(0.47)
CAPEX	−0.091	−0.044	−0.013
	(1.10)	(0.93)	(0.21)
REG_FD	0.184	0.070	0.111
	(10.25)**	(6.19)**	(7.68)**
Trend	0.001	0.002	−0.003
	(0.14)	(4.50)**	(4.21)**
Firm fixed effects	Y	Y	Y
Adjusted R^2	0.27	0.23	0.17
Observations	46,332	46,332	46,332

The regressions are estimated over the time period 1996 to 2004. The sample includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. *FREQ* represents the number of long-horizon management earnings forecasts in quarter *t*. Long-horizon forecasts are those made prior to 90 days before the forecast period end date. The regressions are estimated over the time period 1996 to 2004. *FREQ_WU* is the number of long-horizon, walk-up earnings forecasts issued by firm *i* in quarter *t*. *FREQ_WD* is the number of long-horizon, walk-down earnings forecasts issued by firm *i* in quarter *t*. All independent variables are defined as in table 2. Standard errors are calculated using the Newey-West procedure with a lag length of two quarters.

* and ** indicate significance at the 10% and 5% levels, respectively.

contrast, we do not find a statistically significant association between *SENT* and the number of long-horizon walk-down forecasts.

Taken together, consistent with our hypotheses, the results suggest that management disclosure over longer horizons is affected by its incentives to maintain optimistic valuations. In particular, during periods of low

sentiment, managers issue more earnings forecasts that walk up prevailing consensus analyst estimates, while during high sentiment periods they reduce forecast frequency.

While not the main focus of the paper, the coefficients on the control variables in table 3 reveal some insights as well. Past market returns have a positive effect on the number of long-horizon walk-up forecasts and a negative effect on walk-down forecasts, which appears consistent with a tendency of managers to be more optimistic about the future when past market returns are high over sustained periods. Past market volatility is associated with increased disclosures of both types of forecasts, suggesting that managers issue forecasts when market uncertainty about the future is high. Also, we find that walk-up disclosures increase through time, particularly after the imposition of Regulation FD.

Turning to firm-specific variables, firm size appears to have a positive effect on walk-down forecast frequency, consistent with size proxying for the litigation risk of the firm (Shu [2000]). Past firm returns are associated positively with walk-up forecast frequency and negatively with walk-down forecast frequency. Interestingly, firm-specific return volatility is associated negatively with both types of forecast frequencies. Finally, the issuance of both walk-up and walk-down forecasts is associated positively with analyst following, and negatively associated with the incidence of losses.

5.2 CROSS-SECTIONAL CORRELATION ACROSS FIRMS

In this section, we address the possible effect of cross-sectional correlation across firms within a particular quarter by estimating standard errors in regression (1) clustered at the quarterly level. Additionally, to further address concerns regarding both serial and cross-sectional correlation jointly, we employ a changes specification, and again calculate standard errors by clustering at the quarterly level. In the changes specification, every independent and dependent variable is differenced with respect to the corresponding observation in the same quarter of the previous year. The results are reported in table 4. Focusing on column 1 and column 2 of the table, we find that our results continue to hold after taking into account quarterly cross-firm correlations: The coefficient of walk-up forecast frequency (*FREQ_WU)* on *SENT* is still negative and statistically significant. On the other hand, similar to the results presented above, we do not observe a statistically significant association between walk-down forecast frequency (*FREQ_WD)* and *SENT*.

Column 3 and column 4 of table 4 present results with the differenced specification employing standard errors clustered at the quarterly level. As column 3 shows, the negative association between walk-up forecast frequency and sentiment is robust to this differencing specification. The coefficient indicates that if change in sentiment varies by one standard deviation, change in walk-up forecast frequency varies by 0.02. This is an economically large effect, since the mean change in walk-up forecast frequency is

TABLE 4

Regressions of Long-Horizon Management Earnings Forecast Frequency on Investor Sentiment—Addressing Cross-correlation Issues

	Levels Specification: Standard Errors Clustered at Year-Quarter Level		Differenced Specification: Standard Errors Clustered at Year-Quarter Level	
	Column 1: *FREQ_WU*	Column 2: *FREQ_WD*	Column 3: *FREQ_WU*	Column 4: *FREQ_WD*
SENT	−0.452	0.022	−0.260	0.209
	(2.66)**	(0.09)	(2.34)**	(1.45)
GDPCHG	−0.002	0.003	0.008	0.004
	(0.30)	(0.41)	(2.53)**	(1.05)
PASTMARKET	0.102	−0.045	0.034	−0.115
	(1.18)	(0.49)	(0.85)	(1.94)
MARKETVOL	1.097	0.748	0.232	−0.184
	(1.32)	(0.82)	(1.00)	(0.28)
SIZE	0.037	0.090	0.011	0.071
	(3.74)**	(9.19)**	(1.15)	(4.49)**
BTM	0.003	0.001	0.006	−0.001
	(0.22)	(0.10)	(0.65)	(0.07)
ROA	0.040	0.039	0.032	0.135
	(0.79)	(0.41)	(0.70)	(1.47)
RET	0.012	−0.013	0.011	−0.012
	(1.64)	(1.84)*	(3.07)**	(1.81)*
RETVOL	−0.068	−0.119	−0.032	−0.133
	(1.39)	(2.03)**	(0.57)	(2.76)**
ISSUE	−0.010	0.005	−0.007	0.016
	(0.91)	(0.19)	(0.51)	(0.55)
ANALYSTN	0.003	0.006	0.004	0.008
	(2.74)**	(4.69)**	(3.81)**	(5.66)**
INSTOWN	−0.038	−0.052	0.039	−0.008
	(0.96)	(1.70)	(1.29)	(0.20)
LOSS	−0.015	−0.004	−0.013	−0.002
	(2.22)**	(0.45)	(2.43)**	(0.26)
CAPEX	−0.044	−0.013	0.093	0.296
	(0.39)	(0.12)	(1.31)	(3.24)**
REG_FD	0.070	0.111	0.106	0.114
	(1.45)	(1.56)	(4.98)**	(4.10)**
Trend	0.002	−0.003		
	(1.14)	(1.04)		
Firm fixed effects	Y	Y	N	N
Adjusted R^2	0.23	0.17	0.01	0.01
Observations	46,332	46,332	31,706	31,706

The regressions are estimated over the time period 1996 to 2004. The sample includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. *FREQ_WU* is the number of long-horizon, walk-up earnings forecasts issued by firm i in quarter t. *FREQ_WD* is the number of long-horizon, walk-down earnings forecasts issued by firm i in quarter t. Long-horizon forecasts are those made prior to 90 days before the forecast period end date. The first two columns present results using a levels specification; the third and fourth columns present results using a differenced specification, where every variable in the regression is differenced with respect to the corresponding observation in the same quarter of the previous year. All independent variables are defined as in table 2. Standard errors are calculated using clustering at the year-quarter level.

* and ** indicate significance at the 10% and 5% levels, respectively.

approximately 0.03. We again find no evidence of a statistically significant association between change in walk-down disclosures and change in sentiment.

5.3 CONTROLLING FOR THE PESSIMISM IN CONSENSUS ANALYST ESTIMATES

Managers' attempts to walk up earnings estimates via their disclosures during low-sentiment periods can be interpreted in two ways. First, managers could be using their disclosure policy to adjust market expectations of future earnings upwards in the face of perceived or actual undervaluation of their firms during low-sentiment periods. Second, it could be that, regardless of any perceived or actual undervaluation, managers are simply attempting to correct a pessimistic bias in analyst earnings estimates during periods of low sentiment. Indeed, in section 6 we provide evidence consistent with such a bias, by documenting that investor sentiment is positively associated with the difference between analyst earnings estimates and realized earnings.

To examine whether managers' disclosure choices solely reflect their desire to correct analyst biases, we directly control for variation in analysts' pessimism regarding future earnings. We measure analyst pessimism at the time of management forecast issuance in two ways. To construct the first measure of analyst pessimism, we identify for each management forecast whether the consensus analyst estimate at the time of forecast issuance is lower than the eventually realized earnings. For every firm-quarter we then compute the number of consensus analyst estimates that are pessimistic at the time of forecast issuance, and denote it *NPESS*. We set *NPESS* to zero for all firm-quarters in the sample without a management forecast.

We also construct a second measure of analyst pessimism for firm-quarters that include at least one management forecast. For every managerial forecast, we define the consensus analyst error as the difference between the eventual realization of the forecasted earnings and the contemporaneous consensus analyst estimate of these earnings. Since we include both annual and quarterly earnings estimates, analyst errors in estimating annual earnings are further scaled by four to make them comparable to errors in estimating quarterly earnings. We obtain a quarterly estimate of analyst pessimism for each firm, *AN_PESS*, by computing the average consensus analyst error across all earnings forecasted by the firm in that quarter, and expressing it as a percentage of beginning-of-quarter stock price.

We analyze the relation between managerial disclosure and investor sentiment after controlling for our measures of analyst pessimism using the following regression:

$$FREQ\_WU_{it} = \alpha + \beta * SENT_{t-1} + \lambda * PESSIMISM_{it} + \gamma * X_{t-1} + \delta * Z_{it-1} + \varepsilon_{it}, \quad (2)$$

where *PESSIMISM* is either one of our two measures, *NPESS* or *AN_PESS*, and all other variables are defined as in regression (1). If the negative

association between walk-up forecast frequency and sentiment simply reflects managers' attempts to correct analysts' pessimistic biases, then β should not be significantly different from zero after controlling for *PESSIMISM*. On the other hand, if β is significantly negative in regression (2) then it is unlikely that managers' disclosure choices simply reflect their desire to correct analyst biases.

The results of estimating regression (2) are presented in table 5. Columns 1–3 use *NPESS* as the measure of analyst pessimism. Column 1 presents the results of estimating regression (2) using robust standard errors corrected for second-order autocorrelation at the firm level, along with firm fixed effects. The results indicate a very strong positive association between *FREQ_WU* and *NPESS*, suggesting that a large number of walk-up forecasts issued by managers are indeed motivated by outstanding pessimistic consensus analyst estimates. However, the negative association between *FREQ_WU* and SENT survives the control for *NPESS*. The coefficient on *SENT* in column 1 is significantly negative and implies that a one-standard-deviation decrease in *SENT* is associated with an increase of 0.02 in *FREQ_WU*. While this effect represents less than half the increase we document without the control for *NPESS*, it is still economically significant, representing 13% of the mean long-horizon walk-up forecast frequency.

In our second specification (column 2 of table 5) we report the results of regression (2) with *t*-statistics computed using standard errors clustered at the quarterly level. The standard errors with clustering at the quarterly level are substantially larger, but the negative coefficient on *SENT* is still statistically significant at the 10% level. In column 3, we use a differenced specification, where every observation is differenced with respect to the corresponding observation in the same quarter of the previous year. Standard errors are again clustered at the quarterly level. The results show that changes in *NPESS* are highly significantly associated with changes in walk-up forecast frequency. However, even after imposing the control for *NPESS* in column 3 the coefficient of *FREQ_WU* on *SENT* is negative and statistically significant at the 10% level.

In column 4 through column 6, we repeat our analysis using *AN_PESS* instead of *NPESS* as our measure of analyst pessimism. The regressions in column 4 through column 6 are estimated over a subsample of 12,520 firm-quarters that include at least one management forecast. As can be seen, in all three specifications, the association between sentiment and management walk-up forecast frequency is negative and statistically significant. The coefficient on *SENT* in column 4 implies that a one-standard deviation decrease in *SENT* is associated with an increase in *FREQ_WU* of 0.10. This is an economically significant effect relative to the mean *FREQ_WU* of 0.46 in the reduced sample.

In summary, this section presents evidence to suggest that during periods of low sentiment, managers' tendency to issue walk-up forecasts cannot be simply explained by the greater pessimism in analyst estimates. Even after controlling for analyst pessimism, managers still respond to sentiment,

TABLE 5

Regressions of Management Long-Horizon Walk-Up Earnings Forecast Frequency on Investor Sentiment—Controlling for Analyst Pessimism

	PESSIMISM = NPESS			*PESSIMISM = AN_PESS*		
	Levels		Differences	Levels		Differences
Specification Standard Errors Estimated With:	Column 1: Newey-West	Column 2: Clustering at Year-Quarter	Column 3: Clustering at Year-Quarter	Column 4: Newey-West	Column 5: Clustering at Year-Quarter	Column 6: Clustering at Year-Quarter
SENT	−0.176	−0.176	−0.105	−1.042	−1.042	−0.650
	(4.57)**	(1.87)*	(1.88)*	(7.76)**	(1.79)*	(2.36)**
PESSIMISM	0.453	0.453	0.403	10.570	10.570	15.221
	(24.34)**	(24.52)**	(25.05)**	(8.66)**	(5.06)**	(7.40)**
GDPCHG	−0.001	−0.001	0.017	−0.021	−0.021	0.021
	(1.31)	(0.35)	(2.26)**	(4.64)**	(0.78)	(2.25)**
PASTMARKET	0.046	0.046	0.004	0.443	0.443	0.064
	(2.81)**	(1.04)	(0.46)	(6.81)**	(1.44)	(0.53)
MARKETVOL	0.545	0.545	−0.010	3.769	3.769	0.703
	(3.04)**	(1.22)	(0.26)	(4.65)**	(1.19)	(0.96)
SIZE	0.021	0.021	0.004	0.023	0.023	−0.048
	(4.31)**	(2.95)**	(2.28)**	(1.03)	(0.67)	(1.16)
BTM	0.001	0.001	0.009	0.035	0.035	0.037
	(0.10)	(0.07)	(0.49)	(0.85)	(0.70)	(0.76)
ROA	0.004	0.004	0.221	−0.089	−0.089	0.556
	(0.09)	(0.11)	(1.37)	(0.25)	(0.27)	(0.77)
RET	−0.002	−0.002	0.001	0.01	0.01	0.026
	(0.91)	(0.59)	(0.19)	(0.83)	(0.48)	(1.30)
RETVOL	−0.007	−0.007	−0.008	0.243	0.243	0.399
	(0.24)	(0.24)	(0.22)	(1.49)	(1.01)	(1.55)

(*Continued*)

TABLE 5 — *Continued*

Specification	*PESSIMISM = NPESS*			*PESSIMISM = AN_PESS*		
	Levels		Differences	Levels		Differences
Standard Errors Estimated With:	Column 1: Newey-West	Column 2: Clustering at Year-Quarter	Column 3: Clustering at Year-Quarter	Column 4: Newey-West	Column 5: Clustering at Year-Quarter	Column 6: Clustering at Year-Quarter
ISSUE	−0.020	−0.020	−0.021	0.021	0.021	0.114
	(1.46)	(1.77)*	(1.86)*	(0.49)	(0.53)	(1.83)*
ANALYSTN	0.003	0.003	0.004	0.004	0.004	0.005
	(3.94)**	(3.22)**	(3.78)**	(1.77)*	(1.33)	(1.40)
INSTOWN	0.010	0.010	0.032	−0.004	−0.004	0.159
	(0.55)	(0.40)	(1.25)	(0.05)	(0.03)	(1.28)
LOSS	−0.011	−0.011	−0.014	0.028	0.028	0.004
	(2.40)**	(1.91)*	(3.28)**	(1.06)	(0.81)	(0.14)
CAPEX	0.001	0.001	0.112	−0.731	−0.731	0.610
	(0.02)	(0.01)	(1.67)*	(3.61)**	(1.50)	(1.49)
REG_FD	0.065	0.065	0.083	0.169	0.169	0.232
	(6.65)**	(2.53)**	(6.36)**	(4.23)**	(1.04)	(4.01)**
Trend	0.001	0.001		−0.002	−0.002	
	(0.32)	(0.13)		(1.17)	(0.33)	
Firm fixed effects	Y	Y	N	Y	Y	N
Adjusted R^2	0.48	0.48	0.23	0.19	0.19	0.02
Observations	46,332	46,332	31,706	12,520	12,520	4,988

The dependent variable is *FREQ_WU*, or the number of long-horizon, walk-up earnings forecasts issued by firm i in quarter t. The regressions are estimated over the time period 1996 to 2004. The sample includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. For every firm-quarter, *NPESS* is the number of consensus analyst estimates that are pessimistic at the time of management forecast issuance. *NPESS* is zero for firm-quarters without a management forecast. *AN_PESS* is the average consensus analyst error as a percentage of price across all earnings forecasted by a firm in a quarter. All other independent variables are defined as in table 2. The Newey-West estimations are with a lag length of two quarters.

* and ** indicate significance at the 10% and 5% levels, respectively.

suggesting that managers attempt to communicate with investors in general, and not just analysts.[10]

5.4 AGGREGATING VARIABLES AT THE QUARTERLY LEVEL

In table 3 through table 5, we essentially test whether investor sentiment has a systematic effect on long-horizon disclosures across all firms. Another approach to testing this systematic effect is to estimate a regression at the aggregate quarterly level relating average disclosure frequency across all firms to investor sentiment. This approach also directly addresses the concern that estimating regression (1) and regression (2) using a panel data set understates standard errors due to quarterly cross-firm correlation.

We begin by computing average quarterly disclosure frequencies. We define our primary variable of interest, *MFREQ_WU*, as the quarterly average of the long-horizon walk-up forecast frequency across all sample firms in each of the 36 quarters in the sample. Figure 1 plots *MFREQ_WU* against the previous quarter's sentiment index *SENT*. Although clearly only suggestive, the figure shows a general pattern in which investor sentiment is negatively related to the quarterly average number of long-horizon managerial walk-up forecasts.

In table 6, we examine the association between sentiment and *MFREQ_WU* at the quarterly level. To do so, we collapse our panel data set by taking the quarterly mean value of all independent variables in regression (2). In particular, we include *MNPESS* and *MAN_PESS*, respectively, the quarterly means of *NPESS* and *AN_PESS*, as our measures for analyst pessimism.

Column 1 and column 3 of table 6 report the results of a levels regression using a Newey-West estimator to control for time-series correlation. Column 2 and column 4 report results using the differenced specification where every variable is differenced with respect to the corresponding observation in the same quarter of the previous year. As the table indicates, the results using aggregate quarterly observations support the evidence in table 5. Using the 36 quarterly observations, we find a negative association between walk-up forecast frequency and investor sentiment that is statistically significant, even after controlling for variation in analyst pessimism.

Our aggregate regressions at the quarterly level clearly have limited degrees of freedom, and the results should be interpreted with caution.[11] Still, both the panel and aggregate regressions are consistent in providing evidence of a negative association between investor sentiment and walk-up forecast frequency. Further, this negative association cannot simply be explained by managers' attempts to walk up pessimistic analysts. Instead,

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[10] In untabulated results, we examine if management forecast bias with respect to eventually realized earnings varies with investor sentiment. For a reduced sample of firm-quarters with point or two-sided range forecasts, we are unable to detect any association between sentiment and the bias in management forecasts.

[11] Note that in the panel regressions, we identify the effects of firm-level controls by utilizing heterogeneity at the firm level and not at the aggregate quarterly level.

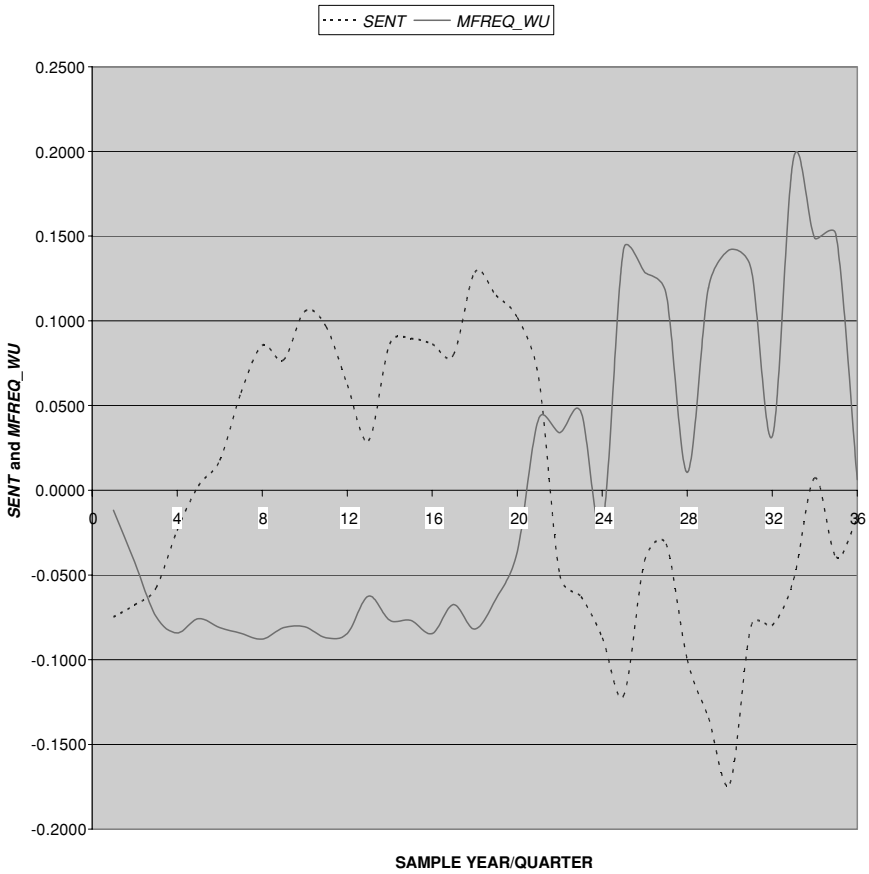

FIG. 1—Walk-up long-horizon forecast frequency and investor sentiment. The figure plots *SENT* and *MFREQ_WU* over the 36 quarters extending from the first quarter of 1996 to the last quarter of 2004. The quarters are numbered from 1 to 36 on the *x*-axis. *SENT* is the quarterly average Michigan Consumer Sentiment Index. *MFREQ_WU* is the mean number of long-horizon, walk-up earnings forecasts across all firms in a given quarter. The variables are plotted as deviations from their mean over the sample period.

managers' disclosure policies during low-sentiment periods appear to be motivated by a desire to communicate with investors at large as well.

6. *Additional Analysis: Analyst Errors and Short-Horizon Forecasts*

6.1 SENTIMENT AND ANALYST BIASES

In section 5, we refer to the possibility that the bias in long-horizon analyst estimates varies systematically with sentiment. In this section, we present evidence of the association between sentiment and the bias in analyst earnings estimates and show that it is indeed the case that analysts issue more optimistic earnings when sentiment is high.

TABLE 6

Aggregate Quarterly Regressions of Management Long-Horizon Walk-Up Earnings Forecast Frequency on Investor Sentiment

	MPESSIMISM = MNPESS		*MPESSIMISM = MAN_PESS*	
Specification	Column 1: Levels	Column 2: Differences	Column 3: Levels	Column 4: Differences
SENT	−0.144	−0.060	−0.916	−0.173
	(1.66)*	(1.74)*	(2.03)**	(1.79)*
MPESSIMISM	0.739	0.566	−0.242	−0.062
	(11.78)**	(8.17)**	(1.12)	(0.58)
GDPCHG	0.000	−0.001	0.001	0.003
	(0.04)	(0.56)	(0.19)	(0.66)
PASTMARKET	−0.033	−0.003	−0.043	−0.052
	(1.17)	(0.11)	(0.19)	(0.36)
MARKETVOL	−0.439	−0.337	0.620	0.129
	(1.39)	(1.13)	(0.61)	(0.16)
MSIZE	0.067	0.020	0.035	−0.069
	(2.36)**	(1.12)	(0.18)	(1.01)
MBTM	−0.116	−0.033	−0.584	−0.213
	(2.31)**	(0.79)	(1.50)	(0.68)
MROA	3.252	4.793	10.417	6.124
	(2.14)**	(5.06)**	(1.87)*	(1.26)
MISSUE	−0.671	−0.072	−1.195	0.608
	(2.01)**	(0.17)	(0.85)	(0.67)
MANALYSTN	−0.054	−0.026	−0.060	0.027
	(4.44)**	(2.33)**	(0.94)	(1.55)
MINSTOWN	−0.263	0.222	−0.389	0.512
	(1.75)*	(1.60)	(0.54)	(0.86)
MLOSS	0.515	0.541	0.720	0.293
	(4.28)**	(3.98)**	(1.27)	(0.66)
MCAPEX	0.101	−0.943	−0.702	−1.224
	(0.51)**	(2.03)**	(0.98)	(0.90)
REG_FD	0.049	0.059	0.076	0.094
	(3.31)**	(6.59)**	(1.75)*	(4.32)**
Trend	0.003		0.008	
	(2.42)**		(1.40)	
Adjusted R^2	0.98	0.90	0.80	0.54
Observations	36	32	36	32

The dependent variable is *MFREQ_WU*, or the mean number of long-horizon, walk-up earnings forecasts across all firms in a given quarter. The sample includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. The regressions include 36 quarterly observations over the time period 1996 to 2004. *MPESSIMISM, MSIZE MBTM, MROA, MISSUE, MANALYSTN, MINSTOWN, MLOSS*, and *MCAPEX* represent the means of firm-quarter level observations within each quarter. All other independent variables are defined as in table 2. Standard errors are calculated using the Newey-West procedure with a lag length of five quarters. In the differenced specification, each variable is differenced with respect to the corresponding observation in the same quarter of the previous year. The level regressions in column 1 and column 2 are run with intercept terms, which are statistically insignificant in both columns.

* and ** indicate significance at the 10% and 5% levels, respectively.

Analyst estimates of future earnings per share are taken from I/B/E/S over the 76 quarters between January 1, 1986 and December 31, 2004.[12] For each firm and quarter, we construct a measure of the median optimistic

[12] We exclude analyst estimates prior to 1986, since the coverage in I/B/E/S during this period is limited. Since our focus is on analyst estimates of future earnings, we also exclude estimates of earnings that are issued after the end of the estimate period end date.

bias in the long-horizon analyst earnings estimate. We classify each analyst estimate made earlier than 90 days before the estimate period end date as a long-horizon estimate and match it to the corresponding actual earnings declared by the firm.[13] The optimistic bias in each analyst's estimate is then defined as the difference between the earnings estimate and the corresponding actual earnings, expressed as a percentage of the firm's beginning of quarter stock price. Since we include both annual and quarterly earnings estimates in calculating analyst optimism, we divide the bias by four when scaling at the annual, rather than quarterly, level.[14] For each firm and each quarter we then compute the median optimism across all analyst estimates issued for that firm in that quarter.[15] This quarterly, firm-specific measure of analyst optimism is denoted *AN_OPT* and is winsorized at the 1% level to reduce the effect of outliers.

Our final sample, which spans 76 quarters over 1986 to 2004, comprises 100,346 firm-quarters. Consistent with previous literature, analyst estimates are, on average, optimistic: Mean analyst optimism is 0.48% of price per share. The distribution of analyst bias is skewed, with the median scaled analyst error much lower, at 0.04%.

The relation between investor sentiment, as proxied by the Michigan Consumer Confidence Index, and the degree of optimism embedded in analyst earnings estimates is measured using the following linear regression:

$$AN\_OPT_{it} = \alpha + \beta * SENT_{t-1} + \gamma * X_{t-1} + \delta * Z_{it-1} + \varepsilon_{it}. \qquad (3)$$

The dependent variable, AN_OPT_{it}, is the median optimism in analyst earnings estimates for firm i in quarter t, and $SENT_{t-1}$ is the average Consumer Confidence Index during quarter $t-1$.[16] X_{t-1} and Z_{it-1} represent the vector of quarterly and firm-quarter control variables described

[13] As an example of a long-horizon estimate, consider an analyst quarterly earnings estimate issued on January 15, 2006 for the quarter ended June 30, 2006. Because the estimate period end date is June 30, 2006, the estimate is classified as long-horizon since it is provided more than 90 days prior to the estimate period end date. The mean difference between the estimate period end date and the date of analyst estimate issuance for the long-horizon analyst estimates is 339 days.

[14] In unreported results, we also scale the analyst bias by the absolute value of earnings and find similar results. In doing so, we exclude firms and estimate periods with actual earnings exactly equal to zero. The resultant reduction in sample size is very small (less than 0.6% of the original sample).

[15] All regressions are repeated using mean, rather than median, firm-quarter analyst estimate errors; using the mean estimate errors only strengthens the main conclusions we draw from our tests.

[16] Because end-of-quarter increases in firm earnings may be correlated with end-of-quarter increases in sentiment, the errors in analyst estimates issued at the beginning of a quarter may be negatively related to the average quarterly sentiment, $SENT_t$. To avoid this spurious correlation, we use lagged average quarterly sentiment, $SENT_{t-1}$, as a dependant variable in our specifications.

TABLE 7

Regressions of Median Analyst Earnings Optimism on Investor Sentiment

Specification	Levels		Differenced
Standard Errors Estimated With:	Column 1: Newey-West	Column 2: Clustering at Year-Quarter	Column 3: Clustering at Year-Quarter
SENT	0.519	0.519	0.638
	(3.87)**	(1.87)*	(2.42)**
GDPCHG	0.032	0.032	−0.023
	(10.16)**	(4.87)**	(4.93)**
PASTMARKET	0.212	0.212	−0.068
	(4.19)**	(2.21)**	(0.77)
MARKETVOL	−1.784	−1.784	−1.403
	(2.88)**	(2.13)**	(1.43)
SIZE	0.035	0.035	0.358
	(0.98)	(1.07)	(3.55)**
BTM	1.118	1.118	1.406
	(9.69)**	(10.98)**	(6.53)**
ROA	0.363	0.363	0.907
	(0.69)	(0.53)	(1.23)
RET	−0.044	−0.044	0.053
	(2.91)**	(2.58)**	(2.27)**
RETVOL	0.462	0.462	−0.416
	(1.89)*	(1.82)*	(1.72)
ISSUE	−0.030	−0.030	−0.017
	(0.79)	(0.85)	(0.55)
ANALYSTN	0.003	0.003	0.007
	(1.47)	(1.51)	(3.01)**
INSTOWN	−0.242	−0.242	0.282
	(2.56)**	(2.05)**	(2.60)**
LOSS	0.398	0.398	0.183
	(11.38)**	(9.64)**	(3.32)**
CAPEX	1.025	1.025	1.186
	(5.21)**	(3.29)**	(3.37)**
REG_FD	0.148	0.148	0.450
	(2.99)**	(1.40)	(2.84)**
Trend	−0.004	−0.004	
	(2.91)**	(2.87)**	
Firm fixed effects	Y	Y	N
Adjusted R^2	0.33	0.33	0.02
Observations	100,346	100,346	70,177

The dependent variable in the regressions is *AN_OPT*. For every firm-quarter, *AN_OPT* is the median difference between the earnings estimates for the firm provided by the analyst in that quarter and the corresponding actual earnings, scaled by price. This measure includes only long-horizon analyst earnings estimates made prior to 90 days before the estimate period end date. The regressions are estimated over the time period 1986 to 2004. All independent variables are defined as in table 2.

* and ** indicate significance at the 10% and 5% levels, respectively.

in section 4. To maintain consistency, all control variables included in previous regressions are retained in regression (3), which is estimated over the 100,346 firm-quarters in our sample. Results are presented in table 7. Due to the panel nature of our data, we use three specifications in estimating regression (3): Column 1 employs firm fixed effects with standard errors calculated using a Newey-West estimator to control for heteroskedasticity and

autocorrelation in firm-level errors. Column 2 employs firm fixed effects and calculates standard errors clustered at the quarterly level to control for cross-firm correlations. Column 3 employs a differenced specification where each observation is differenced with respect to the corresponding observation in the same quarter of the previous year, with standard errors again clustered at the quarterly level.

As can be seen in table 7, the coefficient on *SENT* is consistently significantly positive in all three specifications, indicating that when consumer confidence is high, the optimistic bias in analyst estimates increases. Focusing on column 1, the coefficient on *SENT* implies that a one-standard-deviation increase in investor sentiment is associated with a 0.05 percentage point increase in our analyst bias measure. This effect is economically significant, as it represents 10.3% of the mean analyst bias of 0.48% of price.[17]

Our results thus demonstrate that the bias in the optimism of analyst earnings estimates is positively associated with our measure of investor sentiment. Still, as our results in section 5 demonstrate, long-horizon firm disclosure is not aimed solely at correcting this bias.

6.2 SENTIMENT AND VOLUNTARY DISCLOSURE OVER SHORTER HORIZONS

As discussed in the introduction, we expect managers' desire to maintain high sentiment to primarily affect their disclosures about earnings over longer horizons. The expected relation between sentiment and disclosure regarding short-horizon earnings is less clear. Numerous studies document that managers are averse to announcing negative earnings surprises and tend to walk down analyst estimates as the earnings announcement date approaches (see, e.g., Skinner [1994], Soffer, Thiagarajan, and Walther [2000], Richardson, Teoh, and Wysocki [2004]). According to this literature, during periods of high sentiment, rather than remaining silent, managers are expected to issue disclosures that reduce optimistic market expectations of short-horizon earnings. Thus, contrary to the relation between long-horizon forecasts and sentiment, the relation between the number of short-horizon earnings forecasts and sentiment tends to be positive as firms issue more short-horizon *walk-down* forecasts during periods of high sentiment. The relation between investor sentiment and short-horizon forecast frequency after controlling for analyst pessimism is even more ambiguous, since it is possible that over the short horizon, managers are more concerned about directly responding to analyst pessimism rather than general investor sentiment.

For completeness, in this section we discuss the results of estimating the relation between sentiment and the frequency of short-horizon management

[17] Finally, in an untabulated analysis, we find no relation between sentiment and short-horizon analyst errors, defined as analyst estimates issued within 90 days of the forecast period end date.

TABLE 8

Regressions of Firm Short-Horizon Earnings Forecast Frequency on the Michigan Consumer Confidence Index, for the Primary Sample

	PESSIMISM = NPESS		*PESSIMISM = AN_PESS*	
	Column 1: *SH_WU*	Column 2: *SH_WD*	Column 3: *SH_WU*	Column 4: *SH_WD*
SENT	−0.102	0.344	−0.088	1.171
	(1.95)*	(2.40)**	(0.18)	(1.49)
PESSIMISM	0.403	0.37	−9.692	5.505
	(30.80)**	(11.48)**	(6.83)**	(2.22)**
GDPCHG	0.003	0.001	0.041	0.022
	(1.19)	(0.05)	(1.73)*	(0.69)
PASTMARKET	0.002	−0.146	−0.184	−0.618
	(0.07)	(1.87)*	(0.71)	(1.60)
MARKETVOL	−0.215	−1.464	−1.147	−3.429
	(0.68)	(1.57)	(0.38)	(0.74)
SIZE	−0.004	0.064	−0.062	0.024
	(0.71)	(5.89)**	(2.56)**	(0.56)
BTM	0.003	−0.002	0.051	0.034
	(0.49)	(0.20)	(1.00)	(0.52)
ROA	0.021	0.208	0.428	0.742
	(0.51)	(1.77)*	(1.30)	(1.63)
RET	0.003	−0.046	0.02	−0.018
	(0.98)	(4.70)**	(1.33)	(0.67)
RETVOL	−0.03	−0.138	0.115	−0.364
	(1.17)	(1.99)**	(0.56)	(1.15)
ISSUE	−0.001	−0.045	0.01	−0.051
	(0.14)	(2.17)**	(0.31)	(0.97)
ANALYSTN	0.004	0.017	0.008	0.016
	(7.53)**	(11.49)**	(5.52)**	(4.81)**
INSTOWN	0.033	0.079	0.146	−0.069
	(2.35)*	(3.02)**	(2.20)**	(0.72)
LOSS	−0.015	−0.011	−0.055	−0.009
	(4.23)**	(1.72)*	(1.89)*	(0.22)
CAPEX	0.064	0.391	0.479	1.407
	(1.41)	(3.05)**	(1.56)	(2.60)**
REG_FD	0.046	0.204	0.254	0.155
	(3.31)**	(6.01)**	(1.67)*	(0.64)
Trend	0.001	−0.009	−0.001	0.003
	(0.45)	(4.27)**	(0.12)	(0.33)
Firm fixed effects	Y	Y	Y	Y
Adjusted R^2	0.51	0.29	0.37	0.36
Observations	46,332	46,332	12,520	12,520

The regressions are estimated over the time period 1996 to 2004. The sample includes all firm-quarters that follow the initial appearance of the corresponding firm on the First Call CIG database. *SH_WU* is the number of short-horizon, walk-up earnings forecasts issued in quarter *t*. *SH_WD* is the number of short-horizon, walk-down earnings forecasts issued in quarter *t*. Short-horizon forecasts are those made within 90 days of the forecast period end date. All independent variables are defined as in table 5. All standard errors are calculated using clustering at the year-quarter level.

* and ** indicate significance at the 10% and 5% levels, respectively.

forecasts issued by a firm in a given quarter. We classify any management forecast issued within 90 days of the estimate period end date as a short-horizon forecast. Forecasts issued after the end of the fiscal period are excluded from our sample, since they tend to be exclusively earnings

warnings and are more likely to be motivated by a desire to reduce litigation risk.[18]

In table 8, we therefore examine the association between sentiment and the following: (1) the number of short-horizon forecasts that walk up analyst estimates, *SH_WU*, and (2) the number of short-horizon forecasts that walk down analyst estimates, *SH_WD*. We include controls for analyst pessimism in the regression. In column 1 and column 2, the control is *NPESS*, while in column 3 and column 4 the control is *AN_PESS*. Column 1 and column 2, with *NPESS* as the measure of analyst pessimism, indicate that over the short horizon walk-up and walk-down forecast frequencies have relations of opposite sign with investor sentiment. The coefficient on *SENT* in column 1 indicates sentiment's negative and significant relation with the frequency of short-horizon walk-up forecasts, *SH_WU*. In contrast, the coefficient on *SENT* in column 2 indicates a positive and significant relation between sentiment and the frequency of short-horizon walk-down forecasts, *SH_WD*. In column 3 and column 4, however, with analyst error as the measure of analyst pessimism, we find no evidence of a significant relation between short-horizon forecast frequency and sentiment. In untabulated results we again find very weak and ambiguous results on the association of *SENT* with *SH_WU* and *SH_WD* when we use a differenced instead of a levels specification. In summary, the empirical evidence on the relation between short-horizon forecast frequency and sentiment after controlling for analyst pessimism is quite mixed.

7. *Conclusion*

In this paper we analyze the relation between investor sentiment and firm disclosure policy. We present evidence that managers strategically vary their voluntary disclosure policies in response to prevailing sentiment. During low-sentiment periods, managers increase the frequency of long-horizon earnings forecasts that walk up consensus analyst estimates, while during high-sentiment periods, managers reduce this forecast frequency. Further, we show that the bias in analysts' estimates of future earnings are positively associated with sentiment, but importantly, that firms' disclosure policies are not solely aimed at correcting analyst bias. Indeed, we find that managers still respond to sentiment after controlling for variation in analyst pessimism, suggesting that managers attempt to communicate with investors in general, and not just analysts. In summary, our study demonstrates how firms attempt to influence sentiment by strategically varying their disclosure policies.

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[18] The mean frequency of short-horizon forecasts in the sample is 0.43, and the mean horizon is 46 days.

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