Self-Fulfilling Stock Recommendations

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Abstract

This paper tests a form of bias in earnings forecasts that arises from analysts' desire to be perceived as accurate. In particular, we propose that analysts with buy (sell) recommendations have an incentive to report downward (upward) biased earnings estimates so that the company is more (less) likely to beat the consensus forecast and experience an earnings surprise that is "in line" with the analyst's outstanding stock recommendation. Consistent with this prediction, we find that stock recommendations prior to earnings announcements significantly and positively predict subsequent earnings forecast errors, and that this predictability is concentrated in situations where the motivation for such strategic behavior is particularly strong. Together, our evidence suggests that analysts' desire to be perceived as accurate can, in fact, lead to biases in their reported earnings forecasts.

JEL Classification: G12, G14, G23.

Keywords: Biased earnings forecasts, Return predictability, Strategic behavior.

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1 Introduction

Sell-side analysts play an integral role in financial markets. They collect, process, and transmit information to market participants, who in turn use analysts' reports to guide their investment decisions.[1] Two core ingredients of an analyst report are the analyst's earnings forecasts and his overall stock recommendation. The goal of this paper is to explore whether, in an attempt to be perceived as accurate, sell-side analysts in fact give up earnings forecast accuracy.

In particular, we hypothesize that analysts, sometimes, report biased earnings estimates to better "align" the subsequent earnings surprise with their stock recommendations. To illustrate, consider an analyst with a strong buy recommendation, i.e., an analyst, who believes that the market currently undervalues the firm in question. If the firm subsequently misses its consensus forecast, this could be construed as contradicting the analyst's bullish view on the company and hence raise doubt on the analyst's competency.[2] The analyst can hedge against such risk by introducing a negative bias into his reported earnings forecast so that the company is more likely to meet or beat the consensus forecast and experience a positive earnings surprise; relatedly, when the analyst has a bearish recommendation outstanding, he can introduce a positive bias into his reported earnings forecast so that the company is more likely to miss the consensus forecast and experience a negative earnings surprise.

To test our hypothesis, we obtain data on earnings forecasts and stock recommendations from the IBES database. We then examine whether recommendations issued prior to a firm's earnings announcement predict individual analysts' subsequent earnings forecast errors, which we define as the difference between the reported earnings-per-share and the most recent earnings-per-share forecasts, scaled by lagged price.

Our results are consistent with sell-side analysts exhibiting strategic forecasting behavior. After

[1]Stickel (1995), Womack (1996), and Jegadeesh, Kim, Krische, and Lee (2004) provide evidence that stocks experiencing a recommendation upgrade subsequently outperform stocks experiencing a recommendation downgrade. Moreover, financial analysts' earnings forecasts appear, on average, to be more accurate than forecasts generated by statistical models (e.g., Kothari (2001)).

[2]How the respective firm fares around the earnings announcement could be particularly relevant when there is disagreement over the horizon over which and the benchmark against which stock recommendation performance should be measured. In untabulated analyses, we relate the fraction of "inconsistent" stock recommendations with measures of analyst career outcomes that have been proposed by prior literature. In particular, we find that analysts in the bottom quintile ranked by the fraction of inconsistent recommendations in a year is 4.8% (p=0.05) more likely to be demoted from a large brokerage house to a smaller one in the following year, and is 4.9% (p=0.08) less likely to be promoted.

controlling for variables known to be related to analysts' recommendations and earnings forecast errors, we find that an analyst's recommendation issued at least three months before the earnings announcement strongly predicts the subsequent earnings forecast error. Specifically, a one-notch increase in an analyst's outstanding recommendation is associated with a 27 basis points (bps) increase in the earnings forecast error (t-statistic=3.52).

Because analysts' motivation to bias earnings forecasts stems from their capacity to move the *consensus* forecast (and announcement day returns), in our main analysis, we aggregate both earnings forecasts and recommendations to the firm level and test whether firms with more optimistic (pessimistic) recommendations subsequently experience more positive (negative) earnings surprises.[3] The tenor of our results remains. Specifically, sorting firms-years into terciles based on their average recommendation levels, we find that firm-years in the tercile with the most pessimistic recommenations, on average, experience a price-scaled earnings surprise of -12 bps; in comparison, firm-years in the tercile with the most optimistic recommendations experience a price-scaled earnings surprise of +2 bps. Taking the long-term average stock price of $35 per share from Weld, Thaler, and Benartzi (2009), the difference of 14 bps (t-statistic=2.88) translates into a five-cent difference in earnings surprise between the top and bottom tercile. Correspondingly, we observe that the fraction of firm-years meeting or beating the analyst consensus forecast is 7% higher in the top tercile than in the bottom tercile (t-statistic=9.19). This result continues to hold within a regression framework (both OLS and median regressions) and with the inclusion of various controls for growth opportunities and earnings management.

Given the strong association observed between recommendation level and subsequent earnings surprise (and the fraction of firm-years meeting or beating the consensus forecast), it should not surprise that the average recommendation significantly and positively predicts stock returns in a three-day window around the earnings announcement. The difference in characteristic-adjusted earnings announcement day returns between the top and bottom terciles is 0.66% (t-statistic=4.92).[4] We also observe some evidence that the difference in earnings-announcement-day returns reverses

[3] Conducting our analysis at the firm-level also has important methodological advantages. This is because aggregating to the firm-level circumvents the problem of us not directly observing analysts' true (unbiased) earnings forecasts, which are also related to analysts' outstanding recommendations. See Section 4.2 for a more detailed discussion.

[4] Consistent with prior research, we also find that recommendation levels have no predictive power for stock returns *outside* of these announcement windows.

within months of the earnings announcement, consistent with part of the earnings-announcement-day return being induced by analysts' hedging behavior.

To further explore our interpretation of the results, we exploit cross-sectional variation in potential benefits and costs associated with analysts' strategic behavior. Any strategic deviation by a single analyst in his reported earnings forecast has a larger impact on the consensus forecast when analyst coverage is lower. Moreover, when an analyst chooses to report biased earnings estimates, other analysts with similar recommendations can free-ride on this analyst's decision. To the extent that the analyst with the distorted earnings forecast is the only one to bear the cost, the more analysts that are covering a firm, the less likely any one of them would report distorted earnings estimates. We thus predict that analysts are more likely to report distorted earnings estimates when a firm is followed by fewer analysts.

Our conjecture is born out by the data. We observe that the association between the average recommendation and subsequent earnings surprise significantly decreases with analyst coverage. Moreover, making the assumption that geographic proximity mitigates the coordination/free-rider problem, we partition firms based on whether the analysts covering the firm in question are from the same locale (based on Metropolitan Statistical Areas), and find that even after controlling for analyst coverage, the association between average recommendation and subsequent earnings surprise is stronger for firms covered (exclusively) by analysts from the same locale.

We also explore the role of valuation uncertainty. Our interpretation of the evidence so far is that analysts "hedge" their recommendations through biased earnings forecasts: Analysts with optimistic (pessimistic) recommendations are afraid that the firm misses (beats) the consensus forecast, and attempt to hedge against such risk by introducing a negative (positive) bias into their reported forecasts. Because firms with higher uncertainty have a wider range of potential earnings realizations, in order to "ensure" that these high-uncertainty firms meet (miss) the consensus forecast, analysts have to report more biased forecasts. Using firm size and stock return volatility as proxies for valuation uncertainty, we find evidence consistent with this conjecture.

To complement the results on recommendations and earnings surprises, we further examine investor trading behavior around earnings announcements. In order for analysts to benefit from strategic distortions in their earnings forecasts, some investors must be unaware that earnings forecasts have been strategically manipulated. In particular, we predict that retail investors, naïve about incentives, take analyst reports at face value, while institutional investors account for distortions in earnings forecasts and adjust their trading decisions accordingly (e.g., Daniel, Hirshleifer, and Teoh (2002); Schotter (2003); Malmendier and Shanthikumar (2007)). Consistent with this prediction, we find that the association between average recommendation and subsequent earnings surprise increases with retail investor holdings. Moreover, using detailed trading records from the Trade and Quote (TAQ) database, we provide evidence that high stock recommendations lead to increased buying among retail investors around subsequent earnings announcements, yet increased selling among institutional investors.

Overall, the findings presented in this paper are consistent with the here-proposed hypothesis. That is, analysts with optimistic (pessimistic) recommendations on a firm are concerned that the company subsequently experiences a negative (positive) earnings surprise; analysts hedge against such risk by introducing a negative (positive) bias into their reported forecasts.

There are alternative interpretations for parts of our findings. In particular, one may argue that managers from firms with bullish recommendations have a stronger incentive to beat (or meet) the consensus forecast than those with bearish recommendations, as the former are penalized more severely for missing their respectively earnings targets (e.g., Abarbanell and Lehavy (2003)). Consequently, managers from firms with bullish recommendations manage earnings upward and/or guide analysts' forecasts downward, while those with bearish recommendations decide to take big earnings baths. We label this alternative explanation the "earnings management" interpretation.

Relatedly, there is a growing body of research that examines how analysts compromise their objectivity and issue biased research reports in order to curry favor with firm managers. Lin and McNichols (1998), Michaely and Womack (1999) and Chen and Jiang (2006), among others, suggest that analysts from brokerage houses that have underwriting relations with the firm in question ("affiliated" analysts) tend to issue more optimistic recommendations than their "unaffiliated" peers. Malmendier and Shanthikumar (2009), in particular, provide evidence that affiliated analysts with the most optimistic recommendations also issue the most pessimistic earnings forecasts. No such relation is found for unaffiliated analysts. We label this interpretation the "currying favor" hypothesis.

Our goal in this paper is not to cast doubt on these alternative explanations. Rather, we hope to introduce a novel mechanism through which analysts -by trying to appear accurate/consistent-in fact give up earnings forecast accuracy. While difficult to prove conclusively, all of the results presented in this study are at the very least consistent with this view of analyst behavior. We attempt to differentiate our hypothesis from the earnings management interpretation by explicitly controlling for discretionary accruals, the inclusion of which as an additional independent variable has little impact on the partial correlation between recommendation and earnings surprise. Moreover, both the earnings-management and currying-favor interpretations have no clear prediction on how the observed effect should vary with analyst coverage, analyst locale, and valuation uncertainty. In addition, the currying favor interpretation has considerable difficulty explaining negative earnings surprises observed in association with pessimistic recommendations. Together, while both the earnings management and the currying favor interpretations likely play a role in explaining parts of our findings, neither can explain the full set of results by itself, making our interpretation the most parsimonious. As such, our paper may add to the set of frameworks that economists, investors, and regulators use to study analyst forecasting behavior and to examine information flows in financial markets.

The paper proceeds as follows. Section 2 summarizes our data collection and screening procedures. Section 3 reports the results of our main analysis. Section 4 discusses alternative explanations and conducts robustness checks. Finally, Section 5 concludes.

2 Data

We obtain information regarding sell-side analyst recommendations and earnings forecasts from the Institutional Brokers Estimate System (IBES) detail recommendation file and the IBES unadjusted U.S. detail history file, respectively. The IBES recommendation file tracks each recommendation made by each analyst, where recommendations are standardized and converted to numerical scores ranging from 1 (strong buy) to 5 (strong sell). To facilitate the interpretation of our results, we reverse the IBES coding to 5 (strong buy), 4 (buy), 3 (hold), 2 (sell), and 1 (strong sell). A high value, thus, indicates a more bullish view. The IBES unadjusted detail history file tracks each earnings-per-share (EPS) forecast made by each analyst (among others). Following prior literature (e.g., Teoh, Welch, and Wong (1998a,b)), we define the consensus forecast as the *average* annual EPS forecast (across all forecasts issued in the three months prior to the earnings announcement);

in robustness tests, we also use the *median* earnings forecast and obtain very similar results.[5] The sample period spans from 1994 to 2010 and is determined by the availability of recommendation data in the IBES dataset. We augment the IBES file with financial-statement and financial-market data from COMPUSTAT and the Center for Research in Security Prices (CRSP), respectively. To examine the relation between analysts' forecasting behavior and institutional holdings and trading decisions, we also obtain quarterly institutional holdings information from Thomson Financial and small-/large-trades from the Trade and Quote database. Finally, we manually collect location information for the brokerage firms in our sample from *Nelson's Directory of Investment Research* (and other sources). Appendices A and B provide a full description of the variables used in this study.[6]

In our analysis, we exclude firm observations with the most extreme 0.1% of standardized earnings surprise ($SUE=$ actual EPS minus consensus earnings forecast scaled by lagged stock price). Less conservative procedures of truncating the sample (e.g., most extreme 1% or 5%) produce results with much higher statistical significance than the ones reported in this study. In an attempt to mitigate market microstructure issues, in our stock-return analyses, we follow prior literature (e.g., Jegadeesh and Titman (2001), Avramov, Chordia, Jostova, and Philipov (2007)) and also exclude firm observations with prices below \$5 a share and market capitalization that would place them in the bottom NYSE decile. Our final sample comprises around 33,000 firm-year observations.

Table I presents summary statistics of our main variables of interest. Consistent with prior literature, the median firm in our sample beats its most recent consensus earnings forecast (the median SUE is 0.001). In addition, the distribution of SUE is significantly negatively skewed, suggesting that firms sometimes choose to take earnings baths when they are unable to meet the consensus forecast. Firms that meet or beat their consensus earnings forecast outperform those that miss their consensus by a significant margin in a three-day window around the earnings announcement (1.31% vs. -1.82%).

[5]The consensus forecast reported on popular investment sites, such as *Yahoo!Finance*, *MSN-Money*, and *WSJ*, are all defined as the *mean* forecast. Consistent with investors paying more attention to the mean forecast than the median forecast, we find that the earnings-response coefficient (i.e., the association between earnings surprise and earnings-announcement-day return) is stronger when defining the consensus forecast as the mean forecast (results available upon request).

[6]In a recent study, Ljungqvist, Malloy, and Marston (2009) detect that the IBES recommendations database downloaded at different points in time (but for the same sample period) yields different observations. Thomson Financial has for the most part purged the data. As of February 12th 2007, the data on Wharton Research Data Services (WRDS) reflect the corrections Glushkov (2007).

The average market capitalization is \$4.14 billion and the average book-to-market ratio is 0.56. Compared to the CRSP-sample averages, these figures indicate that firms covered by analysts tend to be larger and more growth-oriented. Table I also shows that the earnings surprise of a firm is positively correlated with the average recommendation outstanding prior to the earnings announcement.

3 Biases in Analysts' Earnings Forecasts

In this section, we motivate our empirical design and take our main hypothesis to the data. Our proposition in this study is that analysts with optimistic (pessimistic) recommendations sometimes choose to report negatively (positively) biased earnings estimates – relative to their true beliefs – so that the firm is more (less) likely to meet/beat the consensus forecast and hence to experience a positive (negative) subsequent earnings surprise. This proposed behavior stems from analysts' desire to hedge the risk of "inconsistent recommendations" – i.e., recommendations that are contradicted by subsequent earnings surprises. In untabulated analyses, we find that analysts in the bottom quintile ranked by the fraction of inconsistent recommendations in a year is 4.8% (p=0.05) more likely to be demoted from a large brokerage house to a smaller one than their peers, and is 4.9% (p=0.08) less likely to be promoted from a smaller brokerage house to a larger one in the following year. Relatedly, we find a similar effect of recommendation performance, defined as the average annual return of all recommendations made by an analyst, on the analyst's future career outcome. The career-outcome result is also robust to the control of past earnings forecast accuracy.

3.1 Results at the Analyst Level

Empirical tests of our hypothesis face the challenge that we, as econometricians, do not observe analysts' true earnings estimates. Consider analyst j's forecast bias for firm i:

$$\underbrace{\left(\widehat{e}_{j,i,t+1} - \widehat{e}^{rep}_{j,i,t+1}\right)}_{Forecast\,Bias\,(unobserved)}, \tag{1}$$

where $\widehat{e}_{j,i,t+1}$ is analyst j's *true* earnings forecast, and $\widehat{e}^{rep}_{j,i,t+1}$ is his reported earnings forecast. The goal of this study is to assess whether the *unobserved* difference between analyst j's reported and true earnings forecast ($Forecast\,Bias$) varies systematically with his recommendation level. One approach to circumvent this problem is to substitute the analyst's true earnings forecast, $\widehat{e}_{j,i,t+1}$, with the actual earnings per share (EPS), $e_{i,t+1}$. We can then test whether analysts with more optimistic (pessimistic) recommendations are more likely to have positive (negative) earnings forecast errors, $\left(e_{i,t+1} - \widehat{e}^{rep}_{j,i,t+1}\right)$.

In particular, we conduct the following regression analysis at the firm-year-analyst level:

$$\overbrace{e_{i,t+1} - \widehat{e}^{rep}_{j,i,t+1}}^{Earnings\,Forecast\,Error} \quad = \alpha_t + \beta * rec_{j,i,t} + Control * \gamma + \varepsilon_{j,i,t}, \tag{2}$$

where $\hat{e}^{rep}_{j,i,t+1}$ is the most recent earnings forecast for firm i issued by analyst j, and $rec_{j,i,t}$ is the latest stock recommendation issued by the same analyst at least three months and no more than fifteen months prior to the earnings announcement. In our regression analysis, we scale $Earnings\,Forecast\,Error$ by lagged price per share to address potential heteroscedasticity issues. We also include year-fixed effects in the regression to deal with changes in overall market conditions. Our main prediction is that β be significantly positive.

Our choice of control variables ($Control$) in regression specification (2) is motivated by the observation that recommendations tend to be more optimistic for larger, growth firms with higher past stock returns, and that these firm characteristics may be related to earnings forecast errors through other channels. For example, prior studies (e.g., Subramanyam and Wild (1996); Skinner and Sloan (2002); Abarbanell and Lehavy (2003)) document a significantly stronger return response to earnings surprises for growth firms than for value firms; put differently, growth firms are penalized more severely than value firms for missing their respective earnings targets. Consequently, managers of growth firms may have stronger incentives to manipulate their earnings (e.g., through discretionary accruals). To the extent that analysts do not fully anticipate this behavior, growth firms will be associated with both higher recommendations and more positive earnings forecast errors. Similar conjectures apply to large firms and firms with high past returns.

We include *discretionary accruals* in our regression to control for the effect of earnings management on earnings forecast errors. We also include variables intended to capture earnings management incentives: *lagged firm size*, *book-to-market ratio*, and *prior-year stock returns*. In additional analyses, we include alternative controls for a firm's growth opportunities (investment ratio, price-to-earnings ratio, advertising expenditures, and etc.), as well as past stock returns over various horizons; the results are very similar to the ones reported in this study. There may be other omitted variable issues that are not dealt with using the current set of controls. To keep the presentation uncluttered, we defer related discussions to Section 5.

The results, shown in Table II, are consistent with the hypothesis that sell-side analysts strategically report biased earnings forecasts to improve their recommendation performance ex-post, and thus to enhance their career outcomes. After controlling for the list of variables that are known to be related to analysts' recommendations and earnings forecast errors, an analyst's outstanding recommendation issued at least three months before the earnings announcement significantly and positively predicts his subsequent earnings forecast error. Specifically, a one-notch increase in the analyst's outstanding recommendation is associated with a 26.5 (t=3.52) basis point increase in the price-adjusted earnings forecast error.

We also conduct a logistic regression analysis with the dependent variable being an indicator function that takes the value of one if the earnings forecast error is non-negative and zero otherwise. The result are similar as those reported above; a one-notch increase in outstanding recommendation is associated with a 3.15% (p=0.00) increase in the probability of a non-negative earnings forecast error. Together, these results are consistent with our hypothesis that analysts with optimistic (pessimistic) recommendations issue negatively (positively) biased earnings forecasts for career purposes.

3.2 Results at the Firm Level

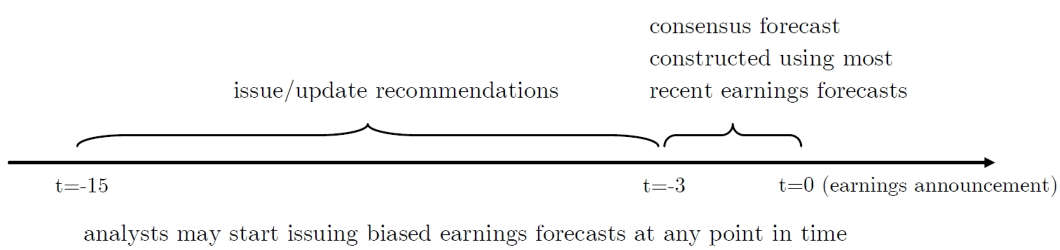
3.2.1 Regression Specification

Because analysts' motivation to report biased earnings forecasts stems from their ability to affect the consensus forecast and earnings announcement day return, in our main analysis, we aggregate both earnings forecasts and recommendations to the firm level, and examine whether firms with more optimistic (pessimistic) average recommendations subsequently experience more positive (negative) earnings surprises and announcement day returns. Specifically, we conduct the following regression with firm-year observations:

$$\overbrace{e_{i,t+1}-\overline{\widehat{e}}^{rep}_{i,t+1}}^{Earnings\,Surprise} = \alpha_t + \beta * \overline{rec}_{i,t} + Control * \gamma + \varepsilon_{i,t}, \tag{3}$$

where the dependent variable $e_{i,t+1}-\overline{\widehat{e}}^{rep}_{i,t+1} = \frac{1}{J}\sum_j \left(e_{i,t+1}-\widehat{e}^{rep}_{j,i,t+1}\right)$, and $\overline{rec}_{i,t} = \frac{1}{J}\sum_j rec_{j,i,t}$.

We follow prior literature (e.g., Gu and Wu (2003)) and only consider the most recent earnings forecasts issued/updated within a three-month window preceding the earnings announcement when computing the consensus earnings forecast; relatedly, in constructing the average recommendation outstanding, we use the most recent recommendations issued/updated three to fifteen months prior to the earnings announcement.[7] The fifteen-month filter serves to weed out "stale" recommendations. We impose the three-month filter to ensure that our earnings-announcement returns are not confounded by recent changes in recommendation. Note that we do not take a position on when exactly analysts start issuing biased earnings forecasts (for their recommendations issued [-15;-3]). Analysts may do so simultaneous to their issuing the recommendation; alternatively, they may wait a few months to (better) evaluate the "need" to report biased earnings forecasts based on whether the realized returns (after recommendation issuance) are in line with those implied by their recommendation. In later analyses, we explore these and related timing issues:



Conducting our main analysis at the firm level also has important methodological advantages. To see this, we decompose the dependent variable in regression equation (2) into a forecast-bias component, a true forecast-deviation component, and a true earnings surprise component:

$$\underbrace{\left(e_{i,t+1}-\widehat{e}^{rep}_{j,i,t+1}\right)}_{Earnings\,FE} = \underbrace{\left(\widehat{e}_{j,i,t+1}-\widehat{e}^{rep}_{j,i,t+1}\right)}_{Forecast\,Bias} + \underbrace{\left(\overline{\widehat{e}}_{i,t+1}-\widehat{e}_{j,i,t+1}\right)}_{True\,Deviation} + \underbrace{\left(e_{i,t+1}-\overline{\widehat{e}}_{i,t+1}\right)}_{True\,Surprise}. \tag{4}$$

[7]We observe similar results whether we include earnings forecasts issued four, six, or twelve months before the earnings announcement. Our results are also robust to whether we begin with including recommendations issued twelve or fifteen months before the earnings announcement as well as whether we stop including recommendations issued three, four, or six months before the earnings announcement.

The above equation is derived by simultaneously adding and subtracting $\widehat{e}_{j,i,t+1}$ and $\overline{\widehat{e}}_{i,t+1}$, where $\widehat{e}_{j,i,t+1}$ is analyst j's *true* earnings forecast and $\overline{\widehat{e}}_{i,t+1}$ is the *true* consensus forecast. The $True\,Deviation$ term measures the deviation of an analyst's unbiased earnings forecast from that of the other analysts covering the same stock; the $True\,Surprise$ term captures the difference between the actual EPS and true consensus forecast, which, under the assumption that analysts form rational beliefs, equals zero in expectations. Any observed correlation between $Earnings\,FE$ and recommendation level reflects both the effect of recommendation level on forecast bias and the effect of recommendation level on analyst's true deviation from the consensus belief. We conjecture the former to be positive; the latter is negative because analysts with more positive recommendations likely also have more optimistic *true* beliefs about future earnings than their less positive counterparts. The coefficient β on recommendation in equation (2) is thus biased toward zero. That is, while an analyst with a "strong buy" recommendation may report a negatively biased forecast relative to his true belief, because his true belief is higher than that of his peer with a "hold" recommendation on the same stock, the "strong buy" analyst's reported forecast may still be higher than that of the "hold" analyst even in the presence of strategically distorted forecasts.

The advantage of regression (3) is that, in aggregating $Earnings\,FE$ to the firm level, we eliminate the $True\,Deviation$ term from equation (4), as $\frac{1}{J}\sum_j \left(\widehat{e}_{j,i,t+1} - \overline{\widehat{e}}_{i,t+1}\right) = 0$. That is, the positive association between analysts' recommendations and their *relative* views on subsequent earnings of any particular firm is washed out at the firm level. The firm-level equation (3) therefore allows for a cleaner test of the hypothesis we propose in this study.[8] In the following analyses, we use equation (3) as our baseline regression specification.

3.2.2 Results

The results of regression (3), presented in Table III, are consistent with our hypothesis. The coefficient estimate on the firm's average recommendation level is both statistically and economically significant. Specifically, a one-notch upgrade in the consensus recommendation prior to the earnings announcement (e.g., from 3 (hold) to 4 (buy)) is associated with a 67-basis-point increase (t=2.48) in scaled earnings surprise, which is about twice the interquartile range of the earnings-surprise variable in our sample. The coefficient estimates on the control variables indicate that earnings

[8] We discuss potential alternative interpretations of equation (3) in Section 5 in more detail.

surprises tend to be more positive for firms with more growth opportunities, higher past returns, and more positive discretionary accruals. The positive correlation between stock recommendations and subsequent earnings surprises is also robust to a median regression specification; the point estimate in the median regression is 0.008 (t=3.12), suggesting that our result is not driven by a small number of large negative earnings surprises.

Table III also reports coefficient estimates from a binary response model with the logistic function. The dependent variable equals one if a firm meets or beats its consensus earnings forecast, and zero otherwise. The independent variables are the same as in equation ((3)). The results show a positive relation between the average recommendation level and the propensity to meet or beat consensus earnings forecasts. All else equal, a one-notch increase in the average recommendation level is associated with a 8.56% increase (p=0.00) in the likelihood of meeting or beating consensus forecasts.

To further quantify the extent to which analysts with optimistic and pessimistic views are each responsible for the suggested bias in earnings forecasts, we conduct portfolio analyses. Specifically, in each year, we sort all firms into terciles based on their average outstanding recommendation level three months prior to the annual earnings announcement and report the average earnings surprise for each tercile portfolio. As shown in Table IV, the consensus recommendation of the average firm in the bottom tercile is around three (a "hold"); the consensus recommendation of the average firm in the top tercile is around four and a half (the mid-point between a "buy" and a "strong buy").

Both high- and low-recommendation groups contribute significantly to the observed association between consensus recommendations and subsequent earnings surprises. Specifically, the difference in price-scaled earnings surprise between the high- and low-recommendation groups is about 14 basis points (t=2.88), of which roughly two thirds can be attributed to the difference between the low- and median-recommendation groups, and the remaining 40% to the difference between the high- and median-recommendation groups. Given the long-term average stock price of $35 per share (in the CRSP universe), the difference in price-scaled earnings surprise between the top and bottom tercile translates into a earnings surprise of 5 cents per share, which is economically meaningful relative to the median earnings surprise of 1.5 cents per share in our full sample.

As a natural extension, we repeat our analysis, but now replace the earnings-surprise variable with earnings announcement day returns. The basic prediction is that, if investors do not fully understand analysts' incentives and mistake the bias in earnings forecasts for a genuine earnings surprise, we expect the average recommendation prior to an earnings announcement to positively predict earnings-announcement-day returns. If, however, investors are perfectly aware of potential agency issues among sell-side analysts and thus respond rationally to the bias component in the earnings surprise, then we would expect no predictable returns around earnings announcements.[9]

As reported in Panel B of Table V, recommendation level and subsequent earnings-announcement-day returns are positively correlated, where earnings announcement day returns are market-adjusted returns in a three-day window around the annual earnings announcement. Specifically, the average spread in market-adjusted returns between the top and bottom tercile based on recommendation level is 66 basis points (t=4.92). In untabulated analyses, we also examine long-run returns. If part of the announcement-day returns is caused by investors being misled by analysts' strategic behavior, we would expect some of the so-induced return effect to be reversed in the long run. Consistent with this conjecture, we observe a return reversal of 77 basis points in the six-month period following the earnings announcement; specifically, the cumulative six-month Daniel, Grinblatt, Titman, and Wermers (1997)(hereafter DGTW)-adjusted return of the top tercile is 83 basis points below that of the bottom tercile in months four to nine following the earnings announcement. The difference, however, is only weakly statistically significant.

Our documented return predictability of lagged stock recommendations is distinct from prior findings that recent *updates* in recommendations can predict future stock returns. As shown in Womack (1996), recommendation revisions have essentially no return predictive power beyond the horizon of three months, whereas in our study we use (levels of) recommendations that are issued at least three months prior to earnings reports. To confirm this conjecture, we conduct a placebo test, in which we use the average recommendation issued in months t-15 to t-3 to predict stock returns in month t. There is no predictive power flowing from lagged recommendation levels to future stock returns *outside* the earnings-announcement period. This result further implies that the return predictability around earnings announcements is likely caused by analysts' strategic behavior rather than value-relevant information.

If analysts understand the return pattern induced by their distorted earnings forecasts, we

[9]Further, we would expect analysts not to engage in this game, as their attempt to issue biased earnings forecasts in order to temporarily boost stock prices would be in vain.

would expect (at least some) analysts to revert their recommendations shortly after earnings are announced, as the positive return predictability of their stock recommendations has been realized and future returns are likely to reverse. This conjecture is borne out by the data. Specifically, we compute the average recommendation revision in months one through three after earnings announcements for each of the three terciles ranked by consensus recommendations. To control for any mechanical mean reversion in stock recommendation, we repeat our analysis for all three-month episodes that are neither preceeded by nor coincide with an annual earnings announcement (placebo sample).

Table V reports the average recommendation revision in the post-announcement quarter relative to the average recommendation level in the pre-announcement period for all three recommendation terciles. In the high-recommendation tercile, recommendations issued within the first three months after an earnings announcement are about 40% of a notch lower than the average recommendation before the earnings announcement; similarly, in the low-recommendation tercile, recommendations issued within the first three months after an earnings announcement are about 60% of a notch higher than the average pre-announcement recommendation. The difference in recommendation revision between the two groups is close to a full notch and statistically significant at the 1% level (t=-33.08). In comparison, in our placebo sample, the difference in recommendation revision between the top and bottom terciles is (only) 0.38 of a notch. Taken together, the evidence is consistent with the idea that (at least some) analysts are aware of the stock-return effect caused by distortions in earnings forecasts and time their recommendations accordingly.

3.3 Additional Analyses

To further explore our interpretation of the results, we exploit cross-sectional variation in potential benefits and costs associated with analysts' strategic behavior. We focus on two sets of firm characteristics that likely vary with the benefits and costs associated with distortions in earnings estimates. The first variable we examine is a firm's analyst coverage. Intuitively, the more analysts that are following a firm, the less each analyst's earnings forecast weighs in the consensus forecast upon which the earnings surprise is based. High analyst coverage also exacerbates the free-rider problem. To the extent that the analyst with the distorted earnings forecast is the only one to bear the cost, the more analysts that are covering a firm, the less likely any one of them would report distorted earnings estimates. Taken together, we expect analysts to distort their forecasts more frequently and to a larger extent for firms that are covered by fewer analysts.

The second set of firm characteristics we examine, lagged firm size and stock-return volatility, are related to a stock's valuation uncertainty.[10] Our interpretation of the evidence so far is that analysts hedge their recommendations through biased earnings forecasts: Analysts with optimistic (pessimistic) recommendations are concerned that their firms may miss (beat) the consensus forecasts, and thus hedge against such risk by introducing negative (positive) biases into their reported forecasts. Because firms with higher uncertainty have a wider range of potential earnings realizations, in order to "ensure" that these high uncertainty firms meet (miss) the consensus forecast, analysts have to report more biased forecasts (see figure below).

To test our predictions, we re-estimate equation (3), but now include interaction terms between indicator variables of the aforementioned firm characteristics and the firm's average outstanding recommendation prior to earnings announcements:

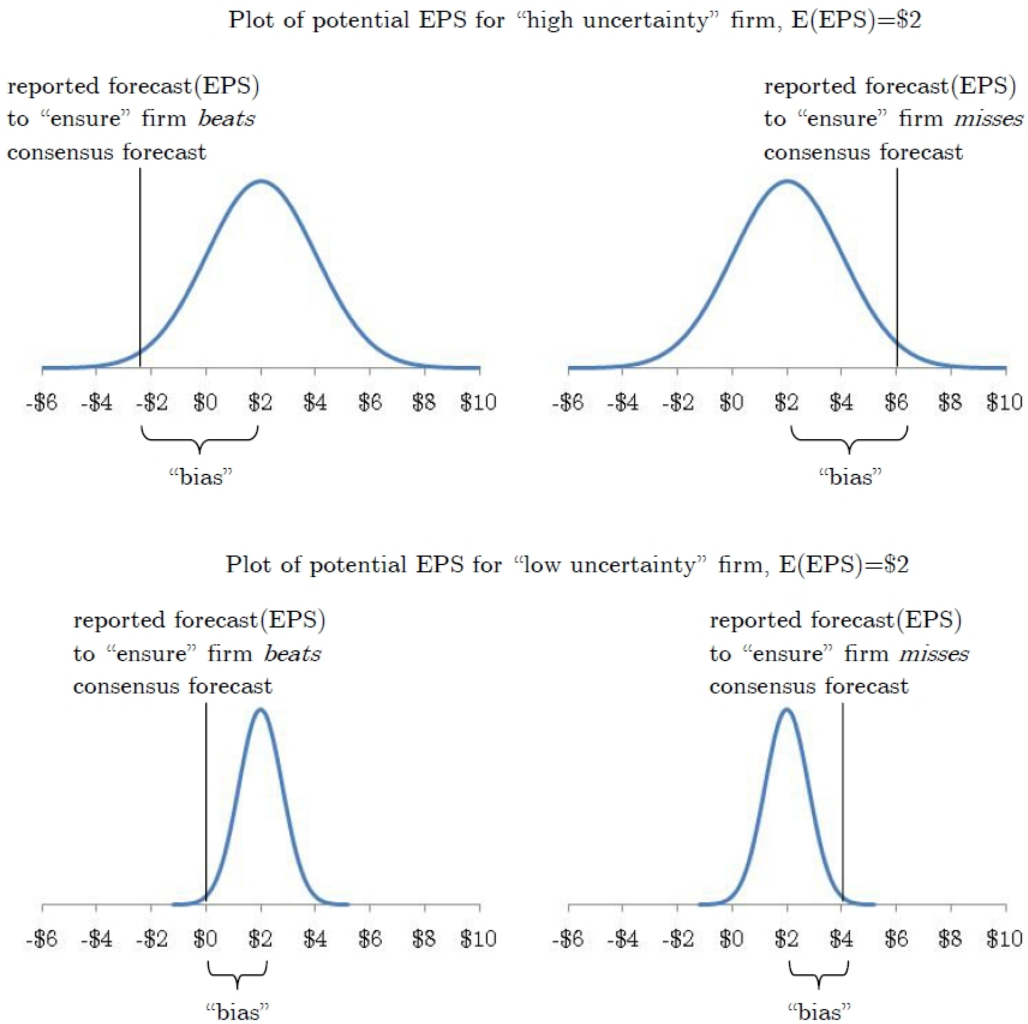
$$\left(e_{i,t+1} - \overline{\overline{e}}_{i,t+1}^{rep}\right) = \alpha + \beta_1 * \overline{rec}_{i,t} + \beta_2 * \overline{rec}_{i,t} * I\left(.\right)_{i,t} + \beta_3 * I\left(.\right)_{i,t} + Control * \gamma + \varepsilon_{i,j,t}, \qquad (5)$$

where the indicator function, $I\left(.\right)_{i,t}$, equals zero if the respective firm characteristic is in the bottom tercile of its distribution in a given year, one if the respective firm characteristic is in the middle tercile, and two otherwise.

The results are reported in Table V. Consistent with our hypothesis, the association between the average recommendation and subsequent earnings surprise significantly decreases with analyst coverage and increases with our proxies for valuation uncertainty. Specifically, the coefficient estimate on the analyst-coverage interaction term is -0.806 (t=-2.12), the estimate on the firm-size interaction term equals -0.607 (t=-1.63), and the estimate on the return-volatility interaction term is 0.757 (t=1.82). All coefficient estimates are economically meaningful compared to the average effect of 0.667 reported in Table III. In particular, the association between average recommendation level and subsequent earnings surprise is indistinguishable from zero in the tercile with the highest analyst coverage, i.e., among firms that are, on average, followed by more than ten analysts. The

[10] We compute stock-return volatility as in French, Schwert, and Stambaugh (1987): $\sigma_t^2 = \sum_{d=1}^{D_t} r_d^2 + 2\sum_{d=2}^{D_t} r_d r_{d-1}$, where D_t is the number of days in month t and r_d is the return on day d. In an untabulated analysis, we explore alternative proxies for valuation uncertainty, including firm age, cash-flow volatility, and number of industry segments the firm operates in, with very similar results

same qualification applies to firms in the largest size tercile and the lowest return-volatility tercile.



To better isolate the residual effect of each of the three variables (i.e., analyst coverage, firm size, and return volatility), we also estimate a regression equation that includes interaction terms between the average recommendation and all three variables in the same specification. The results, presented in the last column of Table VI, show that the interaction terms based on analyst coverage and return volatility remain highly significant, with an economic magnitude of -0.707 (t=-2.13) and 0.691 (t=1.81), respectively, while that based on firm size loses its significance.

The stronger association between earnings surprise and recommendation level when analyst coverage is low is consistent with the idea that the strategic-distortion game described in this paper requires coordination and sharing of both costs and benefits to be viable. To further test this interpretation, we partition the sample based on whether the analysts covering the firm in question are from the same locale. The argument is that geographic proximity facilitates coordination and lowers the cost of acting strategically. We therefore expect the association between recommendation and earnings surprise to be stronger when the firm is covered by analysts from the same locale.

We extract brokerage firm names from the *Broker Translation File* and match the names with brokerage codes in the IBES dataset. We then manually collect each brokerage firm's location using a combination of *Nelson's Directory of Investment Research*, *Manta*, *D&B Million Dollar Database,* and the brokerage firm's website.[11] Each brokerage firm's location is (then) assigned its Metropolitan Statistical Area (MSA) or its ISO 3166-1 Country Code, if the brokerage firm is located outside the US. In the end, we are able to determine the brokerage firm's MSA/country for 98% of all observations. A firm is considered to be covered by analysts from the same locale if they all come from the same MSA/non-US-country.

Panel A of Figure I reports the partial correlation coefficient for the subsample of observations where analyst coverage equals one, the subsample where coverage is between two and four, the subsample where coverage is between five and eight, and the subsample where coverage is greater than eight.[12] The coefficient estimates are 1.147 (t=2.19), 0.484 (t=2.69), 0.227 (t=0.72), and 0.090 (t=0.98), respectively. Panel B further partitions the sample based on analyst locale. In all subsamples for which a comparison can be made, i.e., for which there are both firms covered exclusively by analysts from the same locale and firms covered by analysts from different locales, the coefficient estimates are substantially higher when analysts are from the same locale than when they are not: Within the subsample where coverage is between two and four, the partial correlation coefficient between earnings surprise and recommendation level is 0.410 for analysts from different locales, but 0.584 for analysts from the same locale; within the subsample where coverage is between five and eight, the coefficient is 0.209 for analysts from different locales, but 0.422 for analysts from the same locale. This is consistent with our prediction.

3.4 Investors' Trading Behavior

For our findings to be consistent with strategic distortions, we need (at least some) investors to be unaware of the potential bias in analysts' earnings forecasts and take the earnings surprise at face

[11] Here, we assume that analysts are located at the brokerage firm's headquarters.

[12] In other words, we plot the coefficient estimate $\hat{\beta}$ on the average recommendation level from our baseline regression (3) estimated for various subsamples.

value. In this section, we examine which investor group is more likely to be misled by distortions in analysts' earnings forecasts.

Prior studies (e.g., Daniel, Hirshleifer, and Teoh (2002); Schotter (2003); Malmendier and Shanthikumar (2007)) suggest that retail investors, who are naïve about incentives, are particularly vulnerable to agents' strategic behavior, while institutional investors, having a better understanding of the incentive structure in financial markets, are likely able to see through such behavior. We therefore expect the association between the average recommendation level and subsequent earnings surprise to weaken with the fraction of institutional holdings. Moreover, we expect retail investors to buy (sell) on positive (negative) earnings surprises induced by analysts' strategic behavior and institutional investors to take the other side of such unsophisticated demand.

To test our first prediction, we re-estimate (3), but now interact average recommendation level with an institutional-holdings indicator. The indicator function equals zero if the fraction of institutional holdings is in the bottom tercile of its distribution *in a given year*, one if it is in the middle tercile, and two otherwise. Consistent with our conjecture, Column 1 of Table VIII reports that the association between the average recommendation and subsequent earnings surprise decreases with institutional holdings; the estimate on the institutional-ownership interaction term equals -0.597 (t=-2.05).[13]

To test our second prediction, we re-estimate equation (3), except that the dependent variable is now the small-trade imbalance (large-trade imbalance) in the three-day window around the earnings announcement, $\frac{SmallBuys - SmallSells}{SmallBuys + SmallSells}$ $\left(\frac{LargeBuys - LargeSells}{LargeBuys + LargeSells}\right)$. Following Barber, Odean, and Zhu (2007), we use "small" orders (i.e., those below \$5,000 in value) to gauge retail trading and "large" orders (i.e., those above \$50,000 in value) to gauge institutional trading.[14] We limit our analyses to the 1994-July 2000 period, as the adoption of decimalization by the NYSE in late 2000 renders identification of retail vs. institutional trading activities using TAQ data impossible.

The results, presented in Columns 2 and 3 of Table VIII, are consistent with our prediction. Retail investors submit more buy orders, while institutional investors submit more sell orders around earnings announcements for firms with more optimistic recommendations (relative to firms with

[13]We observe significantly stronger results on the interaction term when computing indicator variables based on "absolute" cutoff points, such as $<20\%$ or $<30\%$, or the like.

[14]Using \$10,000 as an alternative cutoff point for small trades (e.g., Lee, 1992; Bessembinder and Kaufman, 1997) yields very similar results.

more pessimistic recommendations). Specifically, the coefficient estimate on the average recommendation is 0.018 (t=3.83) for small trade imbalance and -0.206 (t=-2.02) for large trade imbalance. For comparison, institutional investors, on average, are net buyers of stocks with positive earnings surprises (untabulated). Put differently, while institutional investors respond favorably to earnings surprises "unconditionally," they trade in the opposite direction to the part of the earnings surprise that is associated with the average recommendation level prior to the earnings announcement. This is consistent with our prediction that institutional investors understand the potential bias in analysts' forecasts and thus are willing to trade against retail investors when the latter are misled by analysts' strategic behavior.

4 Alternative Interpretations and Robustness Checks

This section discusses a number of alternative interpretations of our findings. The dependent variable in equation (3) – the difference between reported consensus forecast and actual earnings – can be decomposed into a forecast-bias component and a *true* earnings-surprise component:

$$\underbrace{(e_{i,t+1} - \overline{\widehat{e}}^{rep}_{i,t+1})}_{Earnings\,Surprise} = -\underbrace{(\overline{\widehat{e}}^{rep}_{i,t+1} - \overline{\widehat{e}}_{i,t+1})}_{Forecast\,Bias} + \underbrace{\left(e_{i,t+1} - \overline{\widehat{e}}_{i,t+1}\right)}_{True\,Earnings\,Surprise}, \tag{6}$$

where $\overline{\widehat{e}}_{i,t+1}$ is the *true* (yet unobserved) consensus forecast. Alternative interpretations of (some of) our findings arise because forecasts may be biased for reasons other than to improve recommendation performance, yet in a fashion that correlates with recommendation level (Sections 4.1, 4.2, and 4.3). Moreover, recommendation level may affect *Earnings Surprise* because of its relation to the true earnings-surprise component (Section 4.1).

4.1 Earnings Management and Forecast Guidance

Firms with more optimistic recommendations may have stronger incentives to manage earnings upward, as they are penalized more severely for missing their earnings targets; these firms may also have stronger incentives to guide analyst forecasts downward. In contrast, firms with more pessimistic recommendations may be more inclined to take big earnings baths. To the extent that financial analysts do not fully correct for the effect of earnings management and allow their forecasts to be guided, firm management can induce a positive correlation between recommendation level and *Earnings Surprise*.

To address this possibility, in our regression analyses, we explicitly control for earnings management using discretionary accruals and variables intended to capture earnings management and earnings-guidance incentives (firm size, past returns, book-to-market ratio, and etc.). We observe that the partial correlation between recommendations and subsequent earnings surprises is virtually unchanged after including these controls. . Moreover, the earnings management interpretation has no clear prediction on how the observed effect should vary with analyst coverage, analyst locale, and valuation uncertainty.

4.2 Currying Favor with Firm Managers

Lin and McNichols (1998), Michaely and Womack (1999), and Richardson, Teoh, and Wysocki (2004), among others, provide evidence that analysts, particularly those from brokerage firms that have underwriting business with the firm in question, tend to curry favor with management by issuing overly optimistic stock recommendations and beatable earnings forecasts. Moreover, Malmendier and Shanthikumar (2009) document that for "affiliated" analysts (i.e., those whose employers have an underwriting relation), the more positive the recommendation is relative to the existing consensus, the more negative is the same analyst's same-stock earnings forecast relative to the consensus. Malmendier and Shanthikumar (2009) find no such association for unaffiliated analysts.

The currying-favor channel has difficulty explaining negative earnings surprises observed in association with pessimistic recommendations; it also has no clear prediction on the interaction effect with analyst coverage, analyst locale and valuation uncertainty. Moreover, the currying favor mechanism speaks more to analysts' relative views *within the same firm* (i.e., differences in forecasting behavior between affiliated and unaffiliated analysts covering the same firm) and the main results of this paper continue to hold in firm-level analyses. Nevertheless, in additional analyses, we collect data from the SDC New Issues database to determine whether the analyst's employer was a lead or co-underwriter of an initial public offering (IPO) in the past five years or of a seasoned equity offering (SEO) in the past two years. We (then) re-estimate our baseline regression, but now include the fraction of analysts who are affiliated with the firm in question as an additional independent variable. The inclusion of the affiliation variable does not alter the coefficient estimate on the average recommendation level: The coefficient estimate becomes 0.680 (t=2.61). For comparison, the estimate reported in Table IV equals 0.667 (t=2.48). We also include an interaction term between the fraction of affiliated analysts and recommendation level; the coefficient on this interaction term is close to zero and not statistically significant.

4.3 Analysts' Sluggish Updating of Earnings Forecasts

Another possible explanation for our findings is that analysts sluggishly update their earnings forecasts. For instance, an analyst with a positive signal on a firm may upgrade his recommendation first, and only partially and gradually update his earnings forecast, thus resulting in a subsequent positive earnings surprise. This interpretation is unlikely to play an important role here. First, it is not clear, ex-ante, why analysts are more efficient in incorporating information into their recommendations than their earnings forecasts. Second, this alternative story does not fit our regression specifications exactly, as we are analyzing the relation between the subsequent earnings surprise and average recommendation level (as opposed to changes in recommendation), which has been shown to contain little timely information. Moreover, the sluggish-updating interpretation is inconsistent with the result that the average recommendation negatively predicts large-trade imbalances around earnings announcements, given that institutional investors in general are more responsive to new information released by analysts. This interpretation is also inconsistent with the finding that analysts significantly revert their recommendations shortly after earnings announcements.

The predictions of our main hypothesis and those of alternative explanations are listed in Appendix C. Taken together, our hypothesis helps interpret a good deal of evidence and yields predictions, which (we believe) are unique to our hypothesis and are subsequently supported by the data.

4.4 Robustness Checks

In our last set of analyses, we perform a number of additional specification and robustness checks. First, we use an alternative definition of analysts' consensus earnings forecast. Specifically, following Richardson, Teoh, and Wysocki (2004), among others, we define the consensus earnings forecast as the median (rather than the mean) forecast across all analysts with valid earnings forecasts issued within three months prior to the annual earnings announcement, and then re-estimate regression equation (3) with this alternative measure. The results reported in Panel A of Table VII are virtually unchanged from those in Table IV.[15] The average recommendation level significantly and positively relates to the subsequent earnings surprise; the coefficient estimate equals 0.671 (t=2.48). In addition, the average recommendation is positively related to the likelihood that the firm meets or beats the median analyst forecast with a point estimate of 0.174 (p=0.00).

We also analyze whether analysts distort their forecasts for quarterly earnings reports. The tests reported in Panel B of Table VII are identical to those in Panel A, except that we replace the dependent variable with the subsequent *quarterly* earnings surprise. The results indicate that analysts issue biased estimates for quarterly earnings as well. Specifically, the average recommendation prior to a quarterly earnings announcement significantly and positively predicts the subsequent quarterly earnings surprise, with a coefficient estimate of 0.264 (t=5.46) when the consensus forecast is defined as the mean forecast across all analysts, and an estimate of 0.263 (t=5.46) when the consensus forecast is defined as the median forecast. Results from logistic regressions based on a binary dependent variable, which equals one if a firm's quarterly earnings report meets/beats its consensus forecast and zero otherwise, are also in line with the results based on annual earnings reports. The point estimates on the average recommendation level are 0.486 (p=0.00) for the mean consensus forecast and 0.484 (p=0.00) for the median consensus forecast.

5 Conclusion

We conjecture that analysts issue biased earnings forecasts in a direction that helps "confirm" their stock-recommendation. We employ a simple yet novel approach to test this hypothesis. Instead of fixating on individual analysts' recommendations and earnings forecasts (which lack a natural unbiased benchmark), we examine, at the firm level, the relation between the average recommendation and subsequent earnings surprise.

The results are consistent with our hypothesis. Firms with more optimistic average recommendations prior to earnings announcements experience significantly more positive earnings surprises and announcement-day returns. The effect is stronger among firms with low analyst coverage, coverage by analysts from the same locale,, high valuation uncertainty, and low institutional holdings.

[15] For the purpose of comparison, we also include results based on the mean forecast in the same Panel.

Combined, these findings suggest that analysts in an attempt to appear accurate and consistent, in fact give up earnings forecast accuracy.

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Appendix A:

Brief Definitions and Sources of Main Variables

Variable Name	Description	Source
(Actual EPS - EPS Forecast)/Price	Difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price.	IBES, CRSP
Indicator(Actual EPS ≥ EPS Forecast)	Indicator that actual *EPS* is greater than or equal to the consensus *EPS* forecast.	IBES
Recommendation Level	Analyst's outstanding recommendation level three months before the earnings announcement (but no later than fifteen months).	IBES
Size ($MM)	Firm's market capitalization (in million$), the month prior to the earnings announcement.	CRSP
Book-to-Market Ratio	Firm's book-to-market ratio (of equity), the month prior to the earnings announcement.	CRSP, COMPUSTAT
Past Returns	Firm's cumulative one-year stock return prior to the earnings announcement.	CRSP
Discretionary Accruals	See Appendix B.	COMPUSTAT
Earnings Announcement Day Return	Cumulative market-adjusted return three days around the earnings announcement.	CRSP
Long-Run Return	Cumulative six-month DGTW-adjusted return from four months to nine months after the earnings announcement.	CRSP, Russ Wermer's Website[26]
Analyst Coverage	Number of analysts providing annual earnings forecasts for the firm in question.	IBES
Return Volatility	Monthly volatility (the month prior to the earnings announcement) calculated as in French, Schwert and Stambaugh (1987): $\sigma_t^2=\sum_{d=1}^{D_t} r_d^2 + 2\sum_{d=2}^{D_t} r_d\, r_{d-1}$, where D_t is the number of days in month t and r_d is the return on day d. The second term adjusts for serial correlation in daily returns.[27]	CRSP
Institutional Holdings	Institutional holdings.	THOMPSON

[26] http://www.rhsmith.umd.edu/Faculty/rwermers/

[27] In rare cases, the autocorrelation in returns is less than -0.5 and the variance estimate is negative. For these stocks, the variance estimator is the sum of squared daily returns only.

Appendix B:

Discretionary Accruals

We begin with total accruals, calculated as the difference between net income and net cash flow.[28] We decompose total accruals into a discretionary component, *DACCR*, and a non-discretionary component, *NDAACR*. Specifically, we form industry-year clusters of all COMPUSTAT firms using two-digit SIC codes. Then, for each industry-year cluster (j, t) with at least eight firms, we estimate the following firm-level regression for all firms i in industry j in year t:

$$ACCR_{i,j,t} / TA_{i,j,t-1} = \alpha_{0j,t} + \alpha_{j,t}\left[1 / TA_{i,j,t-1}\right] + \beta_{j,t}\left[\Delta REV_{i,j,t} / TA_{i,j,t-1}\right] + \gamma_{j,t}\left[PPE_{i,j,t} / TA_{i,j,t-1}\right] + \varepsilon_{i,j,t}\,, \quad \text{(A1)}$$

where $ACCR$ is total accruals, TA is total assets, ΔREV is the change in net sales, and PPE is gross property, plant and equipment. Using the coefficient estimates from equation (A1) and adjusting changes in revenues by changes in accounts receivables to account for the discretion allowed in realizing sales on credit (e.g., Dechow, Sloan, and Sweeney, 1995), we calculate the non-discretionary accruals component:

$$NDACCR_{i,j,t} = \hat{\alpha}_{0j,t} + \hat{\alpha}_{j,t}\left[1 / TA_{i,j,t-1}\right] + \hat{\beta}_{j,t}\left[\left(\Delta REV_{i,j,t} - \Delta AR_{i,j,t}\right) / TA_{i,j,t-1}\right] + \hat{\gamma}_{j,t}\left[PPE_{i,j,t} / TA_{i,j,t-1}\right]. \quad \text{(A2)}$$

Our estimate for the discretionary component in accruals is the difference between total accruals and the non-discretionary accruals component (from equation (A2)):

$$DACCR_{i,j,t} = ACCR_{i,j,t} / TA_{i,j,t-1} - NDACCR_{i,j,t}\,. \quad \text{(A3)}$$

Other studies following this approach include Teoh, Welch, and Wong (1998a; 1998b), Xie (2001), Klein (2002) and Yu (2008).

[28] We truncate at 99th percentile of absolute total accruals to remove extreme outliers.

Appendix C:

Summary of Results and Interpretation

Results	Analysts issue biased forecasts to support their recommendation.	Firms manage earnings and guide analysts' forecasts.	Analysts curry favor with management.	Analysts are sluggish in updating their information set.
The recommendation level prior to an earnings announcement predicts analyst's earnings forecast error.	+	?	+	?
The consensus recommendation level prior to an earnings announcement predicts the firm's earnings surprise and the firm's earnings announcement day return.	+	+	+	?
Specifically, pessimistic consensus recommendation level is associated with a *low* earnings surprise,	+	+	-	?
and optimistic consensus recommendation level is associated with a *high* earnings surprise,	+	+	+	?
This association is stronger for stocks with				
- high valuation uncertainty	+	?	?	?
- low analyst coverage	+	?	?	?
- coverage by analysts from same locale	+	?	?	?
- high retail investor holdings.	+	?	?	?
The consensus recommendation level prior to an earnings announcement predicts small-trade buying, yet large-trade selling around the earnings announcement.[29]	+	+	+	-

[29] There's evidence that the consensus recommendation level prior to an earnings announcement positively predicts the firm's earnings announcement day return, yet negatively predicts the firm's long-term return subsequent to the earnings announcement. There's substantial reversion in recommendations issued shortly after the earnings announcement [before the return reversal].

Table I

Summary Statistics

This table presents summary statistics on various variables used in this study. The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. *(Actual EPS - EPS Forecast)/Price* is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. *Earnings Announcement Returns* is the cumulative market-adjusted return three days around the earnings announcement. *Recommendation Level* is the analyst's outstanding recommendation level three months before the earnings announcement. *Size* is the firm's market capitalization (in million$). *Book-to-Market Ratio* is the firm's book-to-market ratio. *Past Returns* is the firm's cumulative one-year stock return prior to the earnings announcement. *Discretionary Accruals* is as defined in Appendix B.

Variables	Mean	25th	Median	75th	Standard Deviation
Panel A: Earnings Surprise and *Market Reaction to Earnings Surprise*					
(Actual EPS - EPS Forecast)/Price	-0.006	-0.001	0.001	0.003	0.160
Earnings Announcement Returns, when Actual EPS ≥ EPS Forecast	1.31%	-2.79%	0.87%	5.21%	8.65%
Earnings Announcement Returns, when Actual EPS < EPS Forecast	-1.82%	-5.72%	-1.23%	2.57%	9.80%
Panel B: Other Variables					
Recommendation Level	3.782	3.333	3.800	4.200	0.651
Size ($MM)	4,136	201	628	2,108	17,532
Book-to-Market Ratio	0.563	0.256	0.438	0.705	0.599
Past Returns	0.186	-0.239	0.054	0.377	0.917
Discretionary Accruals	0.044	-0.021	0.032	0.112	0.200

Table I. Continued.

Panel C: Correlation Matrix (Pearson)

		(1)	(2)	(3)	(4)	(5)
(1)	(Actual EPS - EPS Forecast)/Price					
(2)	Recommendation Level	0.040				
(3)	Size ($MM)	-0.010	-0.010			
(4)	Book-to-Market Ratio	-0.040	-0.130	-0.080		
(5)	Past Returns	0.040	0.160	-0.030	0.150	
(6)	Discretionary Accruals	0.040	0.020	0.030	-0.030	0.020

Table II

Recommendation and Earnings Forecast Error – Analyst Level

This table presents estimates from pooled regressions of the difference between actual *EPS* and *EPS* forecasts on recommendation levels (on an analyst/firm/year-level). The sample includes all analysts with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. In column (1), the dependent variable is the difference between the actual *EPS* and the *EPS* forecast scaled by (lagged) price. In column (2), the dependent variable is an indicator that actual *EPS* is greater than or equal to the *EPS* forecast. The independent variables are: *Recommendation Level*, defined to be the analyst's outstanding recommendation level three months prior to the earnings announcement; *Size*, defined to be the logarithm of the firm's market capitalization (in million$); *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. In column (1), the coefficient estimates are multiplied by 100. *T*-statistics and *p*-values, reported in parentheses, account for heteroskedasticity and clustering (by time).

	Coefficient (*t*-statistic),[*p*-value]	
Variables	Standardized Earnings Forecast Error (1)	Indicator (Actual ≥ Forecast) (2)
Recommendation Level	0.265	0.025
	(3.52)	[0.00]
Size	0.159	0.073
	(1.33)	[0.00]
Book-to-Market Ratio	-0.392	-0.112
	(-1.72)	[0.00]
Past Returns	0.730	0.282
	(3.42)	[0.00]
Discretionary Accruals	3.087	0.134
	(3.16)	[0.18]
Year Effects	Yes	Yes
Number of Observations	62,303	62,303
Adj. R^2/Likelihood Ratio	0.006	1,108

Table III

Recommendation and Earnings Surprise – Firm Level

This table presents estimates from pooled regressions of the difference between actual *EPS* and consensus *EPS* forecasts on recommendation levels (on a firm/calendar year-level). The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. In column (1), the dependent variable is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. In column (2), the dependent variable is an indicator that actual *EPS* is greater than or equal to the consensus *EPS* forecast. The independent variables are: *Recommendation Level*, defined to be the firm's consensus recommendation level three months prior to the earnings announcement; *Size*, defined to be the logarithm of the firm's market capitalization (in million$); *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. In column (1), the coefficient estimates are multiplied by 100. *T*-statistics and *p*-values, reported in parentheses, account for heteroskedasticity and clustering (by time).

	Coefficient (*t*-statistic),[*p*-value]	
Variables	Standardized Earnings Surprise (1)	Indicator (Actual ≥ Forecast) (2)
Recommendation Level	0.667 (2.48)	0.162 [0.00]
Size	0.223 (2.93)	0.107 [0.00]
Book-to-Market Ratio	-0.466 (-2.04)	-0.054 [0.00]
Past Returns	0.535 (3.62)	0.314 [0.00]
Discretionary Accruals	3.030 (3.19)	0.200 [0.01]
Year Effects	Yes	Yes
Number of Observations	33,135	33,135
Adj. R^2/Likelihood Ratio	0.009	829

median regression; should we show the positive side and the negative side separately? Perhaps we can just discuss the two subsamples in the text.

Table IV

Recommendation and Earnings Surprise – Portfolio Approach

This table presents means of portfolios formed on recommendation levels. The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010, and for which the stock price is greater than $5 and the market capitalization is above the NYSE 10th percentile. *Recommendation Level* is the firm's consensus recommendation level three months prior to the earnings announcement. *Standardized Earnings Surprise* is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price multiplied by 100. *Indicator (Actual ⩾ Forecast)* is an indicator that actual *EPS* is greater than or equal to the consensus *EPS* forecast. *Earnings Announcement Day Return* is the cumulative characteristic-adjusted return three days around the earnings announcement. *Long-Run Return* is the cumulative six-month DGTW-adjusted return from four months to nine months after the earnings announcement. *ΔRecommendation Level* is the difference between the average recommendation before the earnings announcement and the recommendations issued within the first three months after the earnings announcement. *T*-statistics, reported in parentheses, account for heteroskedasticity and clustering (by time).

	Recommendation Level			
Variables	Low	Medium	High	High - Low
Panel A: Earnings Surprise				
Standardized Earnings Surprise	-0.123	-0.020	0.018	0.141
				(2.88)
Indicator (Actual ⩾ Forecast)	0.622	0.675	0.692	0.070
				(9.19)
Panel B: Earnings Announcement Day Return				
DGTW-adjusted Return	-0.09%	0.28%	0.57%	0.66%
				(4.92)
Panel C: Recommendation Level				
Recommendation Level - before earnings announcement	3.131	3.798	4.432	1.301
ΔRecommendation(t+1, t+3)	0.322	-0.070	-0.547	-0.870
				(-36.54)

Table V

Recommendation and Earnings Surprise – Interaction Terms

This table presents estimates from pooled regressions of the difference between actual *EPS* and consensus *EPS* forecasts on recommendation levels (on a firm/year-level). The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. The dependent variable is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. The independent variables are: *Recommendation Level*, defined to be the firm's consensus recommendation level three months prior to the earnings announcement; *I(Analyst Coverage)*, *I(Return Volatility)* and *I(Firm Size)* equal zero if the respective variables are below the 33rd percentile of its distribution (in a given year), one if they are between the 33rd and 66th percentile, and two, otherwise. Other (untabulated) independent variables include: *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. All coefficient estimates are multiplied by 100. *T*-statistics, reported in parentheses, account for heteroskedasticity and clustering (by time).

	Coefficient (*t*-statistic)			
Variables	(1)	(2)	(3)	(4)
Recommendation Level	1.330 (2.35)	-0.139 (-0.72)	1.150 (2.09)	0.554 (1.67)
Recommendation Level * I(Analyst Coverage)	-0.806 (-2.12)			-0.707 (-2.13)
Recommendation Level * I(Return Volatility)		0.757 (1.82)		0.691 (1.81)
Recommendation Level * I(Size)			-0.607 (-1.63)	-0.018 (-0.07)
I(Analyst Coverage)	3.449 (2.18)			3.064 (2.25)
I(Return Volatility)		-3.614 (-1.98)		-3.329 (-2.01)
I(Size)			2.877 (1.80)	0.181 (0.16)
Year Effects	Yes	Yes	Yes	Yes
Number of Observations	33,135	33,135	33,135	33,135
Adj. R^2	0.010	0.011	0.010	0.012

Table VI

Institutional Ownership and Analyst Strategic Behavior

This table presents estimates from pooled regressions of the difference between actual *EPS* and consensus *EPS* forecasts, and trade imbalance on recommendation levels (on a firm/year-level). In column (1), the sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. In columns (2) and (3), the sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994:01 to 2000:07. In column (1), the dependent variable is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. In column (2), the dependent variable is the dollar proportion of *small* buyer-initiated trades vs. *small* seller-initiated trades three days around the earnings announcement scaled by (lagged) trading volume. In column (3), the dependent variable is the dollar proportion of *large* buyer-initiated trades vs. *large* seller-initiated trades three days around the earnings announcement scaled by (lagged) trading volume. Trades are categorized as small if their dollar value is less than $5,000, and large if their dollar value is greater than $50,000. Trades are signed using the Lee and Ready algorithm (1991). The independent variables are: *Recommendation Level*, defined to be the firm's consensus recommendation level three months prior to the earnings announcement; *Size*, defined to be the logarithm of the firm's market capitalization (in million$); *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. The indicator variable is based on institutional holdings and equals zero if the respective variable is below the 33rd percentile of its distribution (in a given year), one if it is between the 33rd and 66th percentile, and two, otherwise. Coefficient estimates in column (1) are multiplied by 100. *T*-statistics, reported in parentheses, account for heteroskedasticity and clustering (by time).

	Coefficient (*t*-statistic)		
Variables	Standardized Earnings Surprise (1)	% Small Buyer-Initiated Trades (2)	% Large Buyer-Initiated Trades (3)
Recommendation Level	1.146	0.018	-0.206
	(2.32)	(3.83)	(-2.02)
Recommendation Level * I(Inst. Hldg.)	-0.597		
	(-2.05)		
I(Inst. Hldg.)	2.664		
	(2.17)		
Size	0.159	0.024	0.417
	(1.81)	(9.04)	(10.36)
Book-to-Market Ratio	-0.502	-0.024	0.012
	(-2.09)	(-6.43)	(0.16)
Past Returns	0.510	0.021	0.185
	(3.67)	(5.31)	(3.27)
Discretionary Accruals	3.017	0.028	-0.196
	(3.18)	(2.16)	(-0.66)
Year Effects	Yes	Yes	Yes
Number of Observations	33,115	11,929	11,944
Adj. R^2	0.010	0.035	0.013

Table VII

Robustness Checks

This table presents estimates from pooled regressions of the difference between actual *EPS* and consensus *EPS* forecasts on recommendation levels (on a firm/year-level). The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. In columns (1) and (3), the dependent variable is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. In columns (2) and (4), the dependent variable is an indicator that actual *EPS* is greater than or equal to the consensus *EPS* forecast. The independent variables are: *Recommendation Level*, defined to be the analyst's outstanding recommendation level three months before the earnings announcement. Other (untabulated) independent variables include: *Size*, defined to be the logarithm of the firm's market capitalization (in million$); *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. In columns (1) and (3), the coefficient estimates are multiplied by 100. *T*-statistics and *p*-values account for clustering (by time).

	Coefficient (*t*-statistic),[*p*-value]			
Variables	Standardized Earnings Surprise (1)	Probability (Actual ≥ Forecast) (2)	Standardized Earnings Surprise (3)	Probability (Actual ≥ Forecast) (4)
Panel A: Annual EPS	Mean Forecast		Median Forecast	
Recommendation Level	0.667	0.162	0.671	0.174
	(2.48)	[0.00]	(2.48)	[0.00]
Panel B: Quarterly EPS	Mean Forecast		Median Forecast	
Recommendation Level	0.264	0.486	0.263	0.484
	(5.46)	[0.00]	(5.46)	[0.00]

Figure I

Recommendation and Earnings Surprise

This figure presents estimates from pooled regressions of the difference between actual *EPS* and consensus *EPS* forecasts on recommendation levels (on a firm/year-level) for various analyst coverage-subsamples. The sample includes all firms with valid recommendations and *EPS* forecasts in IBES over the period 1994 to 2010. The dependent variable is the difference between the actual *EPS* and the consensus *EPS* forecast scaled by (lagged) price. The independent variables are: *Recommendation Level*, defined to be the firm's consensus recommendation level three months prior to the earnings announcement. Other (untabulated) independent variables include: *Book-to-Market Ratio*, defined to be the logarithm of the firm's book-to-market ratio; *Past Returns*, defined to be the firm's cumulative one-year stock return prior to the earnings announcement; and *Discretionary Accruals*, as defined in Appendix B. A firm is defined to be from the "same locale" if all analysts covering the firm are based from a brokerage house in the same metropolitan statistical area (excluding New York). All coefficient estimates are multiplied by 100. *T*-statistics, reported in parentheses, account for heteroskedasticity and clustering (by time).