

Why do analysts follow past returns?

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October 2011

Abstract

Sell-side analysts are criticized for upgrading (downgrading) their stock recommendations after high (low) stock returns, providing little value to investors. In this paper, we analyze the validity and implications of this criticism. We first find that analyst recommendation revisions on average followed past returns until 2003, after which no clear trend exists. The recommendation revisions that follow past returns (i.e., momentum recommendations) are more frequent on the negative side (downgrades after negative low returns), are more frequently issued by analysts with less experience and lower forecast accuracy—yet by large brokerage houses and for companies with large share turnover. We also document that the momentum recommendations are accompanied by forecasts that represent larger revisions from the outstanding forecasts and by forecasts that are less accurate ex post. Our findings suggest that analysts issue momentum recommendations when their conflicts of interest are high and when their ability to conduct superior fundamental research is limited. Finally, we document stronger abnormal returns around momentum recommendation dates, suggesting that momentum recommendations reinforce the existing stock price momentum.

Keywords: analysts, momentum, stock returns.

JEL codes: G29, G12, G14.

We thank seminar participants at 2010 European Accounting Research Conference, 2010 AAA Conference, George Washington University and University of Texas at Dallas for helpful comments.

1. Introduction

Fundamental research of sell-side analysts involves developing valuation models and issuing recommendations by comparing outputs of the valuation models with extant stock prices (Womack 1996). If shaped only by fundamental research, analysts' recommendations should not correlate with past stock returns. However, analysts are known to issue recommendations based on factors other than fundamental research (Bradshaw 2004; Block 1999). Specifically, analysts are likely to issue recommendations based on past returns, given that past returns predict returns over the next year (Jegadeesh and Titman 1993; Carhart 1997). Empirical evidence to date supports this argument. Jegadeesh et al. (2004) show that consensus recommendations are more optimistic for "glamour" stocks (i.e., positive momentum and expensive stocks). Altinkilic and Hansen (2009) show that recommendations piggyback on recent news.

That analysts base their recommendations on past returns brings to question whether such recommendations reflect analysts' ability to conduct fundamental research. James Surowiecki of the New Yorker (November 3, 2008) writes: "[A]nalysts often end up following the market, rather than leading it. In the case of a sell-off, this tends to make a bad situation worse. Earlier this month, Goldman Sachs downgraded steel companies like AK Steel. A bold call, you might think, except that it came only after AK Steel's stock had fallen nearly seventy-five percent in two months." Similarly, analysts were criticized for promoting momentum investing without due diligence during the stock market boom of late 1990s (Vickers and Weiss 2000). In this paper, we investigate the merits of this criticism by studying individual analysts' motives to issue recommendations based on past returns (hereafter, momentum recommendations).

Empirically, we compute a momentum likelihood score for each stock recommendation issued between 1994 and 2009 based on the strength of the match between the recommendation

revision and stock returns during the six months preceding the recommendation date. We find that recommendation revisions have on average followed past returns until 2003, after which no clear trend exists. This trend change coincides with the Global Settlement and related regulatory changes in late 2002 aimed at reducing analysts' conflict of interest.¹ Further, we find that momentum recommendations are more frequent in the form of downgrades that follow negative returns—rather than upgrades that follow positive returns. We explain the above findings with analysts' conflict of interest: Because they are rewarded for optimism, analysts underweigh (overweigh) their negative (positive) private assessments of company values (Hong and Kubik 2003). Only after public signals confirm their negative assessments (i.e., after negative stock returns) would analysts downgrade, because it is then easier to justify their downgrades (Chen and Jiang 2006; Conrad et al. 2006). In contrast, because analysts are likely to incorporate their positive private assessments into recommendations in a timely manner, they do not need to upgrade after positive past returns. The momentum recommendations are less frequent after 2002 as a result of the Global Analyst Research Settlement and other regulations, which have reduced analysts' rewards for optimism and therefore their asymmetric response to negative stock returns.

The average trends notwithstanding, there exists significant variation across analysts with respect to their tendency to issue momentum recommendations both before and after 2002. We examine how individual analysts' ability to conduct fundamental research affects their decision to issue momentum recommendations. On the one hand, individual analysts may issue momentum recommendations strategically to ride the price momentum and complement their fundamental research that is superior to that of other market participants (complementing

¹ The regulatory changes related to the Global Settlement led many brokerage houses to switch to three-tier stock rating system from the five-tier system. As shown later in our analyses, this change does not contribute to our findings regarding the change in the frequency of momentum recommendations after 2002.

argument). On the other hand, analysts with limited ability to conduct superior fundamental research may follow stock returns as a source of information (substituting argument).

Our evidence collectively supports the substituting argument: First, *Institutional Investor* All-Star analysts, experienced analysts, and analysts with greater forecast accuracy in the past year are less likely to issue momentum recommendations. Second, earnings forecasts that accompany momentum recommendations represent larger and less accurate revisions than other forecasts. Third, momentum recommendations are more likely to follow other analysts' recommendation revisions. Finally, momentum recommendations are more likely to follow company financials known to correlate with future returns, such as past sales growth, accruals, capital expenditures, unexpected earnings, and earnings to price ratio, when market participants with private information and superior ability to process information are known to be able to predict these signals before they become public (Ke et al. 2003). Collectively, the above findings suggest that analysts with limited ability to conduct superior fundamental research issue momentum recommendations.

Finally, we examine short-term market reaction to momentum recommendations. Given our evidence that momentum recommendations indicate analysts' limited ability, market reaction to momentum recommendations must be muted. However, investors may interpret momentum recommendations as instruments that reinforce the extant stock price momentum. Supporting the latter prediction, we find that momentum recommendations are associated with higher abnormal returns in the direction of past returns during the three days surrounding the recommendation dates. The abnormal returns are economically significant and robust after controlling for determinants known to affect stock returns such as recommendation levels, size, book-to-market, past returns, and investor sentiment. Furthermore, the market reaction is stronger for momentum

recommendations issued by analysts with at least one year of experience, analysts from large brokers, and for companies with smaller size and lower book-to-market ratios. The results are generally consistent with investors reacting strongly to momentum recommendations when other information sources are scarce and when the perceived quality of the recommendations is high.

This paper makes several important contributions to our understanding of why some individual analysts follow past returns when issuing stock recommendations. First, prior literature focuses on consensus recommendations and documents that consensus recommendations are more optimistic for stocks with positive past returns (Jegadeesh et al. 2004; Bradshaw 2004). Our study focuses on individual recommendations in the I/B/E/S universe. In contrast to the prior findings, we show that individual analysts, on average, downgrade after negative past returns but do not upgrade after positive past returns. This finding, most prominent before the Global Settlement and related regulatory changes in late 2002, suggests that analysts follow past returns in their recommendations due to conflict of interest. Second, via a battery of tests, we demonstrate that individual analysts issue recommendations based on past returns to substitute for their lack of ability to conduct superior fundamental research. Third, we find that, even driven by conflict of interest and analysts' limited ability to conduct fundamental research, momentum recommendations trigger abnormal market reactions around the announcement dates. This finding is puzzling in the efficient market framework, but if we relax the assumption of market efficiency, it could be interpreted as investors viewing the momentum recommendations as a force strengthening the existing price momentum.

The paper proceeds as follows. Section 2 describes the related literature and develops predictions. Section 3 describes our momentum likelihood measure and specifies empirical tests. Section 4 explains sample selection and discusses empirical results. Section 5 concludes.

2. Literature review and empirical predictions

Sell-side analysts are expected to—and do—incorporate public information about current-period earnings, as proxied by contemporaneous stock returns, into their earnings forecasts (Lys and Sohn 1990; Abarbanell 1991; Clement et al. 2011). Unlike earnings forecasts, analysts’ stock recommendations are strictly “forward-looking”, and show analysts’ assessments about fundamental company values relative to the extant company values at the recommendation dates. Therefore, if only shaped by fundamental analyses, stock recommendations should not be systematically correlated with past returns. Yet, analysts are also known to incorporate past stock returns into their recommendations. In his survey, Block (1999) finds that analysts issue recommendations based on historical stock patterns rather than fundamental values. Bradshaw (2004) shows that recommendations correlate with long-term growth projections, even if the growth expectations are already incorporated into stock prices. Jegadeesh et al. (2004) show that analysts’ quarterly consensus recommendations are more favorable for glamour stocks with positive price momentum. Altinkilic and Hansen (2009) document that recommendation revisions often piggyback in recent events. In this paper, we investigate the motives of individual analysts to follow past stock returns in their recommendations, which seem to contrast with the “forward-looking” nature of fundamental research.

2.1. Conflict of Interest as Motivation to Issue Momentum Recommendations

Analyst optimism in stock recommendations is largely explained by analysts’ incentives to curry favor with management and develop investment banking relations (Lin and McNichols 1998). This explanation predicts analysts’ tendency (reluctance) to upgrade (downgrade) their outstanding recommendations. If analysts are truly efficient information intermediaries, their private assessments should precede public signals, in our case stock returns. Yet, analysts have to weigh the costs and benefits of acting upon their private assessments. With pressure to show

optimism, analysts are more (less) likely to upgrade (downgrade) when they have positive (negative) private assessments. As a result, analysts are not likely to upgrade after positive stock returns, because they may have already incorporated the positive information into their recommendations. In contrast, analysts are likely to rely on public signals, such as negative stock returns, to downgrade. Conrad et al. (2006) provide empirical evidence for this prediction using analysts' revisions after extremely negative and positive stock returns. Overall, the conflict of interest argument predicts that analysts asymmetrically downgrade after negative returns, but do not upgrade after positive returns.² In our tests, we look for this asymmetry in the I/B/E/S universe as evidence for the conflict of interest argument.

If the conflict of interest drives momentum recommendations, we expect that analysts' asymmetric responses to positive and negative past returns should decline after the Global Settlement and related regulations announced in the aftermath of the stock market crash of 2000 to 2002. The Global Settlement is an agreement between the SEC, NASD, NYSE and ten largest investment firms to address the conflict of interest in the financial services industry, resulting in the investment firms' segregating their investment banking and research departments. The SEC, NYSE, and NASD also issued separate regulations (e.g., NASD Rule 2711 and NYSE Rule 472) to reduce analysts' conflict of interest (Kadan et al. 2009).

If the conflict of interest drives momentum recommendations, we also expect more frequent momentum recommendations after negative stock returns in the following settings where analysts' conflict of interest is potentially greater. First, large brokerage houses, because broker size is associated with brokers' ability to generate trading commissions. Second, brokerage houses with investment banking business, because investment banking business

² Barber et al. (2007) document that *Buy* recommendations from investment bank analysts underperform those from independent research analysts, and the underperformance can be attributed to investment bank analysts' reluctance to downgrade stocks of companies that their brokerage firm helped issue equity.

generates large revenues, especially prior to 2003 (Lin and McNichols 1998). Third, firms with high stock turnover, because stock turnover are positively related with trading commissions.

2.2. *Analyst Ability as Motivation to Issue Momentum Recommendations*

We examine how momentum recommendations relate to individual analysts' ability to conduct superior fundamental research, i.e., to generate private information as well as to process private and public information. On the one hand, analysts may issue momentum recommendations to compensate for their limited ability. This substituting effect should be stronger in settings where fundamental research is difficult such as for companies with poor information environment and during periods of extreme investor sentiment. On the other hand, analysts may issue momentum recommendations to complement their ability and "ride the momentum" when they believe it is profitable to do so. For instance, analysts may have to ride the investor sentiment, because betting against the market can be costly for stocks with poor information environment and during periods of extreme investor sentiment (Shleifer and Vishny 1997). This explanation is similar to Brunnermeier and Nagel (2004) who find that hedge funds ride stock price bubbles because of predictable investor sentiment and limits to arbitrage. Grinblatt et al. (1995) also show that mutual funds follow both past stock returns as well as other mutual funds, and generate abnormal profits.

We distinguish between the substituting and complementing explanations by testing how analyst ability relates to the likelihood of issuing momentum recommendations. We measure analyst ability using the following characteristics: i) whether the analyst is listed in the All-American Research team by the *Institutional Investor* magazine, ii) the number of years the analyst has been issuing recommendations for the specific firm, iii) average absolute error of all forecasts issued by the analyst during the last year.

In our effort to relate analyst ability to momentum recommendations, we control for several analyst and company characteristics. First, we control for the number of companies that an analyst follows during the year as an (inverse) measure of effort spent per company. Second, we control for company size and growth, which proxy for the information environment. When the information environment is poor, both substituting and complementing arguments predict more frequent momentum recommendations. Third, we control for the investor sentiment. A growing body of literature documents that stock prices can be affected by behavioral biases and investor sentiment (DeLong et al. 1990; Baker and Wurgler 2006). During periods of extreme investor sentiment, stock prices are likely to deviate from company fundamentals; both the substituting and complementing arguments predict more frequent momentum recommendations during periods of extreme investor sentiment. We use the absolute value of the *University of Michigan Consumer Sentiment Index* to proxy for investor sentiment.³

2.3. Momentum Recommendations and Accompanying Earnings Forecasts

Prior literature suggests that analysts can better showcase their ability via earnings forecasts than recommendations (Bradshaw 2004; Ertimur et al. 2010). We examine earnings forecasts accompanying momentum recommendations (hereafter, momentum forecasts) and distinguish between the substituting and complementing arguments as follows: If analysts issue momentum recommendations to complement their superior research, their forecasts that accompany these recommendations should be no less, if not more, accurate than those of other analysts. Furthermore, the magnitude of revisions that these forecasts represent should not be larger than those of other forecasts, because momentum recommendations and forecasts are, by

³ This index is shown to be correlated with stock market investor sentiment and future returns (Brown and Cliff 2005; Qiu and Welch 2006). Baker and Wurgler (2006, 2007) construct a more comprehensive empirical measure of investor sentiment; however, the measure ends in 2007. Replacing the Michigan index with Baker and Wurgler measure yields similar results.

definition, not built on useful information. On the other hand, if analysts follow the momentum strategy to compensate for their limited ability, their forecasts should be less accurate and the magnitude of forecast revisions should be larger, because these forecasts will reflect information about events that trigger past stock returns.

2.4. Momentum Recommendations and Other Public Signals

We differentiate between the substituting and complementing arguments using yet another perspective. If analysts follow past stock returns because of their limited ability to conduct superior fundamental research, they are more likely to follow other public signals. In contrast, if analysts exploit past stock returns to ride the momentum, there will be little overlap between momentum recommendations and recommendations that align with other public signals. This is because analysts with superior ability may be able to preempt the information from other public signals before this information becomes public.

We consider two sets of public signals. First are the following five financial variables that predict future stock returns (Jegadeesh et al. 2004): Unexpected earnings (positively), earnings-to-price ratio (positively), sales growth (negatively), total accruals (negatively), and capital expenditures (negatively), all cumulated during the last four fiscal quarters prior to the recommendation dates. Second are other analysts' recommendations during the six months prior to the recommendation dates. In addition to testing for a correlation between momentum recommendations and analysts' following other public signals, we explore analyst characteristics that are associated with a greater correlation between momentum recommendations and analysts' following other public signals. If the substituting argument is valid, for instance, we expect a greater correlation between these strategies among analysts with limited ability to conduct fundamental research.

2.5. Market Reaction to Momentum Recommendations

The quote in Section 1 highlights the belief that momentum recommendations reinforce the existing stock price momentum. The academic evidence on this concern is scarce. In a related paper, O'Brien and Tian (2006) show that analysts were influenced by past stock returns and made favorable recommendations for internet stocks during the 1996-2000 "Internet Bubble" period, and that this relative optimism resulted in abnormal returns during the quarter following the recommendations. We investigate the existence of such a positive feedback effect among momentum recommendations. To isolate the market reactions to recommendations, we examine the three-day market-adjusted returns around the recommendation dates (versus an alternative of searching for abnormal stock returns in longer future periods, an analysis that will be confounded by our ability to adjust for risk). If momentum recommendations do not reflect analysts' superior ability to conduct fundamental research, market reaction to such recommendations should be muted. However, investors may react to momentum recommendations if they consider these recommendations as instruments that reinforce the existing stock price momentum.

3. Research Design

3.1. Measure for Momentum Likelihood of Analyst Recommendations

We develop a momentum likelihood score (ML) to measure the match between recommendation revisions and past stock returns as follows. First, we split the sample of recommendations that are not initiations or reiterations based on the sign of market-adjusted stock returns during the six months prior to the recommendation dates. Next, for positive and negative past return groups separately, we rank recommendations based on the absolute value of the past returns and standardize the ranks to range between 0 and 100. Finally, we define ML as the standardized rank if an analyst revises in the same direction as past returns (i.e., an upgrade

after positive returns or a downgrade after negative returns), and the negative of the standardized rank if the analyst revises in the opposite direction of past returns (i.e., an upgrade after negative returns or a downgrade after positive returns). Overall, ML is a continuous variable that ranges from -100 to 100. An ML score of 100 (-100) suggests that the recommendation is most (least) likely to be following price momentum, because the recommendation revision has the same (opposite) sign with past returns and the absolute value of past returns is the maximum of the sample.

The ML score provides a parsimonious way to examine analysts' likelihood of issuing momentum recommendations. The standardization in return ranking mitigates the impact of extreme returns. Furthermore, ranking positive and negative past returns separately removes the impact of the asymmetric distributions of positive and negative stock returns.⁴ The ML score is likely to be correlated with calendar period and firm characteristics such as stock volatility. Section 4.7 discusses several sensitivity checks for the ML measure, including controls for year and company fixed effects as well as historical return volatility. The sensitivity checks show that the relations between the ML score and firm characteristics do not affect our main empirical results.

3.2. Determinants of Momentum Recommendations

We test the determinants of momentum recommendations using the OLS model below:

$$ML = \alpha + \beta_1 All-Star + \beta_2 Firm\ Experience + \beta_3 Not\ Rookie + \beta_4 Not\ Rookie * Past\ Forecast\ Error + \beta_5 Log\ (NCompany) + \beta_6 Log\ (Broker\ Size) + \beta_7 I-Bank + \beta_8 Log\ (Size) + \beta_9 Book-to-Market + \beta_{10} Log\ (Turnover) + \beta_{11} Michigan\ Sentiment + \beta_{12} Positive\ Past\ Returns + \gamma Industry + \varepsilon \quad (1)$$

where ML is regressed on the following proxies for analyst ability:

⁴ Negative returns are capped at -100% whereas positive returns are not, and return distributions are often found to have a bigger fat tail on the negative side.

All-Star = An indicator equal to one if the analyst is listed in the *Institutional Investor* magazine's All-American Research team during the year of the recommendation and zero otherwise.

Firm Experience = Number of years since the analyst's first recommendation in the *I/B/E/S* database for the firm.

Not Rookie = An indicator equal to one if the analyst has a forecast record in the *I/B/E/S* database for the year prior to the year of recommendation and zero otherwise.

Past Forecast Error = Average of absolute forecast errors for the analyst during the year before the recommendation date, scaled by stock price at the beginning of the year. Note that this variable is defined only if Not Rookie=1.

The following variables capture analysts' conflict of interest:

Log (Broker Size) = Natural logarithm of the number of analysts at the brokerage firm during the year of the recommendation.

I-Bank = An indicator equal to one if the brokerage has a non-zero Carter-Manaster (1990) investment banking rank during the year of the recommendation and zero otherwise.

Log (Turnover) = Natural logarithm of the company's total trading volume during the six months prior to the recommendation divided by shares outstanding.

The following variables serve as controls:

Log (NCompany) = Natural logarithm of the number of firms for which the analyst issues a recommendation during the year of the recommendation.

Log (Size) = Natural logarithm of the company's market capitalization at the end of the quarter prior to the recommendation date.

Book-to-Market = Book value of total assets divided by the sum of market value of equity and book value of debt, at the end of the quarter prior to the recommendation date.

Michigan Sentiment = Absolute value of the standardized *University of Michigan Consumer Sentiment Index*, which has an average of zero and standard deviation of one.

Positive Past Returns = An indicator equal to one if the market-adjusted buy-and-hold returns during the six months prior to the recommendation date is positive and zero otherwise.

Industry = Indicators on ten sectors in the Global Industry Classification Standard (GICS).⁵

3.3. Earnings Forecasts Accompanying Recommendations

We estimate the following OLS model to test whether momentum recommendations are related to forecast revisions and forecast errors:

⁵ Bhojraj et al. (2003) find that GICS is superior to other classifications for purposes of capital markets research.

$$\begin{aligned}
\text{Absolute Forecast Revision or Error} = & \alpha + \beta_1 \text{ML} + \beta_2 \text{Forecast Horizon} + \beta_3 \text{All-Star} \\
& + \beta_4 \text{Firm Experience} + \beta_5 \text{Not Rookie} + \beta_6 \text{Not Rookie} * \text{Past Forecast Error} \\
& + \beta_7 \text{Log (NCompany)} + \beta_8 \text{Log (Broker Size)} + \beta_9 \text{I-Bank} + \beta_{10} \text{Log (Size)} \\
& + \beta_{11} \text{Book-to-Market} + \beta_{12} \text{Log (Turnover)} + \beta_{13} \text{Michigan Sentiment} \\
& + \beta_{14} \text{Positive Past Returns} + \gamma \text{Industry} + \varepsilon
\end{aligned} \tag{2}$$

where the variables not previously defined are:

Absolute Forecast Revision = Absolute value of the difference between the annual earnings forecast issued within ten days before and after the recommendation and the analyst's prior forecast, deflated by the stock price at the beginning of the quarter.

Absolute Forecast Error = Absolute value of the difference between the annual earnings forecast issued within ten days before and after the recommendation and the actual earnings, deflated by the stock price at the beginning of the quarter.

Forecast Horizon = Number of days between the forecast date and the fiscal year end.

3.4. Momentum Recommendations and Propensity to Follow Other Public Signals

We differentiate between the substituting and complementing arguments by investigating whether momentum recommendations align with other public signals. We also explore analyst and broker characteristics that affect this relation.

We estimate the following OLS model, which is an extension of Eq. (1):

$$\begin{aligned}
\text{ML} = & \alpha + \pi \text{Variables} + \beta_1 \text{Follow Financials} + \beta_2 \text{Follow Analysts} + \beta_3 \text{Follow Financials} * \\
& \text{Analyst and Broker Variables} + \beta_4 \text{Follow Analysts} * \text{Analyst and Broker Variables} \\
& + \gamma \text{Industry} + \varepsilon
\end{aligned} \tag{3}$$

where *Variables* are the independent variables in Eq. (1), and *Analyst and Broker Variables* are analyst- and broker-related variables in Eq. (1), i.e., All-Star, Firm Experience, Not Rookie, Not Rookie*Past Forecast Error, Log (NCompany), Log (Broker Size), and I-Bank. *Follow Financials* measures how strongly the recommendation follows the company's publicly-observed financial indicators that are documented to predict future stock returns (Jegadeesh et al. 2004). *Follow Financials* ranges from 0 to 5, with 0 (5) indicating the analyst's revision strongly contradicts with (conforms to) the following financial indicators:

Indicator 1=1 if Standardized Unexpected Earnings (SUE)>industry-year median and analyst upgrades or SUE<industry-year median and analyst downgrades, and 0 otherwise.

Indicator 2=1 if Earnings-to-Price ratio (EP)>industry-year median and analyst upgrades or EP<industry-year median and analyst downgrades, and 0 otherwise.

Indicator 3=1 if Sales Growth<industry-year median and analyst upgrades or Sales Growth>industry-year median and analyst downgrades, 0 otherwise.

Indicator 4=1 if Total Accruals<industry-year median and analyst upgrades or Total Accruals>industry-year median and analyst downgrades, 0 otherwise.

Indicator 5=1 if CAPEX<industry-year median and analyst upgrades or CAPEX>industry-year median and analyst downgrades, 0 otherwise.

Follow Analysts measures how strongly the recommendation follows revisions of other analysts during the six months prior to the recommendations. *Follow Analysts* is a continuous variable based on standardized rank of other analysts' recommendations, defined similarly to ML. If an analyst upgrades (downgrades) a company stock and if the stock is also upgraded (downgraded) by all other analysts during the past six months, then *Follow Analysts* takes the maximum value, 100. If an analyst upgrades (downgrades) a company stock and if the stock is downgraded (upgraded) by all other analysts during the past six months, then *Follow Analysts* takes the minimum value, -100.

3.5. Market Reaction to Momentum Recommendations

We investigate the positive feedback effect of momentum recommendations on the existing price momentum by estimating the following OLS regression:

$$\begin{aligned} \text{Conforming Returns} = & \alpha + \beta_1 ML + \beta_2 \text{All-Star} + \beta_3 \text{Firm Experience} + \beta_4 \text{Not Rookie} \\ & + \beta_5 \text{Not Rookie} * \text{Past Forecast Error} + \beta_6 \text{Log (NCompany)} + \beta_7 \text{Log (Broker Size)} \\ & + \beta_8 \text{I-Bank} + \beta_9 \text{Log (Size)} + \beta_{10} \text{Book-to-Market} + \beta_{11} \text{Log(Turnover)} + \beta_{12} \text{Michigan} \\ & \text{Sentiment} + \beta_{13} \text{Positive Past Returns} + \gamma \text{Industry} + \varepsilon \end{aligned} \quad (4)$$

where *Conforming Returns* is the three-day market-adjusted returns around the recommendation date multiplied by 1 (-1) if the recommendation revision is an upgrade (downgrade). This definition captures the strength of the market reaction to the revision irrespective of the direction

of the revision, and therefore enables a clear comparison of the incremental effect of momentum recommendations. A positive and significant coefficient on *ML* would indicate that a momentum recommendation generates incremental stock returns that are in line with the revision, thereby reinforcing the existing price momentum.⁶

We also estimate the following OLS model to evaluate analyst, broker, and company characteristics that reinforce the short-term market reaction to momentum recommendations:

$$\text{Conforming Returns} = \alpha + \beta_1 \text{ML} + \pi \text{Variables} + \theta \text{ML} * \text{Variables} + \gamma \text{Industry} + \varepsilon \quad (5)$$

where *Variables* are the independent variables in Eq. (1).

4. Sample Selection and Results

4.1. Sample Selection

We obtain analyst recommendations from *I/B/E/S*, company financial information from *Compustat*, and stock returns from *CRSP* databases. We start with 526,525 recommendations between years 1994 and 2009. Our analysis requires recommendations representing revisions, i.e., individual analysts' upgrades or downgrades relative to their most recent recommendations on the same company. Therefore, we omit initiations and reiterations, reducing sample size to 257,548. The sample size further shrinks with the requirement of non-missing financial data and stock returns.⁷ The final sample includes 204,748 recommendation revisions (93,205 upgrades and 111,543 downgrades) from 9,000 unique analysts covering 10,341 unique firms.

⁶ We are interested in the directional match between past stock returns, recommendation revision, and the market reaction. Therefore we define *Conforming Returns* based on the match between the market reaction and the direction of the recommendation revision. Given this specification, Eq. (4) does not need the direction of the revision as an explanatory variable. Table 7 also provides results of Eq. (4) for subsamples of positive and negative past returns.

⁷ Following Beaver et al. (2007), we adjust stock returns with delisting returns provided by *CRSP*, and, if delisting returns are not provided, with average delisting return for the corresponding three-digit delisting code.

Table 1 reports, and the Appendix to Table 1 plots, average ML across years and across companies with positive and negative past returns. The average ML is 1.8; -5.0 for companies with positive past returns, and 8.1 for companies with negative past returns, all significantly different from zero. In other words, analyst recommendations slightly follow past returns, and this result is entirely driven by downgrades after negative past returns. From another perspective, untabulated statistics show that downgrades are on average momentum following (ML=3.9) whereas upgrades are not (ML=-0.6). The stark difference between the extent of momentum recommendations after negative and positive past returns is in contrast to Jegadeesh et al.'s (2004) finding that quarterly consensus recommendations between 1985 and 1998 follow positive returns but not negative returns.

Table 1 shows a distinct pattern of momentum likelihood of recommendations across years. Recommendations were more momentum-following for the period 1994 to 2002 than for the period 2003 to 2009. The average ML was 5.6 (-3.3 for positive returns and 13.5 for negative returns) in the former period, and -2.3 (-5.8 for positive returns and 1.2 for negative returns) in the latter period.

We note that a high ML for an individual recommendation does not necessarily indicate that the analyst follows past returns, because the analyst's fundamental research may result in value estimates consistent with the price momentum. Nevertheless, if analysts solely rely on fundamental research, their recommendations will, *on average*, be independent of past returns for a large and random sample. Overall, Table 1 provides evidence consistent with the conflict of interest explanation. First, momentum recommendations are driven by downgrades after negative returns. Second, the prevalence of momentum recommendations disappeared after 2002, likely due to tightened regulations reining in analysts' conflict of interest.

4.2. Summary Statistics for Determinants of Momentum Recommendations

Table 2 provides descriptive statistics on analyst, broker, company, and investor sentiment characteristics.⁸ All-Star analysts issue 14% of the recommendations in the sample. Analysts have an average of 2.7 years of firm experience. 91% of the analysts in the sample are not rookies, i.e., they issued forecasts in the year prior to the recommendation. Average forecast errors of the analysts are about 1% of share price at the beginning of the year. An average analyst follows 11 companies. An average broker employs 35 analysts; 5% of the brokers are investment banks. An average company has a market capitalization of \$1.7 billion and a book-to-market ratio of 0.63. An average company's shares are traded 0.9 times its shares outstanding during the six months prior to the recommendation. Average absolute deviation of the Michigan sentiment index from its historic mean is 0.84 of its standard error, suggesting significant variations in the monthly investor sentiment. Finally, 48% (52%) of the recommendations are issued after positive (negative) market-adjusted returns during the past six months.

Table 3 presents Pearson and Spearman correlation coefficients. At 1% significance level, ML is correlated with All-Star analyst status (negatively), analyst experience (negatively), analyst's average forecast errors in the past year (positively), broker size (positively), company size (negatively), company book-to-market ratio (positively), past share turnover (positively), investor sentiment (positively), and the sign of past company returns (negatively). Overall, univariate correlations provide preliminary evidence consistent with the two hypotheses set forth in Section 2. Analysts seem to issue momentum recommendations due to their conflict of interest as well as their limited ability to conduct fundamental research.

⁸ Some of the variables used in empirical analyses are natural logarithms of the original measures. We discuss economic significances using the original measures.

4.3. Determinants of Momentum Recommendations

Table 4, Panel A reports the results from estimations of Eq. (1) to evaluate the determinants of the likelihood of momentum recommendations using analyst- and broker-related variables only (first column), and these variables plus company and investor sentiment variables (second column). For brevity, we discuss results of the full model in the second column.

Throughout the multivariate analyses, we report t -statistics based on robust standard errors clustered by both company and calendar quarter, because the likelihood of individual analysts to issue momentum recommendations may be correlated for the same company and period.⁹

The regression coefficients are in line with the univariate relations. Momentum recommendations are more likely to be issued by non-All-Star analysts and inexperienced analysts, consistent with analysts substituting their limited ability with momentum recommendations. In addition, the momentum likelihood is higher among large brokerage houses and companies with high turnover and negative past returns. These results are consistent with analysts issuing momentum recommendations to generate trading commissions and curry favor with management, that is, as a result of their conflict of interest. The coefficients on past year forecast errors and investment banking relations are not significant;¹⁰ however, given the significant coefficients on other variables, we conclude that the results support both the substituting and conflict of interest explanations.

In terms of economic significance, an analyst's All-Star status reduces ML by 1.2; an additional year of firm-specific experience reduces ML by 1.0; a 10% increase in the number of

⁹ We choose calendar quarter as the interval in which observations may be interdependent, because we argue that the alternative of calendar year may be long to capture the interdependencies (e.g., first and last quarters of 2009). Furthermore, we choose to use company instead of industry for cross-sectional clustering, because we believe interdependencies are clearer among within-company observations. The untabulated results using the alternative clustering choices, calendar years and industry effects, show similar results as those reported.

¹⁰ The coefficient on the average past-year forecast errors is positive and significant in the first model, consistent with the prediction of the substituting explanation.

analysts employed by the brokerage house increases ML by 0.1; a 10% increase in the past six month trading volume increases ML by 2.1; and negative returns in the past six months (as opposed to positive returns) increases ML by 12.1.

The relations of ML with the control variables are consistent with our predictions. The momentum recommendations are more likely to be issued by analysts who can attribute limited resources for each individual firm (following more companies), for companies with weak information environment such as small and value companies, and during periods of extreme investment sentiment when price movements are likely to deviate from fundamentals.

Table 4, Panel B reports the results from estimations of Eq. (1) across recommendations with positive and negative past returns, and recommendations before 2003 and in or after 2003.¹¹ Consistent with conflict of interest explanation, there are stark differences between the results for negative and positive past returns. First, the negative return model shows a better fit; analyst, broker, company, and sentiment variables better predict the ML score. Second, variables capturing analysts' conflict of interest such as broker size and company share turnover predict the ML score for negative—but not positive—past returns.

Furthermore, there are significant differences between the determinants of momentum recommendations before and after the Global Settlement and related regulatory changes in late 2002, which significantly reduced analysts' conflict of interest. First, analyst, broker, company, and sentiment variables better explain momentum recommendations before 2003. Second, less firm-specific and general analyst experience are significantly more correlated with the likelihood of momentum recommendations before 2003 than during or after 2003. We interpret this as

¹¹ In order to assess statistical significance between the coefficient estimates, we estimate an extended version of Eq. (1) that includes variables of Eq. (1), an indicator for the partitioning characteristic (positive/negative past returns, before/after 2002), and interaction of the variables and the indicator. For brevity, we do not report this estimation, but only present statistical significances between the coefficient estimates of Eq. (1) across subsamples, which coincide with the significances of the interaction coefficients in the extended model.

collective evidence that analysts substitute their limited ability with momentum recommendations more strongly before 2003.¹² Third, broker size, share turnover, and negative past returns are significantly more correlated with the momentum likelihood before 2003 than during or after 2003. We interpret this as collective evidence that analysts' conflict of interest (i.e., to generate trading volume and to curry favor with management using optimistic recommendations) results in momentum recommendations more strongly before 2003.¹³

4.4. Earnings forecasts accompanying the recommendations

The above evidence is consistent with the substituting explanation that predicts that analysts issue momentum recommendations when they have limited ability to conduct superior fundamental research. In this section, we investigate whether earnings forecasts accompanying recommendations support this explanation.

Table 5, Panel A presents descriptive statistics for absolute forecast revision and absolute forecast error deflated by beginning-of-the-quarter stock price. Both absolute forecast revision and forecast errors are truncated at 99% to avoid the influence of the outliers. The average forecast revision is 0.9%; with 0.8% (1.0%) for those with positive (negative) past returns; and 1.0% (0.8%) for those after (before) 2003. The average forecast error is 1.4%; with 1.2% (1.6%) for those with positive (negative) past returns; and 1.5% (1.3%) for those after (before) 2003. Both absolute forecast revisions and forecast errors are significantly higher for forecasts after negative returns and for years 2003 and after.

Table 5, Panel B examines absolute forecast revisions and forecast errors across momentum quartiles. Forecasts that accompany recommendations of the top momentum quartile

¹² This interpretation is not supported by the coefficient estimate on Log (NCompany), which is positive (negative) after (before) 2003.

¹³ This interpretation is not supported by the coefficient estimate on I-Bank, which is significant and negative only before 2003. We note that I-Bank is virtually zero after 2003, indicating the possibility of this variable correlating with time-specific variables.

(ML between 50 and 100) have an average absolute forecast revision of 1.3% and absolute forecast error of 1.9%. In contrast, forecasts that accompany recommendations of the bottom momentum quartile (ML between -50 and -100) have an average absolute forecast revision of 0.9% and absolute forecast error of 1.6%. Similar relations exist for forecasts that accompany slightly momentum (ML between 0 and 50) and slightly non-momentum quartiles (ML between 0 and -50). In sum, forecasts that accompany momentum recommendations are less accurate and exhibit larger deviation from the analysts' most recent forecasts.

Table 5, Panel C presents results from estimations of Eq. (2) with absolute forecast revision as the dependent variable. Holding other controls the same, a switch from median non-momentum to median momentum recommendation (i.e., an increase in ML from -50 to +50) increases the absolute forecast revision deflated by stock price by 0.3%. This relation is driven by forecasts issued after negative returns. The relation between momentum recommendations and the magnitude of forecast revision is similar for forecasts issued before 2003 versus in or after 2003. Table 5, Panel D presents results from estimations of Eq. (2) with absolute forecast error as the dependent variable. Holding other controls the same, an increase in ML from -50 to +50 increases the absolute forecast revision deflated by stock price by 0.2%. This relation is again driven by forecasts issued after negative returns. The relation between momentum recommendations and the magnitude of forecast error is similar for recommendations issued before 2003 versus in or after 2003.

In sum, we find that momentum recommendations are accompanied by forecasts that are less accurate and that represent larger revisions. The evidence is consistent with the substituting argument; the characteristics of momentum forecasts reflect analysts' limited ability to conduct superior fundamental research. Moreover, this effect is more pronounced for recommendations

issued after negative stock returns. The evidence is also consistent with the conflict of interest argument; momentum forecasts after negative past returns, which can be more clearly explained by analyst optimism, reflect analysts' limited ability to conduct superior fundamental research.

4.5. Momentum Recommendations and Propensity to Follow Other Public Signals

Table 6 reports results from estimations of different versions of Eq. (3) to evaluate the extent to which momentum recommendations are in line with public financial signals and other analysts' past revisions. Column 1 reports the regression results using the determinants of ML in Eq. (1), *Follow Financials*, and *Follow Analysts* as independent variables. All the results of Eq. (1) reported in Table 4 persist. The coefficients on *Follow Financials* and *Follow Analysts* are positive and significant, suggesting strong correlations between the likelihood of analysts' following past stock returns and past financial signals known to predict future returns as well as other analysts' recommendations. The addition of *Follow Financials* and *Follow Analysts* improves the goodness-of-fit of the regression from 2.02% in Table 4 to 5.89% in Table 6.

Column 2 reports regression results including the interactions between *Follow Financials* and *Follow Analysts* with analyst and broker characteristics. The correlation between ML and *Follow Financials* decreases with firm experience and broker size, and increases with past forecast error. The correlation between ML and *Follow Analysts* decreases with firm experience and increases with past forecast error and investment bank affiliation. Columns 3 and 4 show that the results are more pronounced for recommendations after negative past stock returns. Columns 5 and 6 show that results are more pronounced for recommendations before 2003. We conclude that the results are consistent with the predictions of both the substituting and conflict of interest arguments. Analysts with limited ability to conduct superior fundamental research and those that

have incentives to show optimism appear to follow company financials as well as other analysts' past revisions more strongly besides following past stock returns in their recommendations.

4.6. Market Reaction to Momentum Recommendations

Table 7 presents results of tests exploring whether momentum recommendations generate a positive feedback on the existing price momentum. Panel A presents descriptive statistics on *Conforming Returns*, which is the three-day market-adjusted returns around the recommendation dates multiplied by +1 (-1) if the recommendation revision is an upgrade (downgrade). The average *Conforming Returns* is 3.2%; 2.4% for positive past returns and 4.0% for negative past returns; and 3.4% for recommendations issued in or after 2003 and 3.1% before 2003. Not surprisingly, three-day market-adjusted returns around the recommendation dates are, on average, in line with the direction of the recommendation revisions; this relation is stronger for companies with negative past returns and during or after 2003.

Panel B compares average *Conforming Returns* across ML quartiles. The short-term reactions to analyst recommendations are strongly correlated with the likelihood of momentum recommendations. In the top (bottom) momentum recommendation quartile, average *Conforming Returns* is 4.6% (3.2%). The return differential of 1.4% can be interpreted to be the incremental result of the analyst following (countering) the existing price momentum. The average *Conforming Returns* is also larger for the quartile of slightly momentum recommendations than the quartile of slightly non-momentum recommendations (2.7% versus 2.3%).

Panel C presents results from estimations of different versions of Eq. (4), with similar inferences as Panel B. The coefficient estimate for ML is positive and significant in both Column 1 and Column 2, which use the full sample. Holding other controls the same in Column 2, an increase in ML from -50 to +50 increases the short-term market reaction in the direction of the

revision by 0.6%. This relation is driven by recommendations issued after negative past returns. The market responds more strongly (by 1.5%) to momentum downgrades than non-momentum downgrades. In contrast, the market reacts negatively to momentum upgrades (by -0.3%). We note that these reactions are “incremental” reactions that can be attributed to how past stock returns match with the recommendation revision in question. That is, despite market’s incremental negative reaction to momentum upgrades, the absolute reaction to momentum upgrades is positive, as suggested by Panel A. The market reaction to momentum recommendations is similar before 2003 and in or after 2003.

Panel D presents results from estimations of Eq. (5), which uses interactions of ML with analyst, broker, and company characteristics. Columns 1 and 2 report results using the full sample. The market reaction to momentum recommendations are stronger for Non-Rookie analysts, analysts following fewer companies, larger brokers, smaller companies, lower book-to-market companies, and companies with negative past returns. In sum, market reaction to momentum recommendations is greater when information sources are scarce (e.g., small company) and when the perceived quality of the recommendations (e.g., large broker, non-rookie analyst, more analyst effort) is high.

4.7. Sensitivity Analyses

The ML score, which measures the strength of the match between individual analysts’ revisions and market-adjusted company stock returns during the past six months, inevitably incorporates (arbitrary) choices. We conduct a battery of sensitivity checks on the definition of ML. First, we rank past six-month returns within each calendar year and recompute ML (The original definition ranks past six month returns globally across our entire sample). Second, in order to account for company-specific variables that affect momentum recommendations, we

rank past six-month returns within each sample company during the sample period and recompute ML. Third, given that recommendations of companies with volatile stock returns are likely to have ML scores that are large in absolute value, we first quintile rank companies based on daily stock return volatility during the sample period and then rank past six-month returns within each volatility quintile and recompute ML. Fourth, we define ML using three- and one-month past returns.¹⁴ Fifth, we define ML using raw returns instead of market-adjusted returns. Sixth, we define ML using the level of stock recommendations instead of the revisions. That is, for recommendations with positive past returns, we define ML as the standardized rank of past six month returns multiplied with +1, +0.5, -0.5, -0.5, or -1 if the recommendation level is *Strong Buy*, *Buy*, *Hold*, *Sell*, or *Strong Sell*, respectively.¹⁵ The multiplication order is reversed for recommendations with negative past returns. Finally, given that many brokerage houses switched to a three-tier rating system after the Global Settlement (while I/B/E/S continue to translate the recommendations into five-tier ratings), we define ML by converting recommendations in the entire sample period into a three-tier system (Kadan et al. 2009). That is, we group *Strong Buy* and *Buy* recommendations as *Buy*, and *Strong Sell* and *Sell* recommendations as *Sell*. For all the above variations, the new definitions of ML's have high correlations with the original ML and empirical results across these definitions are inferentially similar to those reported.

Section 4.6 documents that three-day stock returns around the momentum recommendations are stronger in the direction of the recommendations. We interpret the results as consistent with momentum recommendations generating a positive feedback effect on the existing price momentum. An alternative argument in the spirit of momentum following of

¹⁴ We borrow the stock return horizon choice of six months from Jegadeesh et al. (2004).

¹⁵ Multiplication by -0.5 of *Hold* and *Sell* recommendations reflects the general view in the literature that these recommendations indicate unfavorable opinions of the analysts. Using 0 for *Hold*, -0.5 for *Sell*, and -1 for *Strong Sell* does not change the results.

analyst recommendations is that analysts also follow the three-day returns or corporate events resulting in such returns—instead of generating them (Altinkilic and Hansen 2009). We employ three sensitivity checks to examine this explanation. First, we exclude recommendations issued within one day of the quarterly earnings announcements (10% of the sample) and rerun Eq. (4) and Eq. (5), and find similar results to those reported. Second, we take a more general approach and exclude observations with extreme stock returns around recommendation dates, arguing that these observations are likely due to corporate events (such as earnings announcements, other company disclosures, and company-specific and macroeconomic shocks) that coincide with the recommendation dates. We exclude observations with stock returns below (above) 5% (95%), 10% (90%), or 25% (75%) of the sample distribution and rerun Eq. (4) and Eq. (5). We find that in every case, *Conforming Returns* are positively correlated with ML. Finally, instead of the three-day window surrounding the recommendation date $[-1, +1]$, we define *Conforming Returns* using returns on Day 0 only, Day +1 only, or on Days 0 and +1, combined. The results are economically less significant, but inferentially similar to those reported.

5. Conclusion

In this paper, we investigate the validity of the popular criticism that momentum recommendations do not reflect analysts' ability to conduct superior fundamental research. First, we document that analysts as a whole have followed past stock returns in their recommendations before 2003, after which no clear trend of return-following exists. Inconsistent with the early literature that documents favorable consensus recommendations for expensive stocks, we find that analysts disproportionately downgrade after negative stock returns, but do not disproportionately upgrade after positive stock returns. We attribute both the disappearance of

momentum recommendations after 2002 and the higher frequency of downgrades after negative past returns (versus upgrades after positive past returns) to conflict of interest. When analysts have higher incentives to issue optimistic recommendations, they issue recommendations that are more likely to follow past returns. We also find that momentum recommendations are more frequent among large brokers and for companies with large share turnover, consistent with analysts' greater use of momentum strategy when there are higher expected brokerage income.

We next document that individual analysts follow stock prices to substitute for their lack of ability to conduct superior fundamental research. First, inexperienced, less reputable, and less accurate analysts issue momentum recommendations more frequently. Second, earnings forecasts accompanying momentum recommendations represent larger revisions from analysts' outstanding forecasts and are less accurate ex post, when compared to other forecasts. Finally, momentum recommendations, and especially those issued by analysts with little experience and poor forecast accuracy, align with other public signals, i.e., past recommendations of other analysts and past financials of the company that are known to be related to future returns.

We also explore short-term market reaction to momentum recommendations. We show economically significant abnormal returns in the direction of the momentum recommendations, after controlling for determinants known to affect company returns, such as size, book-to-market, past returns, and investor sentiment. An average momentum recommendation generates about 0.6% more abnormal returns during the three days centered on the recommendation date than an average non-momentum recommendation does. The positive feedback effect of momentum recommendations is more pronounced when company information sources are scarce and when the perceived quality of the recommendations is relatively high. Under the assumption of inefficient markets, these findings can be interpreted as investors viewing the momentum

recommendations as a force strengthening the existing price momentum, despite little forward-looking information they entail.

Our findings contribute to knowledge on why analysts use past stock returns in their recommendations. Analysts with limited ability to conduct superior fundamental research and those that are pressured to show optimism, incorporate past stock returns more strongly into their recommendations. In the absence of other information sources, investors respond strongly to such recommendations. We predict that this equilibrium results in analysts with limited ability experience favorable career outcomes than they otherwise would have so that incentives for issuing momentum recommendations stay strong. We leave a thorough examination of this prediction regarding analysts' career outcomes for future research.

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Appendix Variable Definitions

Dependent Variables

ML Score (Momentum Likelihood)	Standardized rank (negative of the standardized rank) of company stock returns during the past six months prior to the recommendation date if the recommendation revision has the same (opposite) sign with the past stock returns. The ranking is performed separately for positive and negative past returns. ML Score ranges from -100 to 100, with -100 least likely to be momentum and 100 most likely to be momentum.
Conforming Returns	Market-adjusted returns from one day before to one day after the recommendation date multiplied by +1 if the recommendation revision is an upgrade, and -1 if the recommendation revision is a downgrade. Delisting returns are added to returns and missing delisting returns are completed using the methodology in Beaver et al. (2007).

Independent Variables

All-Star	An indicator equal to one if the analyst is listed in the <i>Institutional Investor</i> magazine's All-American Research team during the year of the recommendation and zero otherwise.
Firm Experience	Number of years since the analyst's first recommendation in the <i>I/B/E/S</i> database for the firm.
Not Rookie	An indicator equal to one if the analyst has forecast record in the <i>I/B/E/S</i> database for the year prior to the year of recommendation and zero otherwise.
Past Forecast Error	Average absolute forecast error for the analyst during the year before the recommendation date, scaled by stock price at the beginning of the year. Note that this measure is only available for non-rookie analysts.
Log (NCompany)	Natural logarithm of the number of firms for which the analyst issues a recommendation during the year of the recommendation.
Log (Broker Size)	Natural logarithm of the number of analysts at the brokerage firm that employs the analyst during the year of the recommendation.
I-Bank	An indicator equal to one if the analyst works for a brokerage with a Carter-Manaster (1990) investment banking rank greater than zero—in other words with investment banking business—during the year of the recommendation and zero otherwise.
Log (Size)	Natural logarithm of company's market capitalization at the end of the quarter prior to the recommendation date.
Book-to-Market	Book value of company total assets divided by the sum of market value of equity and book value of debt, at the end of the quarter prior to the recommendation date.
Log (Turnover)	Natural logarithm of a firm's total trading volume during the six months prior to the recommendation divided by number of shares outstanding.

Michigan Sentiment	Absolute value of the standardized <i>University of Michigan Consumer Sentiment Index</i> . The index is published monthly by the University of Michigan and Reuters based on a survey of consumers. We standardize the measure to have a mean of zero and standard deviation of one for the sample period (January 1978 to July 2010). We then take absolute value of the standardized measure to gauge the deviation from its historical mean.
Positive Past Returns	An indicator equal to one if the market-adjusted buy-and-hold returns during the six months prior to the recommendation date is positive and zero otherwise.

Earnings Forecasts Accompanying the Recommendation within [-10,+10] days

Absolute Forecast Revision	Absolute value of annual earnings forecast accompanying the recommendation within ten days before and after the recommendation less the analyst's prior forecast, deflated by the stock price at the beginning of the quarter.
Absolute Forecast Error	Absolute value of earnings forecast accompanying the recommendation less actual earnings, deflated by the stock price at the beginning of the quarter.
Forecast Horizon	Number of days between the forecast date and the fiscal year end of the forecasted annual earnings.

Financial Signals

Q is the most recent quarter for which an earnings announcement was made before the recommendation date. If the earnings announcement date is not available, we require q to be at least 60 days prior to the recommendation date, to allow time for information dissemination.

SUE	Standardized unexpected earnings = $(EPS_q - EPS_{q-4})/\sigma_q$, where $EPS_q - EPS_{q-4}$ = Unexpected earnings for quarter q, with EPS defined as earnings per share (diluted) excluding extraordinary items, adjusted for stock distributions, σ_q = Standard deviation of unexpected earnings over eight preceding quarters (quarters q - 7 through q).
EP	Earnings to price ratio = $\Sigma_q EPS/P_q$, where $\Sigma_q EPS$ = Rolling sum of earnings per share before extraordinary items from quarter q-3 to q. P_q = Price at the end of the quarter q.
Sales Growth	Rolling sum of sales from quarter q-3 to q divided by the rolling sum of sales from quarter q-7 to q-4.
Total Accruals	Total accruals divided by total assets (balance sheet definition). $((\Delta Current Assets_q - \Delta Cash_q) - (\Delta Current Liabilities_q - \Delta Current LTD_q) - \Delta Deferred Taxes_q - Depreciation and Amortization_q) / ((TA_q + TA_{q-4})/2)$, where $\Delta X_q = X_q - X_{q-4}$.

CAPEX	Capital expenditure divided by total assets = $\Sigma_q CAPEX / ((TA_q + TA_{q-4})/2)$, where $\Sigma_q CAPEX$ = rolling sum of Capital Expenditures from quarters $q - 3$ through q .
Follow Financials (FF)	<p>Combined signal from the above five financial ratios to measure how strongly the financial ratios conform to the price momentum. Follow Financials (FF) ranges from 0 to 5 with 0 indicating signals from financial ratios contradict what is predicted by price momentum, and 5 indicating that signals from financial ratios strongly conform to price momentum. FF is equal to the sum of the five indicator variables defined as follows:</p> <p>When the recommendation revision is an upgrade: Indicator 1=1 if SUE>industry-year median, 0 otherwise, Indicator 2=1 if EP>industry-year median, 0 otherwise, Indicator 3=1 if Sales Growth<industry-year median, 0 otherwise, Indicator 4=1 if Total Accruals<industry-year median, 0 otherwise, Indicator 5=1 if CAPEX<industry-year median, 0 otherwise.</p> <p>When the recommendation revision is a downgrade: Indicator 1=1 if SUE<industry-year median, 0 otherwise, Indicator 2=1 if EP<industry-year median, 0 otherwise, Indicator 3=1 if Sales Growth>industry-year median, 0 otherwise, Indicator 4=1 if Total Accruals>industry-year median, 0 otherwise, Indicator 5=1 if CAPEX>industry-year median, 0 otherwise.</p>
Follow Analysts (FA)	Standardized rank of the percentage of recommendation revisions issued by other analysts during the six months before the recommendation revision. Follow Analysts takes values between -100 and 100. If an analyst upgrades (downgrades) a company stock and if the stock is also upgraded (downgraded) by all other analysts during the past six months, then Follow Analysts takes the maximum value, 100. If an analyst upgrades (downgrades) a company stock and if the stock is in contrast downgraded (upgraded) by all other analysts during the past six months, then Follow Analysts takes the minimum value, -100.

Table 1
Time-series Characteristics of Momentum Recommendations

Year	All observations		Positive past returns		Negative past returns	
	N	ML Score	N	ML Score	N	ML Score
1994	9,167	4.77	4,253	1.01 ^{ns}	4,914	8.02
1995	11,956	4.18	5,266	-4.77	6,690	11.23
1996	10,768	3.42	4,747	-1.98	6,021	7.68
1997	10,515	5.59	4,605	-2.20	5,910	11.66
1998	12,365	6.87	4,260	-5.56	8,105	13.40
1999	11,836	5.40	4,604	4.71	7,232	5.84
2000	10,849	8.39	4,792	-2.24	6,057	16.80
2001	11,350	7.06	6,166	-5.53	5,184	22.03
2002	16,596	4.95	8,733	-13.33	7,863	25.25
2003	14,432	-2.69	8,113	-6.63	6,319	2.37
2004	13,589	-1.50	7,058	-5.50	6,531	2.81
2005	13,063	-3.91	6,766	-5.74	6,297	-1.94
2006	13,308	-4.09	6,528	-8.77	6,780	0.42
2007	13,867	-5.91	6,442	-8.88	7,425	-3.33
2008	16,123	1.51	7,239	-3.86	8,884	5.89
2009	14,964	0.30 ^{ns}	8,179	-1.35	6,785	2.29
Total	204,748	1.83	97,751	-5.00	106,997	8.06

Table 1 reports average momentum likelihood (ML) scores across years and positive and negative past returns. The Appendix defines ML Score. All averages are significantly different from zero at 1% except for those denoted “^{ns}”.

Appendix to Table 1
Momentum Likelihood Score Across Years

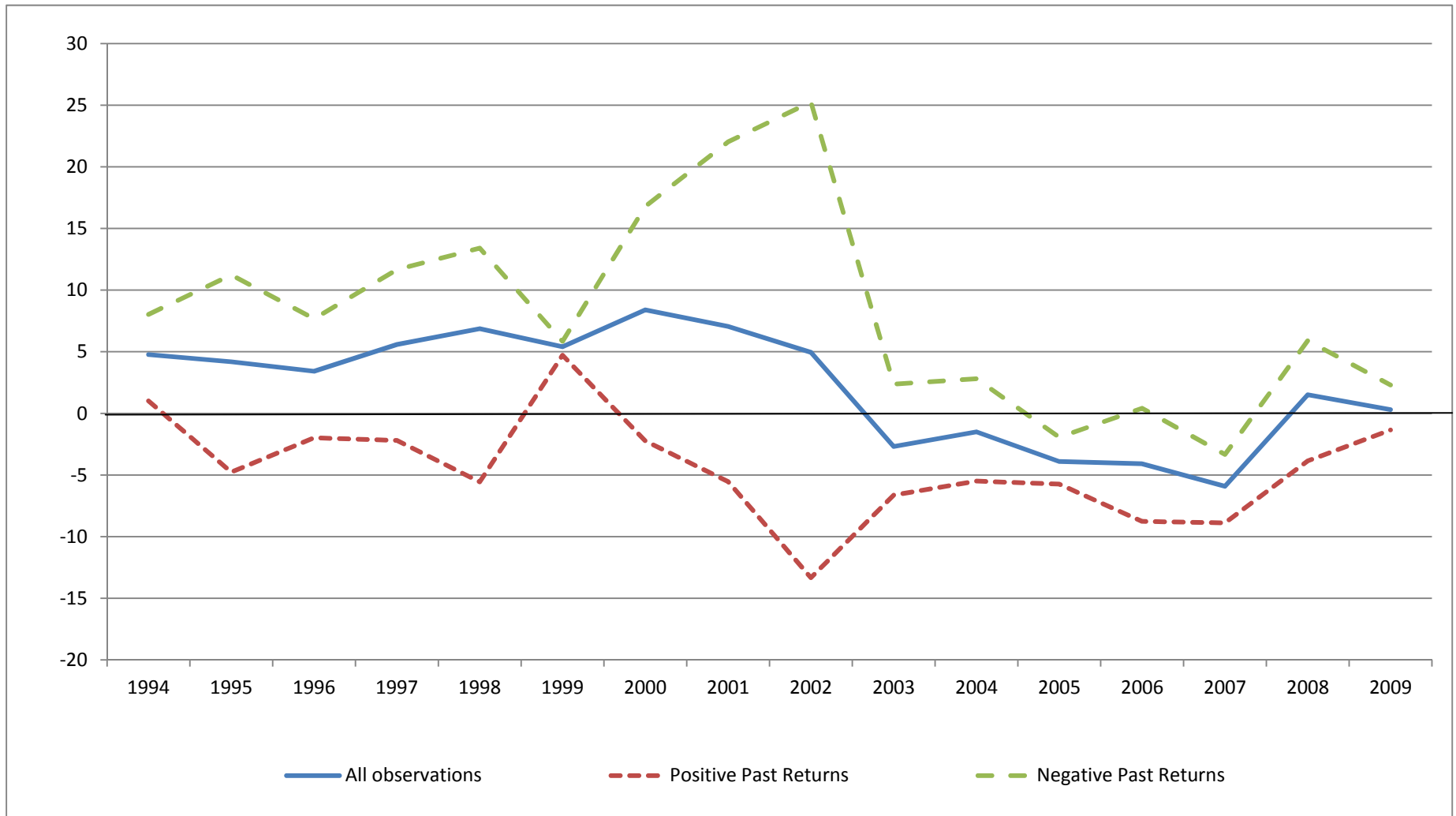


Table 2
Summary Statistics

	N	Mean	Min	Q1	Median	Q3	Max	Std Dev
ML Score	204,748	1.83	-100	-48.39	0.82	53.20	100	58.13
All-Star	204,748	0.14	0.00	0.00	0.00	0.00	1.00	0.35
Firm Experience	204,748	2.68	1.00	2.00	2.00	3.00	15.00	1.54
Not Rookie	204,748	0.91	0.00	1.00	1.00	1.00	1.00	0.29
Not Rookie * Past Forecast Error	204,748	0.01	0.00	0.00	0.01	0.01	0.22	0.01
Log (NCompany)	204,748	2.46	0.69	2.08	2.48	2.77	6.25	0.60
Log (Broker Size)	204,748	3.59	0.69	2.83	3.69	4.49	5.87	1.14
I-Bank	204,748	0.05	0.00	0.00	0.00	0.00	1.00	0.22
Log (Size)	204,748	7.39	0.04	6.14	7.29	8.57	13.31	1.78
Book-to-market	204,748	0.63	0.10	0.40	0.63	0.86	1.30	0.28
Log (Turnover)	204,748	-0.12	-4.50	-0.75	-0.11	0.53	1.99	0.90
Michigan Sentiment	204,748	0.84	0.02	0.35	0.64	1.39	2.38	0.62
Positive Past Returns	204,748	0.48	0.00	0.00	0.00	1.00	1.00	0.50

The Appendix presents variable definitions.

Table 3
Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ML Score		-0.008	-0.030	-0.004	0.009	-0.005	0.017	0.003	-0.049	0.013	0.044	0.031	-0.112
(2) All-Star	-0.008		0.141	0.009	-0.015	0.099	0.384	0.091	0.152	0.037	-0.046	-0.028	0.003
(3) Firm Experience	-0.028	0.131		0.126	0.071	0.038	0.034	-0.039	0.170	0.056	0.071	0.056	0.013
(4) Not Rookie	-0.004	0.009	0.169		0.310	0.057	-0.001	0.025	0.001	-0.017	0.010	0.041	-0.012
(5) Not Rookie * Past Forecast Error	0.012	-0.018	0.134	0.506		-0.014	-0.058	-0.010	-0.121	0.113	0.127	0.109	-0.001
(6) Log (NCompany)	-0.003	0.109	0.040	0.060	0.056		-0.113	0.052	-0.019	0.086	-0.070	-0.030	0.010
(7) Log (Broker Size)	0.016	0.412	0.060	-0.008	-0.070	-0.040		-0.012	0.174	0.002	-0.001	-0.024	-0.004
(8) I-Bank	0.003	0.091	-0.031	0.025	0.007	0.053	-0.022		-0.015	-0.014	-0.069	0.054	-0.014
(9) Log (Size)	-0.047	0.159	0.168	0.001	-0.130	-0.013	0.199	-0.017		-0.207	0.052	-0.007	0.083
(10) Book-to-market	0.010	0.039	0.053	-0.017	0.074	0.095	0.004	-0.016	-0.180		-0.235	0.028	-0.076
(11) Log (Turnover)	0.043	-0.055	0.051	0.010	0.148	-0.073	-0.007	-0.065	0.044	-0.246		0.098	-0.013
(12) Michigan Sentiment	0.030	-0.026	0.047	0.039	0.094	-0.035	-0.024	0.068	-0.014	0.017	0.069		-0.052
(13) Positive Past Returns	-0.112	0.003	0.011	-0.012	-0.004	0.011	-0.002	-0.014	0.083	-0.072	-0.014	-0.049	

The Pearson (Spearman) correlation coefficients are reported above (below) the diagonal. Correlation coefficients significant at 1% level are bolded. The Appendix provides variable definitions.

Table 4
Determinants of the Momentum Recommendations

Panel A: Full sample		
	Dependent variable: ML Score	
Intercept	-5.33 (-3.00)	-7.19 (-2.32)
All-Star	-1.91 (-3.47)	-1.21 (-2.28)
Firm Experience	-1.05 (-7.55)	-1.01 (-7.99)
Not Rookie	-0.68 (-1.02)	-0.30 (-0.50)
Not Rookie *	56.84	-18.64
Past Forecast Error	(2.26)	(-0.77)
Log (NCompany)	0.58 (1.95)	0.60 (2.11)
Log (Broker Size)	1.24 (6.27)	1.39 (6.90)
I-Bank	0.98 (1.17)	0.59 (0.72)
Log (Size)		-1.00 (-6.18)
Book-to-market		5.64 (4.20)
Log (Turnover)		2.15 (5.11)
Michigan Sentiment		2.17 (2.18)
Positive Past Returns		-12.05 (-6.46)
Industry fixed effects	Yes	Yes
N	204,748	204,748
R ²	0.53%	2.02%

Panel B: Subsamples based on past returns and before or after 2002

Dependent variable: ML Score						
	Positive past returns	Negative past returns		2003 and after	2002 and before	
	(1)	(2)	(1) - (2)	(3)	(4)	(3) - (4)
Intercept	-24.51 (-6.72)	-1.54 (-0.32)		-17.55 (-5.00)	-8.60 (-2.67)	
All-Star	-1.38 (-1.46)	-0.90 (-1.34)		-1.43 (-2.17)	-1.98 (-2.60)	
Firm Experience	-0.18 (-1.07)	-1.71 (-7.88)	**	-0.34 (-2.84)	-0.96 (-4.60)	*
Not Rookie	-1.05 (-0.73)	0.31 (0.31)		-1.84 (-3.00)	1.69 (1.79)	**
Not Rookie *	11.19 (0.27)	-47.51 (-1.16)		-19.87 (-0.67)	9.46 (0.42)	
Past Forecast Error	-0.41 (-0.57)	1.44 (1.91)		0.53 (1.86)	-0.85 (-2.13)	**
Log (Broker Size)	0.38 (0.76)	2.27 (3.44)	*	0.40 (2.04)	1.63 (7.34)	**
I-Bank	0.21 (0.18)	0.87 (0.56)		1.46 (0.81)	-2.29 (-3.05)	*
Log (Size)	1.35 (7.68)	-3.05 (-12.67)	**	0.29 (2.19)	-1.41 (-8.39)	**
Book-to-market	4.93 (3.03)	5.33 (2.75)		5.39 (5.01)	9.14 (5.86)	
Log (Turnover)	0.67 (1.35)	3.32 (5.78)	**	1.73 (4.61)	4.19 (8.39)	**
Michigan Sentiment	3.78 (2.34)	0.75 (0.41)		3.26 (2.88)	0.06 (0.08)	
Positive Past Returns				-6.82 (-3.19)	-15.79 (-6.03)	*
Industry fixed effects	Yes	Yes		Yes	Yes	
N	97,751	106,997		99,346	105,402	
R ²	0.60%	2.06%		0.86%	3.78%	

Table 4 reports results from estimations of Eq. (1) where the dependent variable is ML Score. Panel A reports regression estimates for the full sample and Panel B across recommendations with positive versus negative past returns, and the period before 2003 versus the period during and after 2003. The Appendix provides variable definitions. The *t*-statistics are reported in parentheses. The *t*-statistics are based on robust standard errors clustered by company and calendar quarter. ** and * denote significance of differences in coefficients at 1% and 5% levels, based on a two-tailed test.

Table 5
Earnings Forecasts Accompanying Momentum Recommendations

Panel A: Descriptive statistics

		All	Positive past returns	Negative past returns		2003 and after	2002 and before	
			(1)	(2)	(1)-(2)	(3)	(4)	(3)-(4)
Absolute	Mean	0.0090	0.0076	0.0101	**	0.0096	0.0082	**
Forecast	Median	0.0028	0.0023	0.0033	**	0.0031	0.0024	**
Revision	N	78,943	35,547	43,396		44,028	34,915	
Absolute	Mean	0.0144	0.0122	0.0161	**	0.0154	0.0133	**
Forecast	Median	0.0039	0.0033	0.0043	**	0.0045	0.0032	**
Error	N	92,863	41,460	51,403		46,582	46,281	

Panel B: Descriptive statistics across ML quartiles

		Quartiles of ML score					
		[-100, -50]	[-50, 0]	[0, 50]	[50, 100]	(4)-(1)	(4)+(3)-(1)-(2)
		(1)	(2)	(3)	(4)		
Absolute	Mean	0.0091	0.0060	0.0067	0.0130	**	**
Forecast	Median	0.0028	0.0019	0.0023	0.0045	**	**
Revision	N	17,750	18,402	18,855	23,936		
Absolute	Mean	0.0161	0.0104	0.0113	0.0190	**	**
Forecast	Median	0.0044	0.0030	0.0031	0.0053	**	**
Error	N	19,943	22,548	23,281	27,091		

Panel C: Determinants of absolute forecast revision

	All observations		Positive past returns	Negative past returns	(3)-(4)	2003 and after	2002 and before	(5)-(6)
	(1)	(2)	(3)	(4)		(5)	(6)	
Intercept	0.932 (11.0)	0.734 (4.94)	0.421 (2.33)	0.834 (3.77)		0.734 (4.07)	1.193 (6.04)	
ML Score	0.003 (18.7)	0.003 (14.6)	0.001 (2.79)	0.004 (15.6)	**	0.003 (9.66)	0.002 (13.1)	
Forecast Horizon	0.001 (5.86)	0.001 (7.26)	0.001 (5.97)	0.002 (10.7)	**	0.001 (8.65)	0.001 (8.15)	
All-Star	-0.031 (-1.03)	0.032 (1.11)	0.036 (0.99)	0.032 (0.89)		0.076 (1.66)	-0.004 (-0.14)	
Firm Experience	-0.001 (-0.16)	0.017 (2.72)	0.018 (2.97)	0.018 (2.24)		0.010 (1.37)	0.024 (2.80)	
Not Rookie	-0.465 (-6.48)	-0.363 (-6.01)	-0.346 (-3.71)	-0.385 (-5.89)		-0.465 (-6.00)	-0.182 (-2.68)	**
Not Rookie * Past Forecast Error	36.66 (15.8)	25.15 (13.5)	22.52 (11.1)	27.38 (10.8)		29.04 (11.2)	16.57 (9.18)	**
Log (NCompany)	-0.030 (-1.70)	-0.072 (-4.46)	-0.090 (-4.98)	-0.055 (-2.49)		-0.063 (-2.79)	-0.093 (-4.21)	
Log (Broker Size)	-0.059 (-6.41)	-0.015 (-1.67)	-0.014 (-1.46)	-0.016 (-1.45)		-0.030 (-2.57)	0.018 (1.54)	**
I-Bank	-0.108 (-2.80)	-0.088 (-2.70)	-0.154 (-4.22)	-0.043 (-0.85)		-0.247 (-3.25)	-0.031 (-0.90)	*
Log (Size)		-0.206 (-17.5)	-0.169 (-13.2)	-0.230 (-16.8)	**	-0.219 (-11.0)	-0.207 (-19.8)	
Book-to-market		1.286 (14.7)	1.228 (8.41)	1.341 (13.8)		1.439 (13.0)	1.016 (10.7)	**
Log (Turnover)		0.144 (7.93)	0.169 (6.58)	0.121 (5.06)		0.142 (5.77)	0.075 (3.49)	
Michigan Sentiment		0.084 (2.67)	0.110 (2.96)	0.061 (1.36)		0.072 (1.62)	0.032 (0.84)	
Positive Past Returns		-0.108 (-3.03)				-0.056 (-1.07)	-0.197 (-7.21)	*
Industry fixed effects	Yes	Yes	Yes	Yes		Yes	Yes	
N	78,943	78,943	35,547	43,396		44,028	34,915	
R ²	5.84%	13.94%	13.18%	14.51%		15.31%	12.64%	

Panel D: Determinants of absolute forecast error

	All observations		Positive past returns	Negative past returns	(3)-(4)	2003 and after	2002 and before	(5)-(6)
	(1)	(2)	(3)	(4)		(5)	(6)	
Intercept	1.055 (5.23)	-0.668 (-1.60)	-0.686 (-1.64)	-0.803 (-1.52)	**	-1.329 (-2.50)	0.700 (2.25)	
ML Score	0.003 (10.5)	0.002 (6.67)	0.000 (0.01)	0.003 (7.83)	**	0.002 (3.96)	0.002 (6.54)	
Forecast Horizon	0.004 (11.8)	0.005 (19.6)	0.004 (20.6)	0.005 (15.4)		0.005 (13.6)	0.005 (18.2)	
All-Star	-0.076 (-1.85)	0.017 (0.44)	0.007 (0.14)	0.027 (0.50)		0.113 (1.58)	-0.045 (-1.19)	*
Firm Experience	-0.013 (-0.78)	0.009 (0.82)	0.002 (0.17)	0.018 (1.02)		-0.009 (-0.61)	0.013 (0.81)	
Not Rookie	-0.766 (-8.23)	-0.623 (-8.19)	-0.499 (-7.21)	-0.727 (-5.97)		-0.794 (-8.89)	-0.401 (-4.03)	**
Not Rookie * Past Forecast Error	63.26 (10.9)	44.47 (9.50)	38.40 (9.05)	49.21 (8.47)		58.36 (9.13)	29.30 (7.14)	**
Log (NCompany)	-0.065 (-2.48)	-0.119 (-5.22)	-0.110 (-3.13)	-0.124 (-4.05)		-0.107 (-2.82)	-0.129 (-4.47)	
Log (Broker Size)	-0.058 (-3.32)	-0.006 (-0.37)	-0.022 (-1.07)	0.006 (0.28)		-0.006 (-0.27)	0.024 (1.41)	
I-Bank	-0.162 (-2.69)	-0.174 (-3.61)	-0.193 (-2.82)	-0.160 (-2.60)		-0.224 (-1.33)	-0.078 (-1.93)	
Log (Size)		-0.288 (-17.3)	-0.258 (-15.6)	-0.309 (-15.0)	**	-0.287 (-11.6)	-0.320 (-15.6)	
Book-to-market		2.460 (12.6)	2.321 (13.9)	2.559 (10.2)		2.944 (10.8)	1.847 (11.2)	**
Log (Turnover)		0.416 (7.78)	0.413 (7.29)	0.411 (6.47)		0.472 (7.02)	0.227 (5.71)	*
Michigan Sentiment		0.321 (4.55)	0.290 (5.19)	0.336 (3.48)		0.411 (4.84)	0.159 (3.07)	*
Positive Past Returns		-0.160 (-3.72)				-0.121 (-2.38)	-0.211 (-3.70)	
Industry fixed effects	Yes	Yes	Yes	Yes		Yes	Yes	
N	92,863	92,863	41,460	51,403		46,582	46,281	
R ²	5.56%	13.45%	13.74%	13.19%		15.34%	12.68%	

Panel A reports descriptive statistics of annual earnings forecasts that are issued within +/- 10 days around the recommendation dates. Panel B compares the characteristics of forecasts across momentum quartiles. Panel C reports the results from estimations of Eq. (2) with absolute forecast revision as the dependent variable. Panel D reports the results from estimations of Eq. (2) with absolute forecast error as the dependent variable. The Appendix provides variable definitions. The *t*-statistics are reported in parentheses. The *t*-statistics are based on robust standard errors clustered by company and calendar quarter. ** and * denote significance of the differences in coefficient estimates at 1% and 5% levels respectively, based on a two-tailed test.

Table 6
Momentum Recommendations and Analysts' Use of Other Public Signals

Dependent variable: ML Score								
	All observations		Positive past returns	Negative past returns		2003 and after	2002 and before	
	(1)	(2)	(3)	(4)	(3)-(4)	(5)	(6)	(5)-(6)
Intercept	-10.98 (-4.58)	-14.94 (-4.31)	-10.24 (-1.95)	-31.15 (-6.49)		-21.98 (-4.79)	-11.11 (-2.42)	
All-Star	-1.06 (-2.08)	-1.59 (-1.29)	-13.50 (-7.00)	8.99 (4.96)	**	-4.42 (-2.24)	-0.70 (-0.43)	
Firm Experience	-0.97 (-7.76)	-0.29 (-0.98)	-4.72 (-8.94)	3.67 (6.92)	**	-0.09 (-0.21)	-0.11 (-0.20)	
Not Rookie	-0.56 (-0.97)	-0.08 (-0.05)	6.03 (2.40)	-5.45 (-2.47)	**	-3.24 (-1.51)	2.69 (1.56)	
Not Rookie * Past Forecast Error	-9.98 (-0.42)	286.10 (-4.99)	-202.95 (-2.68)	-323.93 (-4.02)		-238.24 (-2.61)	-322.64 (-4.57)	
Log (NCompany)	0.80 (3.07)	0.73 (0.69)	-2.17 (-1.19)	3.28 (2.24)	*	-0.85 (-0.50)	1.29 (1.07)	
Log (Broker Size)	1.19 (6.72)	2.50 (3.90)	0.93 (0.87)	4.21 (4.38)	*	2.50 (2.59)	2.13 (2.88)	
I-Bank	0.70 (0.92)	1.81 (1.09)	4.16 (1.39)	0.33 (0.14)		4.36 (0.67)	-0.39 (-0.24)	
Log (Size)	-0.81 (-5.28)	-0.80 (-5.26)	1.36 (7.65)	-2.54 (-11.5)	**	0.39 (3.08)	-1.18 (-6.84)	**
Book-to-market	5.13 (4.21)	5.11 (4.24)	4.92 (3.05)	4.43 (2.82)		5.22 (5.29)	7.55 (5.23)	
Log (Turnover)	1.89 (4.83)	1.90 (4.87)	0.66 (1.33)	2.59 (5.32)	*	1.70 (4.59)	3.44 (7.49)	**
Michigan Sentiment	2.21 (2.37)	2.20 (2.36)	3.77 (2.36)	0.84 (0.51)		3.29 (2.87)	-0.09 (-0.12)	
Positive Past Returns	-11.34 (-6.37)	-11.32 (-6.38)				-6.61 (-3.18)	-14.49 (-5.83)	**
Follow Financials (FF)	4.52 (12.6)	6.03 (5.57)	-4.52 (-2.56)	15.52 (11.9)	**	4.37 (2.94)	7.31 (5.02)	**
Follow Analysts (FA)	0.20 (16.0)	0.24 (7.74)	0.00 (0.02)	0.43 (11.2)	**	0.14 (4.17)	0.42 (10.56)	**
FF * All-Star		0.24 (0.54)	4.92 (6.56)	-3.84 (-5.98)	**	1.25 (1.83)	-0.33 (-0.62)	
FF * Firm Experience		-0.24 (-1.98)	1.81 (8.72)	-2.00 (-10.4)	**	-0.09 (-0.58)	-0.31 (-1.38)	

(Table continued)

FF *	-0.19	-2.81	2.11	**	0.52	-0.56	
Not Rookie	(-0.35)	(-3.33)	(2.87)		(0.62)	(-0.78)	
FF * Not Rookie *	106.08	84.93	111.35		86.45	125.87	**
Past Forecast Error	(4.86)	(3.03)	(3.67)		(2.40)	(5.20)	
FF *	0.05	0.71	-0.53		0.60	-0.56	
Log (NCompany)	(0.11)	(1.02)	(-1.05)		(0.89)	(-1.19)	
FF *	-0.53	-0.24	-0.93		-0.87	-0.31	
Log (Broker Size)	(-2.07)	(-0.67)	(-3.04)		(-2.29)	(-1.21)	
FF *	-0.56	-1.81	0.27		-1.07	-0.64	
I-Bank	(-1.00)	(-1.72)	(0.34)		(-0.46)	(-1.18)	
FA *	-0.01	0.01	-0.01		0.01	-0.04	*
All-Star	(-1.12)	(0.37)	(-0.84)		(0.92)	(-2.97)	
FA *	-0.01	0.01	-0.03	**	0.00	-0.01	
Firm Experience	(-4.32)	(1.88)	(-5.23)		(-0.66)	(-1.73)	
FA *	-0.01	0.00	-0.03		-0.02	0.01	
Not Rookie	(-0.45)	(0.09)	(-1.33)		(-1.39)	(0.68)	
FA * Not Rookie *	1.59	0.94	2.14		1.93	1.85	
Past Forecast Error	(2.91)	(1.09)	(2.87)		(2.93)	(2.24)	
FA *	-0.01	0.01	-0.02		0.01	-0.06	**
Log (Ncompany)	(-1.63)	(0.55)	(-2.13)		(0.82)	(-6.45)	
FA *	0.00	0.00	0.00		0.00	-0.00	
Log (Brokersize)	(1.03)	(0.11)	(0.57)		(-1.05)	(-0.07)	
FA *	0.06	0.15	-0.03	**	-0.01	0.01	
I-Bank	(3.18)	(5.00)	(-1.20)		(-0.22)	(0.62)	
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	
N	204,748	204,748	97,751	106,997	99,346	105,402	
R ²	5.89%	6.02%	1.49%	13.40%	3.23%	9.54%	

Table 6 examines analysts' use of other public signals in relation to their momentum strategy in issuing recommendations. *Follow Financials* and *Follow Analysts* are the independent variables of interest. *Follow Financials* (FF) is a combined financial signal gauging how strongly the recommendation revisions conform to the financial ratios. *Follow Analysts* (FA) is the standardized rank of the percentage of other recommendation revisions issued during the past six months that match with the recommendation revision. The Appendix provides variable definitions. The *t*-statistics are reported in parentheses. The *t*-statistics are based on robust standard errors clustered by company and calendar quarter. ** and * denote significance of the differences in coefficient estimates at 1% and 5% levels respectively, based on a two-tailed test.

Table 7
Market Reaction to Momentum Recommendations

Panel A: Descriptive statistics								
	All observations	Positive past returns	Negative past returns		2003 and after	2002 and before		
		(1)	(2)	(1)-(2)	(3)	(4)	(3)-(4)	
Conforming Returns	Mean	0.0323	0.0244	0.0395	**	0.0338	0.0309	**
	Median	0.0178	0.0149	0.0208	**	0.0216	0.0137	**
	N	204,748	97,751	106,997		99,346	105,402	

Panel B: Descriptive statistics across ML quartiles							
	Quartiles of ML score						
	[-100, -50]	[-50, 0]	[0, 50]	[50, 100]			
	(1)	(2)	(3)	(4)	(4)-(1)	(4)+(3)-(2)-(1)	
Conforming Returns	Mean	0.0322	0.0234	0.0265	0.0462	**	**
	Median	0.0193	0.0144	0.0152	0.0252	**	**
	N	49,473	52,061	48,869	54,345		

Panel C: Determinants of conforming returns

	All observations		Positive past returns	Negative past returns	(3)-(4)	2003 and after	2002 and before	(5)-(6)
	(1)	(2)	(3)	(4)		(5)	(6)	
Intercept	-0.121 (-0.29)	2.576 (3.91)	1.597 (3.35)	2.381 (2.58)		5.976 (9.03)	0.230 (0.27)	
ML Score	0.009 (7.36)	0.006 (5.77)	-0.003 (-2.12)	0.015 (6.85)	**	0.007 (4.76)	0.007 (4.21)	
All-Star	-0.289 (-2.96)	0.108 (1.12)	0.168 (1.88)	0.056 (0.41)		0.256 (2.54)	0.028 (0.21)	
Firm Experience	-0.013 (-0.40)	0.080 (3.23)	0.108 (4.80)	0.077 (2.46)		0.044 (2.64)	0.083 (1.68)	
Not Rookie	0.504 (5.45)	0.556 (7.49)	0.401 (5.02)	0.702 (6.15)	*	0.467 (4.59)	0.633 (6.03)	
Not Rookie * Past Forecast Error	27.91 (6.00)	6.33 (2.02)	7.39 (2.16)	6.44 (1.54)		8.03 (1.83)	3.23 (0.93)	
Log (NCompany)	-0.352 (-4.73)	-0.331 (-4.89)	-0.249 (-4.48)	-0.439 (-4.58)	*	-0.322 (-3.56)	-0.318 (-3.15)	
Log (Broker Size)	0.571 (8.99)	0.696 (11.1)	0.529 (10.8)	0.831 (9.80)	**	0.517 (8.03)	0.950 (9.59)	**
I-Bank	-0.265 (-1.67)	-0.389 (-2.71)	-0.336 (-2.32)	-0.421 (-2.33)		0.169 (0.45)	-0.282 (-1.97)	
Log (Size)		-0.684 (-18.3)	-0.535 (-14.7)	-0.784 (-17.2)	**	-0.871 (-28.6)	-0.552 (-12.8)	**
Book-to-market		-1.055 (-5.63)	-0.510 (-2.81)	-1.650 (-6.86)	**	-0.791 (-4.17)	-1.226 (-5.84)	
Log (Turnover)		0.766 (14.8)	0.501 (10.9)	0.968 (14.5)	**	0.483 (8.17)	0.837 (10.7)	**
Michigan Sentiment		0.571 (3.90)	0.431 (3.66)	0.752 (3.96)	*	0.487 (3.24)	0.742 (2.89)	
Positive Past Returns		-1.174 (-14.4)				-1.171 (-11.1)	-1.234 (-12.4)	
Industry fixed effects	Yes	Yes	Yes	Yes		Yes	Yes	
N	204,748	204,748	97,751	106,997		99,346	105,402	
R ²	2.12%	4.87%	3.33%	5.53%		4.91%	5.78%	

Panel D: ML as determinant of conforming returns

	All observations		Positive past returns	Negative past returns	2003 and after	2002 and before
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.109 (-0.26)	2.427 (3.70)	1.596 (3.34)	2.212 (2.51)	5.885 (9.18)	0.144 (0.17)
ML Score	0.006 (1.88)	0.018 (2.89)	-0.005 (-0.77)	0.020 (2.14)	0.037 (6.60)	0.010 (1.22)
All-Star	-0.288 (-2.96)	0.105 (1.09)	0.179 (2.12)	0.056 (0.45)	0.262 (2.69)	0.036 (0.27)
Firm Experience	-0.013 (-0.40)	0.087 (3.69)	0.110 (4.87)	0.079 (2.62)	0.048 (2.86)	0.092 (2.00)
Not Rookie	0.496 (5.40)	0.543 (7.15)	0.392 (5.09)	0.631 (5.74)	0.467 (4.65)	0.616 (5.63)
Not Rookie * Past Forecast Error	27.98 (6.01)	6.82 (2.25)	7.15 (2.21)	6.80 (1.78)	8.11 (1.89)	3.64 (1.07)
Log (NCompany)	-0.352 (-4.77)	-0.341 (-4.93)	-0.242 (-4.56)	-0.434 (-4.89)	-0.327 (-3.69)	-0.337 (-3.23)
Log (Broker Size)	0.569 (9.08)	0.685 (10.8)	0.531 (10.9)	0.813 (10.5)	0.519 (8.20)	0.922 (8.94)
I-Bank	-0.266 (-1.69)	-0.390 (-2.71)	-0.317 (-2.19)	-0.402 (-2.33)	0.169 (0.44)	-0.265 (-1.88)
Log (Size)		-0.659 (-17.6)	-0.537 (-14.7)	-0.768 (-17.3)	-0.861 (-28.4)	-0.523 (-12.4)
Book-to-market		-1.038 (-5.64)	-0.446 (-2.38)	-1.291 (-5.84)	-0.793 (-4.19)	-1.159 (-5.65)
Log (Turnover)		0.751 (15.4)	0.494 (10.6)	0.940 (14.8)	0.484 (8.39)	0.800 (11.0)
Michigan Sentiment		0.581 (3.94)	0.427 (3.70)	0.709 (3.92)	0.474 (3.09)	0.783 (3.18)
Positive Past Returns		-1.150 (-14.6)			-1.188 (-10.7)	-1.167 (-12.4)
ML * All-Star	-0.009 (-0.06)	0.095 (0.64)	0.150 (0.97)	0.080 (0.27)	0.354 (2.14)	-0.014 (-0.07)
ML * Firm Experience	-0.109 (-2.42)	-0.029 (-0.77)	0.091 (2.56)	-0.143 (-1.96)	0.012 (0.36)	-0.156 (-2.57)
ML * Not Rookie	0.428 (3.11)	0.330 (2.33)	-0.117 (-0.72)	0.733 (3.53)	0.402 (2.11)	0.256 (1.30)
ML * Not Rookie * Past Forecast Error	-4.64 (-0.74)	-3.09 (-0.51)	-3.27 (-0.50)	-0.98 (-0.10)	-4.81 (-0.57)	-2.82 (-0.40)

(Table continued)

ML *	-0.194	-0.166	0.018	-0.304	-0.316	0.037
Log (NCompany)	(-2.77)	(-2.34)	(0.24)	(-2.70)	(-3.70)	(0.39)
ML *	0.197	0.185	-0.016	0.307	0.081	0.267
Log (Broker Size)	(3.45)	(2.95)	(-0.32)	(2.74)	(1.35)	(2.83)
ML * I-Bank	0.107	0.028	0.472	-0.252	0.086	0.067
	(0.56)	(0.15)	(1.95)	(-0.91)	(0.15)	(0.34)
ML * Log (Size)		-0.120	-0.061	-0.149	-0.269	-0.045
		(-3.65)	(-1.30)	(-2.84)	(-6.81)	(-1.20)
ML * Book-to-market		-0.709	2.098	-3.070	-0.096	-0.990
		(-2.81)	(6.65)	(-7.23)	(-0.36)	(-2.49)
ML * Log (Turnover)		0.106	-0.108	0.316	0.022	0.068
		(1.42)	(-1.34)	(2.45)	(0.27)	(0.64)
ML *		0.050	-0.261	0.422	-0.255	0.337
Michigan Sentiment		(0.26)	(-0.96)	(1.72)	(-1.11)	(1.29)
ML *		-1.818			-1.451	-2.244
Positive Past Returns		(-6.29)			(-3.29)	(-6.94)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	204,748	204,748	97,751	106,997	99,346	105,402
R ²	2.17%	5.14%	3.52%	5.76%	5.27%	5.78%

Table 7 examines the market-adjusted returns during the three days around the recommendation dates. Panel A reports descriptive statistics of *Conforming Returns*. Panel B compares *Conforming Returns* across momentum quartiles. Panel C reports the results from estimations of Eq. (4) with *Conforming Returns* as the dependent variable. Panel D reports the results from estimations of Eq. (5) with *Conforming Returns* as the dependent variable. *Conforming Returns* is market-adjusted returns from one day before to one day after the recommendation date multiplied by +1 if the recommendation revision is an upgrade, and -1 if the recommendation revision is a downgrade. The Appendix provides variable definitions. The *t*-statistics are reported in parentheses. The *t*-statistics are based on robust standard errors clustered by company and calendar quarter. ** and * denote significance of the differences in coefficient estimates at 1% and 5% levels respectively, based on a two-tailed test.