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Why are recommendations optimistic? Evidence from analysts' coverage initiations

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Abstract We examine the long-term stock performance of analyst recommendations and the properties of accompanied earnings forecasts for initiations and non-initiations to evaluate the reporting, selection, and processing explanations for analyst optimism. We find that *Strong Buy* and, to a lesser degree, *Buy* initiation recommendations underperform their non-initiation counterparts after controlling for analyst, brokerage, and firm characteristics associated with the initiation decision and expected long-term stock returns. Yet, earnings forecasts accompanying *Strong Buy* and *Buy* initiation recommendations are less optimistic and more accurate than those accompanying non-initiation recommendations. Our findings suggest that conflicts of interest (that is, the reporting explanation) are the dominant source for favorable recommendations.

Keywords Analysts · Conflicts of interest · Selection bias · Coverage initiations

JEL Classification G29 · G12 · G14

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1 Introduction

Sell-side analysts are known to issue optimistic recommendations.[1] There are three distinct yet not mutually exclusive explanations for this optimism. First, analysts bias their recommendations upward to generate investment banking business and trading commissions and to gain access to management (the reporting explanation) (Francis and Philbrick 1993; Lin and McNichols 1998; Irvine 2004). Second, analysts issue recommendations when they hold truly favorable and rational opinions that are supported by future company events (the selection explanation) (McNichols and O'Brien 1997; Hayes 1998; Das et al. 2006). Third, analysts issue recommendations when they hold truly favorable but irrational opinions that are *not* supported by future company events (the processing explanation).[2] In this paper we examine the long-term stock performance of recommendations and the properties of accompanying earnings forecasts to determine the dominant explanation.

The reporting, selection, and processing explanations have different predictions for the long-term performance of recommendations and the properties of accompanying earnings forecasts. For example, the reporting and processing explanations (but not the selection explanation) predict lower stock returns after optimistic recommendations. However, researchers cannot distinguish between the three explanations by observing subsequent returns in the population of recommendations, because recommendation levels themselves convey new information to the market in addition to any reporting/selection/processing bias introduced by analysts (Womack 1996; Barber et al. 2001). Given this fundamental issue, we focus on initiation recommendations, defined as an individual analyst's first recommendation for a company, and compare them to non-initiation recommendations. The non-initiations serve as a benchmark to capture the information conveyed by the recommendation levels themselves. Our approach is similar in spirit to studies that examine the optimism in affiliated analysts' recommendations using unaffiliated analysts' recommendations as a benchmark (for example, Kolasinski and Kothari 2008; Malmendier and Shanthikumar 2009). Our setting is more general, because unlike the affiliated/unaffiliated setting, (1) the initiation sample is not constrained to recommendations issued around specific corporate events, such as IPOs, SEOs, and M&As, and (2) potential conflicts of interest are not limited to those stemming from affiliation but also include those stemming from incentives to generate *future* investment banking business, trade commissions, and access to management.

The distribution of initiations is more favorable than that of non-initiations (McNichols and O'Brien 1997), suggesting that at least one of the three explanations (reporting, selection, processing) must manifest more for initiations

[1] Throughout the paper we use "optimistic" and "optimism" to refer to the ex ante optimism in recommendations, i.e., the skewness towards favorable opinions. Approximately 25 and 32% of recommendations in I/B/E/S over the 1994 through 2006 period fall in the *Strong Buy* and *Buy* categories, respectively, compared with only 4% in the *Sell* and 2% in the *Strong Sell* categories. The remainder, about 37%, is *Hold* recommendations (see Fig. 1).

[2] The literature uses various terms for the three explanations. For example, reporting and processing explanations are also referred to as "conflicts of interest" and "selection bias with winners' curse" explanations, respectively. We borrow the terminology from Francis (1997).

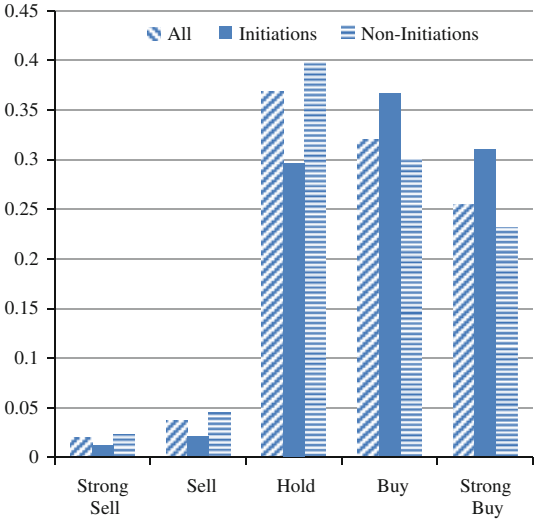

Fig. 1 Distribution of recommendations. The figure reports the distribution of recommendations in the I/B/E/S database issued for US firms over the 1994–2007 period as well as the initiation and non-initiation subsamples

than for non-initiations.[3] To determine the dominant explanation, we test the different predictions of these explanations for the long-term performance of initiations and the properties of the earnings forecasts accompanying initiations. We start with predictions about long-term stock performance after the initiations. If, as the reporting explanation suggests, analysts bias their initiation recommendations upward and if investors do not fully see through this distortion, then initiations should underperform non-initiations when analysts' unjustified optimism unravels in the subsequent periods. Similarly, if, as the processing explanation suggests, analysts make truthful but irrationally optimistic recommendations, then initiations should underperform non-initiations. In contrast, if, as the selection explanation suggests, analysts' rational and favorable opinions bear out in subsequent periods and investors do not fully incorporate analysts' view, then initiations should outperform non-initiations.

The reporting, selection, and processing explanations also have different predictions on the properties of earnings forecasts accompanying initiations. The reporting explanation suggests that analysts are unlikely to sacrifice earnings forecast accuracy given its verifiable nature and the importance of forecast accuracy for their reputation and career outcomes (Hong and Kubik 2003; Leone and Wu 2007). With conflicts of interest, analysts may even issue pessimistic forecasts to help companies meet or beat earnings expectations (Ke and Yu 2006; Baik and Yi 2007; Malmendier and Shanthikumar 2009). Therefore, the reporting explanation predicts that forecasts accompanying initiations are at least as accurate as and no more optimistically biased than those accompanying non-initiations. Similarly, the selection explanation predicts that analysts' favorable expectations will be justified via accurate and not-optimistically biased forecasts. In contrast, the processing

[3] Figure 1 displays the distribution of initiations and non-initiations. *Strong Buy* recommendations comprise 30.92% (23.19%) of initiations (non-initiations), and *Buy* recommendations comprise 36.52% (30.12%) of initiations (non-initiations). Pearson χ^2 suggests that distributions differ (p-value <0.001).

Table 1 Summary of predictions

	Predictions: initiations versus non-initiations		
Explanation for optimism	Long-term returns	Earnings forecast accuracy	Earnings forecast bias
Reporting	Underperform	As accurate or more accurate	Not more optimistically biased
Selection	Overperform	As accurate or more accurate	Not more optimistically biased
Processing	Underperform	Less accurate	More optimistically biased

explanation suggests that analysts' biases should affect recommendations and forecasts similarly (Malmendier and Shanthikumar 2009); that is, forecasts accompanying initiations should be less accurate and more optimistically biased than those accompanying non-initiations. Table 1 summarizes our predictions. As is evident in Table 1, neither long-run returns nor the properties of forecasts are sufficient on their own to differentiate between the three explanations, calling for a joint analysis of recommendations and the accompanying earnings forecasts.

We implement three research designs in the paper. The first one is a regression framework with controls for analyst, brokerage, and firm characteristics that may affect the initiation decision as well as the expected returns to recommendations, forecast accuracy, and optimism.[4] The second approach is a propensity score matched pair research design (Rosenbaum and Rubin 1983), which enables us to match initiations with non-initiations along multiple analyst, broker, and firm characteristics. The third approach is an analyst and recommendation level match design whereby we match each initiation recommendation with an outstanding same-level non-initiation recommendation issued by the same analyst. Using a comprehensive sample of favorable recommendations (*Strong Buys* and *Buys*) issued between 1994 and 2006, we find that initiation recommendations underperform their non-initiation counterparts. There is uniformly strong evidence of underperformance for *Strong Buys* (about 4% per year), but the evidence is mixed for *Buys*. We also find that the accompanying earnings forecasts are more accurate and display lower ex post optimism for initiations than for non-initiations. Collectively, these results support the reporting explanation but not the selection and processing explanations.

We complement our main tests with several additional analyses. First, we consider one specific type of reporting incentive—the importance of investment banking operations to the brokerage house. Selection and processing biases should not vary with the importance of investment banking business while reporting bias should. We find that the underperformance of *Strong Buy* initiations is stronger for top-tier investment banks. Moreover, *Buy* initiations issued by top-tier investment banks underperform non-initiation *Buys*. Accompanying earnings forecasts are more

[4] We focus on long-term rather than short-term performance, because the short-term reaction to recommendations is often incomplete (Womack 1996) and, for initiations, may also reflect the benefits (to the company) of improved liquidity and increased visibility (Irvine 2003).

accurate and less optimistic for initiations regardless of the importance of investment banking business. Second, we compare long-term operating performance of initiations with that of non-initiations. We find some evidence that firms with *Strong Buy* initiations have poorer future operating performance, suggesting that the relative optimism in the *Strong Buy* initiations is unjustified. Finally, we study returns around subsequent earnings announcements and find that initiation underperformance is concentrated around subsequent earnings announcement dates. In sum, complementary analyses lend support to the reporting explanation but not the other two.

Our paper has implications for academics, investors, and regulators. We add to the academic literature on the causes of analyst optimism by showing in a general setting that reporting incentives are the dominant force for the optimism in recommendations. We show that the underperformance of initiations is not limited to recommendations issued by top-tier banks, suggesting that reporting incentives go much beyond investment banking business, which is the typical focus of the prior literature (Kolasinski and Kothari 2008; Malmendier and Shanthikumar 2009). Also, we provide a new comparison for more versus less optimistic recommendations (initiations vs. non-initiations), augmenting the widespread affiliated/unaffiliated distinction. From an investor perspective, we show that favorable initiations underperform the same-level non-initiation recommendations with comparable analyst, brokerage, and firm characteristics. This evidence may help investors, who, at times, rely naïvely on recommendations (Malmendier and Shanthikumar 2007; Mikhail et al. 2007), to make better investment decisions. Additionally, optimistic recommendations are accompanied by more accurate earnings forecasts, suggesting that analyst earnings forecasts are especially useful in coverage initiations. Finally, our evidence that the more optimistic initiations are not valuable to investors should be useful for regulators, who strive to curb biased recommendations in an effort to protect investors.

The paper proceeds as follows. Section 2 reviews related literature and develops our predictions. Section 3 describes the sample. Section 4 presents the main empirical evidence. Section 5 presents the results for supplementary analyses. Section 6 concludes.

2 Related literature and predictions

Prior research puts forward three broad explanations for the optimism in analyst recommendations. First, the reporting explanation argues that various incentives, such as generating investment banking deals, gaining access to management as a source of information, and generating trading commissions for the brokerage, motivate analysts to knowingly issue overly optimistic recommendations. Dugar and Nathan (1995) and Lin and McNichols (1998), among many others, show that recommendations issued by affiliated analysts are more favorable than those issued by unaffiliated analysts, underlining the role of incentives to generate investment banking deals. Similarly, Barber et al. (2007) show that favorable recommendations of investment banks underperform those of independent research firms. Mola and

Guidolin (2009) find that analysts assign frequent and favorable ratings to a stock after the analysts' affiliated mutual funds invest in that stock. Chen and Matsumoto (2006) find that analysts issuing favorable recommendations experience a greater increase in their relative forecast accuracy. Mayew (2008) shows that downgrades in recommendations are associated with decreases in analysts' access to management during earnings conference calls. The evidence in the last two studies is consistent with the hypothesis that analysts selectively receive management-provided information in exchange of issuing favorable recommendations. Finally, Irvine (2004) finds that *Buy* and *Strong Buy* recommendations allow brokerage firms to capture significantly higher market share of trading and thus higher trading commissions.

The second explanation for analyst optimism is selection, which posits that analysts follow companies for which they have truly favorable opinions and that these opinions are supported by future company events. Hayes (1998) provides the initial theoretical background for this explanation. One implication of her model is that analysts initiate (drop) coverage on stocks they expect to perform well (poorly). Using a proprietary dataset of analyst reports over the 1987 through 1994 period, McNichols and O'Brien (1997) demonstrate that (1) the distribution of initiation recommendations is more favorable than recommendations of continued coverage and that (2) the distribution of recommendations prior to analysts' decisions to drop coverage is less favorable than other recommendations. In univariate tests, McNichols and O'Brien (1997) also find that 1-year-ahead industry-adjusted return on equity is higher (lower) for initiations (dropped stocks), suggesting that analysts report recommendations and forecasts selectively based on whether their views about a firm are favorable. Das et al. (2006) develop a model of analyst coverage for IPO firms and show that firms with unexpectedly high levels of analyst coverage experience greater post-coverage returns and better long-run operating performance.

The third explanation for analyst optimism is processing, which posits that analysts follow companies for which they have truly positive opinions (as in selection) but that these opinions are the result of biases and therefore future events do not support these optimistic opinions. Inconsistent with the notion of rational forecasts of market experts in an efficient market, there is evidence that analysts misinterpret new information either by underreacting or overreacting to it. For example, Easterwood and Nutt (1999) show that analysts underreact to bad news and overreact to good news, resulting overly optimistic earnings forecasts.

Two recent studies examine the reporting and selection bias explanations using affiliated versus unaffiliated analysts' recommendations. Kolasinski and Kothari (2008) find that analysts affiliated with acquirer advisors upgrade acquirer stocks around M&A deals, even in the case of all-cash deals for which selection bias is less likely to play a role. Malmendier and Shanthikumar (2009) find that affiliated analysts issue optimistic recommendations but do not display similar optimism in their forecasts. They conclude that affiliated analysts strategically bias their recommendations but not their forecasts. Both studies suggest the reporting incentives dominate analysts' decision for recommendation optimism for affiliated analysts.

We build on prior research and explore the reason for favorable recommendations in *general*. We use coverage initiations as our setting and focus on the future

performance implications of initiation recommendations and on the properties of the accompanying earnings forecasts. Our choice is based on the observation that the initiation setting is much broader than the traditional investment banking affiliation setting. Initiation decisions are relevant for all brokers and stocks, while the affiliation setting is constrained to a short period around specific corporate events such as IPOs, SEOs, and M&As. Additionally, analyst optimism is likely to exist even for analysts/brokerages without any investment banking business.

We do not take an ex ante position as to which explanation (reporting, selection, or processing) drives the relative optimism of initiation recommendations. According to the reporting explanation, analysts face greater incentives for biasing their initiations. For example, pending benefits from trading commissions may be higher for initiations than for non-initiations. The increased visibility around the coverage initiation of a firm is likely to boost trading in the firm's stock by that brokerage (Irvine 2001). Analysts may also believe that the likelihood of maintaining or capturing investment banking business through favorable recommendations is higher around initiations.[5] This may be the case particularly if the relationship between the investment bank and the client firm is fragile in the early days of coverage.[6] Additionally, analysts may be motivated to issue favorable recommendations for initiations due to greater potential benefits of access to management—analysts likely have less information about, and weaker ties with, the management of initiation firms relative to those in their existing portfolio. Finally, the analyst's employer may receive research guarantees from other brokerages through initiations. Research guarantees are direct payments from one brokerage house (Brokerage A) to another (Brokerage B) in exchange for Brokerage B's initiating and keeping favorable coverage for a company with which Brokerage A maintains investment banking relations.[7]

Selection and processing explanations also suggest higher optimism for initiation recommendations. According to the selection explanation, start-up costs such as preliminary research and a higher uncertainty about future performance result in analysts' applying higher thresholds of future expected performance to initiate coverage than to continue coverage. Therefore, analysts start coverage with more favorable recommendations (McNichols and O'Brien 1997; Das et al. 2006). Under the processing explanation, the more uncertain characteristics of the initiation companies, coupled with higher expected performance thresholds to start coverage, will exacerbate the biases and result in overwhelmingly favorable recommendations

[5] Ljungqvist, Marston, and Wilhelm (2006) find that, while analyst behavior does not influence the likelihood of analysts' employers being awarded underwriting business, analysts appear to inflate their recommendations when potential investment banking related income is at stake.

[6] Krigman et al. (2001) document that nearly one-third of the firms that completed a seasoned equity offering within 3 years of their initial public offering in the 1993 through 1995 period, switched to a new underwriter in their following deal. They also find that research coverage is one of the top reasons firms switch underwriters.

[7] Research guarantees were one of the activities that were recently under the scrutiny of the SEC in the context of the Global Analyst Research Settlement in which 12 major investment banks agreed to pay approximately $1.4 billion while not acknowledging any wrongdoing.

for companies of initiation. In other words, analysts will err in optimism more strongly for companies with less public information.[8]

The three explanations lead to different predictions on the long-term performance of initiations to the extent that investors do not react fully to the information content of recommendations (Womack 1996; Barber et al. 2001; Jegadeesh et al. 2004). The reporting explanation suggests that analysts apply a lower threshold for expected performance to issue an initiation recommendation versus a non-initiation recommendation. Therefore, everything else equal, initiations should underperform non-initiations. In contrast, the selection explanation suggests that initiations outperform non-initiations because analysts apply a higher threshold for expected performance. Finally, the processing explanation suggests that initiations underperform non-initiations, because initiations are not justified ex post.

The three explanations also have different predictions for the properties of forecasts accompanying the initiation recommendations. The reporting explanation suggests that analysts bias their recommendations but are unlikely to knowingly sacrifice the accuracy of their forecasts (relative to those of their peers), given that forecast accuracy is easily verifiable and linked more strongly to career outcomes (Hong and Kubik 2003; Jackson 2005; Leone and Wu 2007). Conflicts of interest may even motivate analysts to issue pessimistic rather than optimistic earnings forecasts so that the companies can meet or beat earnings expectations (Ke and Yu 2006). Therefore, under the reporting explanation, we expect the earnings forecasts that accompany initiations to be at least as accurate as and not more optimistic than those that accompany non-initiations. Similarly, the selection explanation suggests that analysts' truthful and accurate opinions result in accurate forecasts, implying that analysts' earnings forecasts are equally accurate between initiations and non-initiations. The processing explanation suggests that analysts' truthful and favorable opinions are not supported by future events. This optimistic processing bias should apply to both recommendations and earnings forecasts (Malmendier and Shanthikumar 2009), indicating that analysts' earnings forecasts are less accurate and more optimistic for initiations than for non-initiations.

3 Sample

We obtain all analyst recommendations issued between October 1993 and September 2006 from the I/B/E/S detail files.[9] We exclude recommendations issued for ADRs, closed-end funds, REITs, and penny stocks (companies with stock prices of less than $1 and market capitalizations of less than $5 million). Following

[8] Baker and Wurgler (2007) argue that valuation mistakes are more likely in small, young, and growth companies.

[9] Malmendier and Shanthikumar (2007) report that I/B/E/S data contain an unusually high number of recommendations during the first 3 months (starting from October 1993) and focus on the period starting from February 1994 to avoid potential issues with the consistency of the early data. The earliest recommendation in our final sample dates from May 2, 1994, because, as we explain below, we exclude all recommendations within the first 6 months of an analyst's appearance on the I/B/E/S recommendation tape from our sample.

McNichols and O'Brien (1997) and Irvine (2003), we define recommendations issued within the first 6 months of an analyst's appearance in I/B/E/S as the analyst's "original" coverage and exclude these observations from our analyses (73,767 observations). For our main variable of interest, we define an analyst's first recommendation for a specific company issued at least 6 months *after* her appearance in I/B/E/S as her "initiation" coverage (97,164 observations).[10] We denote the remaining recommendations, that is, recommendations made after the first 6 months of the analyst's appearance for companies that she has been already covering, as "non-initiation" coverage (232,300 observations). We exclude unfavorable recommendations (that is, *Hold*, *Sell*, and *Strong Sell*) and recommendations for which the control variables are missing, resulting in a sample of 135,531 favorable recommendations (that is, *Strong Buy* and *Buy*). This final sample is comprised of 60,145 *Strong Buy* (18,430 initiations and 41,715 non-initiations) and 75,386 *Buy* (21,975 initiations and 53,411 non-initiations) recommendations.[11]

4 Results

4.1 Long-run returns to initiation and non-initiation recommendations

Long-run returns to recommendations vary with analyst, brokerage, and firm characteristics such as analyst's stock-picking ability, broker resources, firm size, and growth options. Similarly, analysts' decisions to initiate coverage may be associated with analyst, brokerage, and firm characteristics. To isolate the relation between long-run returns and initiations, we adopt a regression approach in which we control for various analyst, brokerage, and firm characteristics. We estimate the following ordinary least squares regression using recommendation-level data, with

[10] McNichols and O'Brien (1997) also treat multiple initiations that occur on a single date after the first 6 months of analysts' tenure as "original" coverage, because such initiations may represent changes in analysts' assignments. We treat these observations as "initiations" for two reasons. First, multiple initiations may also reflect the now-experienced analyst's decision to add several (related) companies to her portfolio. Second, multiple initiations may be due to I/B/E/S lumping together analysts' recommendations that are a few days apart from each other, especially in the earlier years of the database (Clement and Tse 2005; Frankel, Kothari, and Weber 2006). Multiple initiations constitute less than 1% of the initiations in our sample, and our results are qualitatively similar when we treat these initiations as "original" coverage.

[11] In 2002, some brokerage houses switched from the five-tier system to a three-tier system, which combines *Strong Buy* and *Buy* recommendations (Kadan et al. 2009). I/B/E/S continues to translate these recommendations into a five-tier system. We analyze a random sample of brokers' original recommendations and I/B/E/S' translations and find that I/B/E/S somewhat arbitrarily translates *Buy* recommendations in a three-tier system to *Buy* or *Strong Buy* recommendations in a five-tier system. The only pattern we observe is that *Buy*s of some brokerage houses are more often than not translated as *Strong Buy*s, while those of other brokerage houses are predominantly translated as *Buy*s. This switch adds noise or measurement error to our coding of *Strong Buy* and *Buy* recommendations. In untabulated analysis, we find that our results are similar if we only use the pre-2002 period.

standard errors clustered by firm, for the pooled sample of *Strong Buy* and *Buy* and separately for *Strong Buy* and *Buy* recommendations[12]:

$$\begin{aligned} Returns = {} & \alpha_0 + \alpha_1 Initiation + \alpha_2 All\text{-}Star + \alpha_3 \ln(Broker\ age\ Size) + \alpha_4 Experience \\ & + \alpha_5 Number\ of\ Firms + \alpha_6 Revision\ Time + \alpha_7 \ln(Size) \\ & + \alpha_8 Book\text{-}to\text{-}Market + \alpha_9 Sales\ Growth + \alpha_{10} Return\ on\ Assets \\ & + \alpha_{11} Past\ Returns + \alpha_{12} Analyst\ Following + \alpha_{13} IPO \\ & + Year\ Fixed\ Effects + \upsilon \end{aligned} \quad (1)$$

The dependent variable, *Returns*, is the market-adjusted buy-and-hold returns to the recommendations calculated as the raw return less the value-weighted market return. We measure buy-and-hold returns over the window starting 1 day before the recommendation date and ending 1 day after the revision date. If the revision date is missing or the revision is issued longer than 1 year after the recommendation, we set the ending date of the return period as 1 year after the recommendation date. The variable of interest, *Initiation*, is an indicator variable that is equal to one if the recommendation is an initiation as defined in Sect. 3 and zero otherwise. The selection explanation predicts that the coefficient of *Initiation*, α_1, will be positive. The reporting and processing explanations predict that α_1 will be negative.

We use a number of variables to control for analyst and brokerage characteristics.[13] We measure these variables during the year of the recommendation (see the "Appendix" for detailed definitions of all variables). *All-Star* denotes inclusion in an *Institutional Investor All-Star* team and proxies for analyst reputation (Stickel 1992; Hong and Kubik 2003; Leone and Wu 2007). *Brokerage Size* is the number of analysts employed at a brokerage. Larger brokerages offer greater resources to analysts and are deemed to be more prestigious (Clement 1999; Hong and Kubik 2003). We include analyst forecasting longevity, *Experience*, to capture ability and the *Number of Firms* analyst follows to capture the amount of time and effort analyst can invest in following the given firm. *Revision Time* controls for the length of the return window.

We include a number of variables to control for firm characteristics. We measure these variables for the fiscal year preceding the recommendation. Specifically, we control for *Size* and *Book-to-Market* ratio, recent operating performance (*Return on Assets* and *Sales Growth*), and stock performance (*Past Returns*) as well as the number of other analysts following the company (*Analyst Following*). We also include an indicator variable, *IPO*, for firms that had an initial public offering in the year preceding the recommendation in order to account for long-run IPO

[12] An alternative to (1) is to adopt a two-stage estimation approach. First, estimate $x = a_0 + a_1 Z + e_1$ where x is *Initiation* and Z is a vector of variables related to the initiation decision. Second, estimate $y = b_0 + b_1 r(x|Z) + b_2 K + e_2$ where y is *Returns*, $r(x|Z)$ is the residual from the first stage, and K is a vector of factors potentially associated with the returns. This two-stage procedure is equivalent to estimating an expanded regression of the form $y = c_0 + c_1 x + c_2 Z + c_3 K + e_3$, i.e., the approach we adopt in Eq. 1 above. In particular, $c_1 = b_1$ (see Kothari and Shanken 1992 for a proof).

[13] There are some confounding factors that we cannot control for. For example, analysts may do more extensive research for initiations resulting in longer and more detailed reports for initiations than for non-initiations. Such factors would suggest that initiation recommendations result from "better" research (in line with the selection argument) and thus have more positive returns, a prediction that works against the reporting and processing explanations.

underperformance (Ritter 1991). Finally, we include year fixed effects in the regression.

Table 2 Panel A displays the descriptive statistics. The mean (median) returns to favorable recommendations are positive (negative) for both initiations and non-initiations. Univariate tests of differences show that mean and median returns for favorable initiations are significantly lower than for non-initiations. The differences, −1.2% for mean returns and −2.3% for median returns, are also economically significant. Analyst, brokerage, and firm characteristics differ across initiation and non-initiation samples. All-Star analysts, analysts who work for bigger brokerages, analysts with more years of experience, and analysts who follow more firms are less likely to issue initiation recommendations. Initiation firms tend to have smaller market capitalization, book-to-market ratios, and operating profitability but greater sales growth and past stock returns. Initiation firms also have lower analyst following and are more likely to be issued for IPO firms.

Panel B presents the results from the estimation of Eq. 1. For the pooled sample of *Strong Buy* and *Buy* recommendations, the coefficient of *Initiation* is negative and significant ($\alpha_1 = -0.018$, $t = -4.14$), suggesting that favorable initiation recommendations underperform favorable non-initiation recommendations by 1.8%, after controlling for analyst, brokerage, and firm characteristics. When we estimate Eq. 1 separately for *Strong Buy* and *Buy* recommendations, we observe that the underperformance of favorable initiation recommendations is driven by *Strong Buy* recommendations ($\alpha_1 = -0.035$, $t = -5.74$ in the *Strong Buy* sample; $\alpha_1 = -0.005$, $t = -0.81$ in the *Buy* sample).[14]

The results for the control variables provide insights on the characteristics associated with recommendation profitability. Recommendation returns significantly are positively associated with broker size and not associated with All-Star status. Analyst experience is negatively associated with recommendation returns. Consistent with prior literature, returns are also significantly lower for larger firms, for firms with greater sales growth, and for firms that recently had an IPO. Returns are also higher for firms with greater book-to-market ratios and greater analyst following.[15, 16]

[14] We repeat our analysis using alternative return windows to assess the sensitivity of our results to the inclusion/exclusion of announcement returns for recommendations and revisions. The results are qualitatively similar across these alternative return windows. In particular, the coefficient of *Initiation* for *Strong Buy* recommendations is (1) −0.032 when we exclude the revision announcement window, significant at 1% level, (2) −0.026 when we exclude the recommendation announcement window, significant at 1% level, and (3) −0.023 when we exclude both the recommendation and revision announcement windows, also significant at 1% level.

[15] In our main tests, we estimate Eq. 1 for the pooled recommendation-level data with year fixed effects. As an alternative, we also try the Fama and Macbeth (1973) estimation approach and find similar results. That is, we estimate Eq. 1 annually without the year fixed effects and compute averages of the annual coefficient estimates. The results (not tabulated) show that *Strong Buy* initiations underperform their non-initiation counterparts. The coefficient of *Initiation* in the *Strong Buy* sample is −0.0194 with a Fama and MacBeth (1973) *t*-statistic of −2.87, significant at 1% level. The coefficient of *Initiation* remains insignificant for the *Buy* sample.

[16] We also estimate Eq. 1 after excluding recommendations issued during the bubble years (1997 through 2001). The results are qualitatively similar. The coefficient of *Initiation* in the *Strong Buy* sample is −0.0275 and significant at 1% level.

Table 2 Analysis of long-term Returns

Panel A: Descriptive statistics

Variable	All recommendations			Initiation recommendations		Non-initiation recommendations		Initiation versus non-initiation recommendations	
	$N = 135{,}531$			$N = 40{,}405$		$N = 95{,}126$			
	Mean	SD	Median	Mean	Median	Mean	Median	Mean	Median
Returns	0.044	0.595	−0.011	0.036	−0.028	0.048	−0.006	−0.012***	−0.023***
All-Star	0.123	0.328	0.000	0.078	0.000	0.142	0.000	−0.064***	0.000***
Brokerage Size	56.58	58.98	36.00	52.81	33.00	58.18	39.00	−5.38***	−6.00***
Experience	6.73	5.29	5.00	5.51	4.00	7.25	6.00	−1.74***	−2.00***
Number of Firms	16.56	11.09	14.00	15.56	13.00	16.98	15.00	−1.42***	−2.00***
Revision Time	247.31	133.28	335.00	268.39	365.00	238.36	294.00	30.03***	71.00***
Size (in millions)	7,217	18,143	1,214	5,618	788	7,896	1,456	−2,277***	−669***
Book-to-Market	0.403	0.294	0.343	0.397	0.333	0.405	0.346	−0.008***	−0.014***
Sales Growth	0.385	0.839	0.168	0.486	0.199	0.342	0.157	0.144***	0.042***
Return on Assets	0.026	0.154	0.046	0.008	0.040	0.034	0.047	−0.026***	−0.007***
Past Returns	0.189	0.888	0.025	0.301	0.068	0.141	0.009	0.160***	0.059***
Analyst Following	11.75	9.19	10.00	9.61	7.00	12.66	11.00	−3.05***	−4.00***
IPO	0.023	0.149	0.000	0.040	0.000	0.015	0.000	0.025***	0.000***

Panel B: Regression results

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Intercept	0.088***	0.108***	0.073***
	(4.53)	(4.60)	(3.30)

Table 2 continued

Panel B: Regression results

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Initiation	−0.018***	−0.035***	−0.005
	(−4.14)	(−5.74)	(−0.81)
All-Star	0.003	−0.006	0.009
	(0.57)	(−0.70)	(1.51)
ln(*Brokerage Size*)	0.008***	0.013***	0.005**
	(4.93)	(5.17)	(2.32)
Experience	−0.001**	−0.001**	−0.000
	(−2.02)	(−2.47)	(−0.71)
Number of Firms	−0.000	0.000	−0.000
	(−0.08)	(1.04)	(−0.90)
Revision Time	0.000***	0.000***	0.000***
	(18.00)	(16.30)	(13.50)
ln(*Size*)	−0.027***	−0.030***	−0.026***
	(−9.78)	(−8.71)	(−9.17)
Book-to-Market	0.053***	0.042***	0.062***
	(4.58)	(2.83)	(5.22)
Sales Growth	−0.037***	−0.044***	−0.031***
	(−6.69)	(−8.13)	(−4.45)
Return on Assets	0.081**	0.040	0.112***
	(2.44)	(0.90)	(3.45)
Past Returns	−0.001	−0.008	0.004
	(−0.19)	(−1.31)	(0.63)

Table 2 continued

Panel B: Regression results

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Analyst Following	0.003***	0.003***	0.003***
	(4.63)	(3.57)	(5.11)
IPO	−0.076***	−0.106***	−0.050**
	(−3.82)	(−4.23)	(−2.12)
Year fixed effects	Yes	Yes	Yes
N	135,531	60,145	75,386
Adjusted R^2 (%)	2.46	3.06	2.11

Panel C: The four-factor model

	Intercept	$R_{Mt} - R_{ft}$	*SMB*	*HML*	*MOM*	Adjusted R^2
Pooled sample						
Initiations	0.387	1.232	0.610	−0.150	−0.192	0.954
	(2.90)	(34.35)	(16.90)	(−3.25)	(−7.63)	
Non-initiations	0.735	1.171	0.512	0.056	−0.168	0.956
	(6.58)	(38.95)	(16.91)	(1.45)	(−7.99)	
Initiations − Non-initiations	−0.349	0.061	0.098	−0.206	−0.023	0.472
	(−3.25)	(2.11)	(3.39)	(−5.55)	(−1.16)	
Strong Buy						
Initiations	0.335	1.235	0.625	−0.120	−0.164	0.942
	(2.24)	(30.78)	(15.48)	(−2.33)	(−5.82)	

Table 2 continued

Panel C: The four-factor model

	Intercept	$R_{Mt} - R_{ft}$	*SMB*	*HML*	*MOM*	Adjusted R^2
Non-initiations	0.759	1.162	0.513	0.053	−0.090	0.944
	(6.09)	(34.63)	(15.20)	(1.24)	(−3.85)	
Initiations − Non-initiations	−0.425	0.073	0.112	−0.174	−0.073	0.415
	(−3.51)	(2.24)	(3.42)	(−4.15)	(−3.21)	
Buy						
Initiations	0.429	1.227	0.595	−0.174	−0.211	0.956
	(3.28)	(34.86)	(16.80)	(−3.84)	(−8.57)	
Non-initiations	0.709	1.174	0.507	0.059	−0.221	0.954
	(6.11)	(37.57)	(16.11)	(1.47)	(−10.07)	
Initiations − Non-initiations	−0.280	0.053	0.089	−0.233	0.009	0.456
	(−2.44)	(1.72)	(2.85)	(−5.84)	(0.42)	

Panel A reports descriptive statistics for the pooled sample of recommendations and separately for the initiation and non-initiation subsamples. The last two columns report the mean (median) differences between initiation and non-initiations and their statistical significance using *t* tests (Wilcoxon tests). Panel B presents regression results for Eq. 1 in the paper, where the dependent variable is long-run stock returns (*Returns*). Panel C reports the coefficient estimates and *t*-statistics (in parentheses) of the four-factor regression model for monthly excess returns (in percentage) for initiations, non-initiations, and the initiation-non-initiation hedge portfolio, which takes a long position in the initiation stocks and a short position in the non-initiation stocks. We estimate the following model:

$$R_{it} - R_{ft} = a = b_{iM}(R_M - R_{ft}) + s_i SMBt + h_i HMLt + m_i MOMt + \varepsilon_{it}$$

where $R_{it} - R_{ft}$, *SMB*, and *HML* are as defined in Fama and French (1996), and *MOM* is the momentum factor as defined in Carhart (1997). The four factor data are from Kenneth French's website. For each day in the sample period, the initiation portfolio includes all initiation recommendations issued by analysts where the date falls in the period starting 1 day before the initiation recommendation date and ending 1 day after the next revision date. Similarly, we construct the non-initiation portfolio using the issuance and revision dates of the non-initiation recommendations. We calculate daily portfolio returns as the equal-weighted average of stocks included in the initiation or non-initiation portfolio. Then we aggregate daily returns into monthly returns for both initiation and non-initiation portfolios. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Reported *t*-statistics are based on standard errors estimated using the Huber (1967)–White (1980) procedure, with firm-level clustering (Rogers 1993). All variables are defined in the "Appendix"

One concern with the above analysis is that linear controls in the regression may not adequately capture the important differences in firm characteristics between initiations and non-initiations. To address this issue, we use the calendar-time approach and adopt a four-factor return model as in Carhart (1997):

$$R_{it} - R_{ft} = a + b_{iM}(R_{Mt} - R_{ft}) + s_i SMBt + h_i HMLt + m_i MOMt + \varepsilon_{it} \quad (2)$$

where $R_{it} - R_{ft}$ is the return of portfolio i in excess of the risk-free rate in month t; $R_{Mt} - R_{ft}$ is the excess return of the market value-weighted portfolio relative to the risk-free rate; *SMB* represents the size premium and equals the return differential between the portfolios of small and large stocks; *HML* represents the value premium and equals the return differential between portfolios of stocks with high book-to-market ratios and low book-to-market ratios; and *MOM* is the return difference between portfolios of past winners and past losers.[17]

To implement the four-factor model, we form two portfolios: one for initiations and the other for non-initiations. For each day in the sample period, the initiation portfolio includes all initiation recommendations issued by analysts where the date falls in the period starting 1 day before the initiation recommendation date and ending 1 day after the revision date. Similarly, we construct the non-initiation portfolio using the issuance and revision dates of the non-initiation recommendations. We calculate daily portfolio returns as the equal-weighted average of stocks included in the initiation or non-initiation portfolio. Then we aggregate daily returns into monthly returns for both initiation and non-initiation portfolios. As analyst recommendations may have particular investment value manifested in abnormal returns after controlling for common return factors, we are interested in the return difference between the initiation portfolio and the non-initiation portfolio (the initiation − non-initiation hedge portfolio). The coefficient on the intercept (a) provides an estimate of the monthly abnormal returns earned by the initiation-non-initiation hedge portfolio, after controlling for the market, size, book-to-market, and momentum factors.

Panel C presents the parameter estimates of the four-factor model. For the whole sample, the intercept from the four-factor model is −0.349 for the hedge portfolio, with a t-statistic of −3.25, suggesting that initiation recommendations underperform matched firms by 4.27% $(= 1 - (1 + 0.349\%)^{12})$ per year, on average, after controlling for the market, size, book-to-market, and momentum factors. The intercept is reliably negative for both *Strong Buy* and *Buy* and bigger for *Strong Buy* (−0.425 for *Strong Buy* vs. −0.280 for *Buy*).

Overall, the results in Table 2 have two key implications. First, the preponderance of favorable initiations is not driven by selection. The effects of reporting, processing biases, or both dominate the effects of selection bias, if any. Second, the effects of selection, reporting, and processing biases vary across recommendation levels. *Strong Buy* initiations underperform their non-initiation counterparts. The results for *Buy* initiations are mixed: we find evidence of significant underperformance in the four-factor model in Panel C but not in regression models in Panel B.

[17] The four factor data are from Kenneth French's website. See Fama and French (1996) and Carhart (1997) for more details on these four factors.

4.2 Properties of earnings forecasts accompanying initiation and non-initiation recommendations

To study the properties of earnings forecasts, we first identify the earnings forecasts corresponding to each recommendation in the sample. Specifically, we search for annual earnings forecasts issued by the same analyst for the same firm during the period starting 90 days before and ending 7 days after the recommendation date.[18] In case of multiple forecasts during the specified period, we retain the most recent earnings forecast for each analyst-recommendation pair. This procedure results in a sample of 106,742 forecasts, 31,913 (74,829) of which correspond to initiation (non-initiation) recommendations. We then estimate the following earnings forecast level regression with standard errors clustered by firm, for the pooled sample of *Strong Buy* and *Buy* and separately for *Strong Buy* and *Buy* recommendations:

$$\begin{aligned} \textit{Relative Forecast Accuracy}\,(\textit{Optimism}) = {} & \alpha_0 + \alpha_1 \textit{Initiation} + \alpha_2 \textit{All-Star} \\ & + \alpha_3 \textit{Relative Brokerage Size} \\ & + \alpha_4 \textit{Relative Experience} \\ & + \alpha_5 \textit{Relative Number of Firms} \\ & + \alpha_6 \textit{Relative Number of Forecasts} \\ & + \alpha_7 \textit{Relative Horizon} + \upsilon \end{aligned} \tag{3}$$

The dependent variables are *Relative Forecast Accuracy* and *Relative Forecast Optimism.* We calculate the *Relative Forecast Accuracy* of annual earnings forecast k analyst i issues for firm j as $\left(-1 \times \frac{AFE_{ijk} - \overline{AFE}}{\overline{AFE}}\right)$ where AFE_{ijk} is the absolute forecast error for annual earnings forecast k that analyst i issues for firm j. $\overline{AFE}$ is the mean absolute error of all forecasts that are issued by other analysts for firm j during the 60-day period prior to and including the issue date of forecast k. This measure controls for firm-year effects by subtracting the mean absolute forecast error, $\overline{AFE}$, from the analyst's absolute forecast error. Deflating by $\overline{AFE}$ mitigates heteroskedasticity in forecast error distributions across firms (Clement 1999). Multiplying the ratio by -1 assigns higher values to higher levels of accuracy. Similarly, we measure *Relative Forecast Optimism* as $\left(\frac{FE_{ijk} - \overline{FE}}{\overline{AFE}}\right)$ where FE_{ijk} is signed forecast error (forecast less the actual) for forecast k issued by analyst i for firm j.

The variable of interest in Eq. 3 is *Initiation*. Eq. 3 also includes control variables used in prior literature (Clement 1999; Clement and Tse 2003; Ke and Yu 2006). Specifically, we control for All-Star status (*All-Star*), the size of the brokerage house (*Brokerage Size*), the experience of the analyst (*Experience*), the number of the firms the analyst follows (*Number of Firms*), the number of forecasts the analyst issues for the firm during the year (*Number of Forecasts*), and the age of the last

[18] The length of window over which we search for the earnings forecasts is arbitrary. In sensitivity analysis, we conduct the earnings forecast accuracy and optimism tests on a sample of earnings forecasts issued over the period starting 60 days before and ending 3 days after the recommendation date. The results (not reported) are qualitatively similar to the results in Table 3.

Table 3 Earnings forecast accuracy and optimism for initiations and non-initiations

Panel A: Descriptive statistics

Variable	All recommendations			Initiation recommendations		Non-initiation recommendations		Initiation versus non-initiation recommendations	
	$N = 106{,}742$			$N = 31{,}913$		$N = 74{,}829$			
	Mean	SD	Median	Mean	Median	Mean	Median	Mean	Median
Relative Forecast Accuracy	0.299	0.458	0.000	0.151	0.100	0.019	0.000	0.132***	0.100***
Relative Forecast Optimism	0.058	0.496	0.024	−0.065	0.000	0.015	0.000	−0.080***	0.000***
All-Star	−0.009	0.623	0.000	0.078	0.000	0.142	0.000	−0.063***	0.000***
Relative Brokerage Size	0.123	0.328	0.000	−5.024	−3.429	−5.439	−7.250	0.414	3.821***
Relative Experience	0.190	0.393	0.000	−0.559	−0.500	0.478	0.000	−1.036***	−0.500***
Relative # of Firms	0.168	4.415	0.000	−0.799	−0.333	−0.107	−0.200	−0.692***	−0.133***
Relative # of Forecasts	−0.314	8.372	−0.250	−0.713	−0.500	0.136	0.000	−0.849***	−0.500***
Relative Horizon	−0.118	1.737	0.000	−16.109	−15.667	−13.175	−11.300	−2.934***	−4.367***

Panel B: Regression results

	Relative earnings forecast accuracy			Relative earnings forecast bias		
	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)	*Strong Buy and Buy* Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Intercept	−0.0126***	−0.0094***	−0.0152***	0.0226***	0.0266***	0.0195***
	(−5.08)	(−2.66)	(−4.70)	(6.98)	(5.85)	(4.69)
Initiation	0.1128***	0.1035***	0.1205***	−0.0660***	−0.0643***	−0.0678***
	(30.92)	(19.59)	(25.28)	(−13.86)	(−9.69)	(−10.67)

Table 3 continued

Panel B: Regression results

	Relative earnings forecast accuracy			Relative earnings forecast bias		
	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)	*Strong Buy and Buy* Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
All-Star	0.0139**	0.0188**	0.0116*	−0.0018	−0.0075	0.0027
	(2.57)	(2.32)	(1.72)	(−0.25)	(−0.69)	(0.30)
Relative Brokerage Size	0.0001***	0.0001***	0.0001***	−0.0001***	−0.0001*	−0.0001**
	(3.62)	(2.80)	(2.82)	(−2.79)	(−1.84)	(−2.15)
Relative Experience	−0.0020***	−0.0020***	−0.0020***	0.0029***	0.0019**	0.0036***
	(−4.33)	(−3.38)	(−3.30)	(4.70)	(2.23)	(4.80)
Relative Number of Firms	−0.0014***	−0.0015***	−0.0012***	0.0008**	0.0007*	0.0008**
	(−5.40)	(−4.16)	(−4.06)	(2.43)	(1.67)	(2.15)
Relative Number of Forecasts	−0.0113***	−0.0108***	−0.0118***	0.0092***	0.0085***	0.0097***
	(−9.32)	(−6.33)	(−8.03)	(5.75)	(3.80)	(5.02)
Relative Horizon	−0.0025***	−0.0027***	−0.0022***	0.0008***	0.0005**	0.0011***
	(−18.29)	(−14.28)	(−12.94)	(4.58)	(2.02)	(4.71)
N	106,742	47,566	59,176	106,742	47,566	59,176
Adjusted R^2 (%)	2.12	2.00	2.22	0.50	0.40	0.58

Panel A presents descriptive statistics for the variables included in *Relative Forecast Accuracy/Optimism* regressions. Panel B reports regression results for Eq. 3 in the paper, where the dependent variable is *Relative Forecast Accuracy* or *Relative Forecast Optimism*. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Reported *t*-statistics are based on standard errors estimated using the Huber (1967)–White (1980) procedure, with firm-level clustering (Rogers 1993). All variables are defined in the "Appendix"

Table 4 Results for propensity score matched sample

Panel A: Propensity score estimation

	Average coefficient	Aggregate *z*-statistic	Years with positive coefficients	Years with negative coefficients
Intercept	0.1542	3.63	8	5
All-Star	−0.3836	−15.13	1	12
ln(Brokerage Size)	−0.0103	−1.36	8	5
Experience	−0.0597	−42.63	0	13
Number of Firms	−0.0070	−7.80	3	10
ln(Size)	−0.0198	−2.87	5	8
Book-to-Market	−0.1289	−5.45	3	10
Sales Growth	0.0947	11.46	13	0
Return on Assets	−0.4162	−9.59	0	13
Past Returns	0.2328	22.82	13	0
Analyst Following	−0.0354	−31.05	0	13
IPO	0.6977	15.94	13	0

Panel B: Covariate balance between the matched pairs of initiations and non-initiations

	N	Difference in mean	Difference in median	*t*-test *p*-value	Wilcoxon *p*-value
All-Star	40,405	0.0000	0.0000	0.9772	0.9772
ln(Brokerage Size)	40,405	0.0092	0.0000	0.2177	0.0177
Experience	40,405	0.0177	0.0000	0.5002	0.2015
Number of Firms	40,405	0.0582	0.0000	0.3999	0.0003
ln(Size)	40,405	0.0198	0.0000	0.0541	0.1550
Book-to-Market	40,405	0.0003	−0.0012	0.8805	0.2927
Sales Growth	40,405	0.0032	0.0018	0.6109	0.0195
Return on Assets	40,405	−0.0012	0.0000	0.2754	0.2825
Past Returns	40,405	0.0069	0.0163	0.2700	0.0001
Analyst Following	40,405	0.0556	0.0000	0.2010	0.9221
IPO	40,405	0.0032	0.0000	0.0056	0.0056

Panel C: Long-run returns for propensity score matched sample

	N	Initiations versus non-initiations	
		Mean	Median
Recommendation returns			
Strong Buy and Buy	40,405	−0.0541	−0.0206***
Strong Buy	18,430	−0.0888*	−0.0463***
Buy	21,975	−0.0250	0.0010

Table 4 continued

Panel D: The four-factor model for the propensity score matched sample

	Intercept	$R_{Mt} - R_{ft}$	*SMB*	*HML*	*MOM*	Adjusted R^2
Pooled sample	−0.191	0.020	−0.020	−0.066	0.021	0.137
	(−3.31)	(1.26)	(−1.28)	(−3.29)	(1.92)	
Strong Buy	−0.330	0.007	0.008	−0.071	0.027	0.119
	(−4.52)	(0.31)	(0.41)	(−2.81)	(1.99)	
Buy	−0.066	0.029	−0.045	−0.060	0.018	0.067
	(−0.85)	(1.40)	(−2.12)	(−2.21)	(1.20)	

Panel E: Earnings forecast accuracy and optimism for propensity score matched sample

	N	Initiations versus non-initiations	
		Mean	Median
Relative Forecast Accuracy			
Strong Buy and Buy	25,375	0.1319***	0.1081***
Strong Buy	11,721	0.1242***	0.1009***
Buy	13,654	0.1386***	0.1125***
Relative Forecast Optimism			
Strong Buy and Buy	25,375	−0.0701***	−0.0251***
Strong Buy	11,721	−0.0775***	−0.0245***
Buy	13,654	−0.0637***	−0.0256***

Panel A presents summary estimates for Eq. 4 in the paper based on annual regressions from 1994 to 2007. The first column presents the averages of the annual coefficient estimates, and the second column presents an aggregate z statistic calculated as the sum of individual annual z statistics divided by the square root of the number of years for which we estimate Eq. 4. Panel B presents the covariate balance between the 40,405 matched pairs. Panel C presents the difference in annualized long-run returns for initiation recommendations and *p*-score matched non-initiation recommendations. Panel D reports the four-factor regression results for the initiation-matched hedge portfolio, which takes a long position in the initiation stocks and a short position in the *p*-score matched non-initiation stocks. The estimated model is:

$$R_{it} - R_{ft} = a = b_{iM}(R_{Mt} - R_{ft}) + s_i SMBt + h_i HMLt + m_i MOMt + \varepsilon_{it}$$

where $R_{it} - R_{ft}$, *SMB*, and *HML* are as defined in Fama and French (1996), and *MOM* is the momentum factor as defined in Carhart (1997). For each day in the sample period, the initiation portfolio includes all initiation recommendations issued by analysts where the date falls in the period starting 1 day before the initiation recommendation date and ending 1 day after the next revision date. Similarly, we construct the matched portfolio using the issuance and revision dates of the matched recommendations. We calculate daily portfolio returns as the equal-weighted average of stocks included in the initiation or matched portfolio and then aggregate daily returns into monthly returns for both portfolios. Panel D presents the differences in relative forecast accuracy and optimism for initiation recommendations and *p*-score matched non-initiation recommendations. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. All variables are defined in the "Appendix"

earnings forecast of the year (*Horizon*). Similar to the dependent variables, we use *Relative* versions of the independent variables. That is, we adjust the continuous independent variables by subtracting their firm-year means. This approach allows us to control for the cross-sectional variation in the regression variables without

including firm-specific control variables. Thus, all the control variables in Eq. 3 are *Relative* measures.

Table 3 Panel A displays the descriptive statistics for *Relative Forecast Accuracy, Relative Forecast Optimism* and control variables. The univariate tests of differences show that earnings forecasts are significantly more accurate and more pessimistic when they accompany initiation recommendations. The differences in analyst and brokerage characteristics across initiation and non-initiation samples are similar to those in Table 2. The *Relative Horizon* of forecasts accompanying initiation recommendations is, on average, 3 days shorter than those accompanying non-initiations.

Panel B displays the results from the estimation of Eq. 3. With respect to *Relative Forecast Accuracy*, the coefficient of *Initiation* is positive and significant at 1% level for the pooled sample as well as in the *Strong Buy* and *Buy* samples, after controlling for determinants of forecast accuracy. Therefore, the analysts who issue overly optimistic *Strong Buy* recommendations for initiations, which underperform non-initiation recommendations, issue more accurate earnings forecasts for the same firms. These results are inconsistent with the processing explanation and lend support to the reporting explanation. Furthermore, these results suggest that analysts invest more time and effort in forecasting earnings for initiations, perhaps because of the greater investor attention surrounding initiations.

As for *Relative Forecast Optimism*, the coefficient of *Initiation* is negative and highly significant for the pooled sample and for the *Strong Buy* and *Buy* samples, indicating that analysts, on average, issue less optimistic earnings forecasts for initiations. Again, this is consistent with the reporting bias explanation. Moreover, these results suggest that the potential to access management, which incentivizes analysts to issue pessimistic earnings forecasts (Ke and Yu 2006), is greater for initiations than for non-initiations.

The association between relative forecast accuracy and the control variables in Columns 1 to 3 is generally consistent with prior research. *All-Star* analysts, analysts working at larger brokerage houses tend to issue more accurate earnings forecasts. Forecast accuracy is lower for analysts who follow a greater number of firms, consistent with these analysts spending less time covering each firm, and for forecasts that are issued earlier in the year. Similar to the negative relation between analyst experience and stock returns in Sect. 4.1, we find a negative incremental association between *Relative Experience* and *Relative Forecast Accuracy*. In Columns 4 to 6, we observe similar relations between relative forecast optimism and control variables (though in opposite signs since forecast accuracy and optimism are in general negatively correlated).

4.3 Alternative research designs

4.3.1 Matched pair research design: propensity score matched control sample

In observational studies such as ours, it is difficult to make causal statements about the impact of a treatment variable (in our case, initiations) on the outcome (in our case, long-run returns to recommendations, relative forecast accuracy and

optimism). Unlike as in controlled experiments, observations are not assigned at random into treatment and control samples. Adopting a traditional multivariate regression framework to address this issue, as we do in Sects. 4.1 and 4.2, has an important limitation. Specifically, it assumes that returns are linear in the variable of interest, *Initiation*, and other observable predictors, that is, analyst, brokerage, and firm characteristics. If this linearity assumption is violated, the model is misspecified and can produce biased parameter estimates.

An alternative approach is to adopt a propensity score matched pair research design (Rosenbaum and Rubin 1983; Armstrong et al. 2010). Unlike standard matching algorithms that match on specific variables (for example, size, book-to-market) in a step-wise manner, propensity score matched pair research design matches the treatment observations (initiation recommendations) with nontreatment observations (non-initiation recommendations) along multiple dimensions, allowing us to relax the linearity assumption.

The first step in implementing the propensity score matched pair research design is to estimate the conditional probability of receiving the treatment effect, the probability of an initiation, given all the observable potential determinants of the initiation decision. We estimate the following logistic model for the 135,531 favorable recommendations in our sample, which include both initiations and non-initiations, separately for each year in the sample period:

$$\begin{aligned} Initiation = {} & \alpha_0 + \alpha_1 All\text{-}Star + \alpha_2 ln(Brokerage\ Size) + \alpha_3 Experience \\ & + \alpha_4 Number\ of\ Firms + \alpha_5 ln(Size) + \alpha_6 Book\text{-}to\text{-}Market \\ & + \alpha_7 Sales\ Growth + \alpha_8 Return\ on\ Assets + \alpha_9 Past\ Returns \\ & + \alpha_{10} Analyst\ Following + \alpha_{11} IPO + \upsilon \end{aligned} \tag{4}$$

All variables are as defined in Sect. 4.1. Table 4 Panel A reports the estimates of Eq. 4 aggregated over the years. The first column presents the averages of the annual coefficient estimates, and the second column presents an aggregate z-statistic, calculated as the sum of individual annual z-statistics divided by the square root of the number of years.[19] The results show that All-Star analysts and experienced analysts are less likely to issue initiation recommendations. The results also display a negative (positive) relation between the initiation decision and *Book-to-Market*, *Return on Assets*, and *Analyst Following* (*Sales Growth*, *Past Returns*, *IPO*). These findings are consistent with analysts initiating coverage for young and growing firms with good recent stock performance.

The second step is to compute a propensity score for each recommendation, that is, the predicted probability that the recommendation is an initiation, and to use this score to match each initiation recommendation to a non-initiation recommendation. For each recommendation level, we form initiation/non-initiation matched pairs that result in observations with the smallest propensity score differences. At this point, we evaluate the covariate balance between the two samples, that is, whether the treatment and control samples are similar along relevant dimensions. Panel B of

[19] The significance of the individual or aggregate results in Table 4 does not affect the analysis of the returns to initiation and non-initiation recommendations, because we form matched pairs annually based on the corresponding propensity score model.

Table 4 presents the covariate balance between the 40,405 matched pairs. Most of the differences between initiations and non-initiations in Table 2 Panel B are no longer statistically significant after propensity score matching. Even in the case of IPO where the means or medians are statistically different, the economic differences between the treatment and control samples are minimal. While we observe a mean difference in *IPO* of 0.025 between the unmatched samples of initiations and non-initiations in Table 2 Panel A, the mean difference is 0.0032 in Panel B of Table 4. Overall, these results suggest that the covariates are well balanced across the treatment and control samples and that the nature of these variables is unlikely to confound our estimates of the average treatment effect.

The final step is to compare the difference in outcomes (that is, annualized long-run stock returns to recommendations, relative forecast accuracy, and relative forecast optimism) across the treatment and control samples. Because the recommendations are matched along the relevant dimensions, we do not need to run an additional regression.[20] Table 4 Panel C presents the results for market-adjusted returns. Consistent with the results in Table 2, *Strong Buy* initiations underperform *Strong Buy* non-initiations (mean and median differences of −8.88 and −4.63%, with the significance levels of 10 and 1%, respectively), while the performance of *Buy* initiations are not significantly different from that of *Buy* non-initiations. We also conduct the four-factor model for initiations and *p*-score matched non-initiations. Panel D of Table 4 shows that initiations significantly underperform non-initiations for *Strong Buys*, with a monthly return difference of −0.33% ($t = -4.52$) after controlling for four common factors. The return difference for *Buys* is negative but statistically insignificant. Furthermore, consistent with the results in Table 3 Panel B, we find that earnings forecasts that accompany both *Strong Buy* and *Buy* initiations are more accurate and less optimistic that those accompanying non-initiation *Strong Buy* and *Buy* recommendations (Panel E).

4.3.2 Analyst and recommendation level match research design

In our final research design, we match each initiation recommendation with an outstanding same-level recommendation issued by the same analyst within 2 years before the initiation date. Matching by analyst enables us to control for differences in recommendation profitability attributable to the individual analyst and brokerage characteristics. Matching by level of recommendation enables us to control for the analyst's belief about the extent to which a particular stock is over- or undervalued. We account for differences in recommendation performance arising from firm characteristics by using a variety of abnormal return measures. For both initiations and their matches, we compute four long-term buy-and-hold returns over the period starting 1 day before the respective recommendation dates and ending 1 day after

[20] Because there are statistically significant differences in some analyst and firm characteristics across the initiation and non-initiation samples after the matching process, we also estimate Eq. 1 for initiations and the *p*-score matched non-initiations. We find similar results—the coefficients on initiations are −0.106 ($t = -2.06$) and −0.027 ($t = -0.50$) for *Strong Buys* and *Buys*, respectively.

the date of the first revisions (that is, the subsequent recommendation): (1) annualized raw return, (2) annualized market-adjusted returns defined as raw returns less the value-weighted market return, (3) annualized industry-adjusted returns defined as raw returns less industry equal-weighted returns where industries are defined as in Fama and French (1997), and (4) size- and book-to-market-adjusted returns defined as raw returns less returns to size and book-to-market matched portfolios.

The results (not tabulated) show that both *Strong Buy* and *Buy* initiations underperform their matches. The underperformance is evident across all return measures and is statistically and economically significant. For example, the median annualized market-adjusted returns to *Strong Buy* initiations and non-initiations are 3.36 and 7.46%, respectively, which translates into initiation under-performance of 4.10% (significant at 1% level). The underperformance for *Buy* initiations is smaller in magnitude (median under-performance of 2.25% for market-adjusted returns, significant at 1% level). Finally, we conduct the four-factor calendar time regression analysis and find that the initiation-match hedge portfolios have intercepts of -0.437 ($t = -3.66$) and -0.316 ($t = -2.93$) for *Strong Buy* and *Buy* recommendations, respectively, suggesting the underperformance of both *Strong Buy* and *Buy* initiations relative to their matches after controlling for four common factors.

5 Additional analyses

5.1 Role of conflicts of interest from investment banking activities

In this section we consider one specific type of reporting incentives—the importance of investment banking business to the brokerage firm. While, all else equal, analysts who work at brokerages with more significant investment banking business have greater incentives to please the firms they cover, resulting in higher reporting bias, there is no reason for processing bias to vary with the importance of investment banking business. This analysis also permits us to indirectly assess the role of other sources of conflicts of interest (for example, generate trading commissions or gain access to management as a source of information) vis-à-vis investment banking activities. We use the Carter-Manaster investment bank reputation rankings (hereafter, Carter-Manaster) to capture the importance of investment banking business to the brokerage house (Carter and Manaster 1990; Carter et al. 1998).[21] The Carter-Manaster ranks range from 1.1 to 9.1 with higher values indicating bigger investment banking business and higher (investment banking) reputation. We assign a rank of zero to brokerages with no investment

[21] The Carter-Manaster rankings are based on the hierarchy of the listing of underwriters in the prospectus of the security offering where prestigious underwriters are typically listed higher in the underwriting section. We use the updated Carter-Manaster ranks constructed by Loughran and Ritter (2004).

banking arm and to pure research firms. We estimate the following ordinary least squares regression, a variant of Eq. 1 above, separately for (i) brokerages without an investment banking arm (Carter-Manaster rank = 0), (ii) brokerages with a low investment banking profile (Carter-Manaster rank between 1.1 and 8.1), and (iii) for top-tier investment banks (Carter-Manaster rank = 9.1):

$$\begin{aligned} Returns = {} & \alpha_0 + \alpha_1 Initiation + \alpha_2 All\text{-}Star + \alpha_3 ln(Brokerage\ Size) + \alpha_4 Experience \\ & + \alpha_5 Number\ of\ Firms + \alpha_6 Revision\ Time + \alpha_7 ln(Size) \\ & + \alpha_8 Book\text{-}to\text{-}Market + \alpha_9 Sales\ Growth + \alpha_{10} Return\ on\ Assets \\ & + \alpha_{11} Past\ Returns + \alpha_{12} Analyst\ Following + \alpha_{13} IPO \\ & + Year\ Fixed\ Effects + \upsilon \end{aligned} \quad (5)$$

All variables are defined in Sect. 4.1.

We also examine the properties of earnings forecasts that accompany initiation and non-initiation recommendations by the importance of investment banking business to the brokerage to complement the returns analyses. We estimate the following ordinary least squares regression separately for (i)–(iii) above:

$$\begin{aligned} Relative\ Forecast\ Accuracy(Optimism) = {} & \alpha_0 + \alpha_1 Initiation + \alpha_2 All\text{-}Star \\ & + \alpha_3 Relative\ Brokerage\ Size \\ & + \alpha_4 Relative\ Experience\ Optimism \\ & + \alpha_5 Relative\ Number\ of\ Firms \\ & + \alpha_6 Relative\ Number\ of\ Forecasts\ Optimism \\ & + \alpha_7 Relative\ Horizon + \upsilon \end{aligned} \quad (6)$$

All variables are defined in Sect. 4.1.

Table 5 displays the results. For brevity, we present only the coefficient estimate of *Initiation* for each subsample and suppress the coefficient estimates of the control variables. The coefficient of *Initiation* for *Strong Buy* recommendations is negative and significant in all subsamples formed on Carter-Manaster ranks. While the differences are economically small, the magnitude of the coefficient decreases with Carter-Manaster ranks. More importantly, we find that in the case of *Buy* recommendations, *only* initiations issued by analysts at top-tier investment banks underperform non-initiations—the coefficient of *Initiation* is -0.0278 ($t = -2.28$). In all subsamples, forecast accuracy is higher, and forecast optimism is lower, for earnings forecasts accompanying initiations.

Overall, the relative performance of *Strong Buy* and *Buy* recommendations vary with conflicts of interest stemming from investment banking, lending further support to the reporting explanation. Perhaps more importantly, that the underperformance of *Strong Buy* initiations is not limited to recommendations issued by top-tier banks shows that other sources of conflicts (for example, generate trading commissions or gain access to management as a source of information) are not negligible.

Table 5 Role of conflicts of interest

	Strong Buy and Buy		*Strong Buy*		*Buy*	
	N	Coefficient (*t*-statistic)	*N*	Coefficient (*t*-statistic)	*N*	Coefficient (*t*-statistic)
Recommendation returns						
Non-Investment Banks	37,699	−0.0204***	17,915	−0.0325***	19,784	−0.0099
		(−2.88)		(−3.16)		(−1.12)
Non-Top-Tier Investment Banks	72,214	−0.0122**	33,862	−0.0351***	38,352	0.0072
		(−2.17)		(−4.22)		(0.92)
Top-Tier Investment Banks	25,618	−0.0305***	8,368	−0.0380***	17,250	−0.0278**
		(−3.33)		(−2.54)		(−2.28)
Earnings forecast accuracy						
Non-Investment Banks	29,489	0.1149***	14,128	0.1035***	15,361	0.1269***
		(16.43)		(10.42)		(13.29)
Non-Top-Tier Investment Banks	56,936	0.1024***	26,848	0.0942***	30,088	0.1094***
		(21.47)		(13.80)		(17.08)
Top-Tier Investment Banks	20,317	0.1425***	6,590	0.1471***	13,727	0.1409***
		(16.90)		(9.97)		(13.95)
Earnings forecast optimism						
Non-Investment Banks	29,489	−0.0630***	14,128	−0.0638***	15,361	−0.0639***
		(−7.39)		(−5.35)		(−5.34)
Non-Top-Tier Investment Banks	56,936	−0.0702***	26,848	−0.0625***	30,088	−0.0769***
		(−11.19)		(−7.25)		(−8.99)
Top-Tier Investment Banks	20,317	−0.0559***	6,590	−0.0688***	13,727	−0.0492***
		(−4.92)		(−3.49)		(−3.68)

The table presents regression results for Eqs. 5 and 6 in the paper. The dependent variable is long-run stock returns (*Returns*) in the top panel, in the middle panel, and earnings forecast optimism in the bottom panel, for three sub-samples: (1) brokerages with a Carter-Manaster rank of zero, *Non-Investment Banks*, (2) brokerages with a low investment banking profile (Carter-Manaster rank between 1.1 and 8.1), *Non-Top-Tier Investment Banks*, and (3) for top-tier investment banks (Carter-Manaster rank of 9.1), *Top-Tier Investment Banks*. For brevity we present only the coefficient of the variable of interest, *Initiation*. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Reported *t*-statistics are based on standard errors estimated using the Huber (1967)–White (1980) procedure, with firm-level clustering (Rogers 1993). All variables are defined in the "Appendix"

5.2 Subsequent operating performance

In this section, we examine the operating performance of favorable initiation and non-initiation firms after the recommendation issuance. Our objective is to see whether the long-run returns to initiation recommendations are consistent with the firm fundamentals. Specifically, we focus on future return on equity, sales growth, and delistings. To study future profitability we estimate the following regression, with standard errors clustered by firm:

$$\begin{aligned} \textit{Future Return on Equity} = {} & \alpha_0 + \alpha_1 \textit{Initiation} + \alpha_2 \textit{All-Star} + \alpha_3 ln(\textit{Brokerage Size}) \\ & + \alpha_4 \textit{Experience} + \alpha_5 \textit{Number of Firm} + \alpha_6 ln(\textit{Size}) \\ & + \alpha_7 \textit{Book-to-Market} + \alpha_8 \textit{Sales Growth} \\ & + \alpha_9 \textit{Return on Equity} + \alpha_{10} \textit{Leverage} + \alpha_{11} \textit{Past Returns} \\ & + \alpha_{12} \textit{Analyst Following} + \alpha_{13} \textit{IPO} \\ & + \textit{Year Fixed Effects} + \upsilon \end{aligned} \tag{7a}$$

The dependent variable, *Future Return on Equity*, is defined as income before extraordinary items available to common shareholders during the fiscal year after the year of the recommendations scaled by average equity (see "Appendix" for detailed description of variables). To control for industry effects, we adjust this variable by subtracting its two-digit industry mean for the fiscal year. *Leverage* is debt scaled by total assets. All other variables are as defined in Sect. 4.1.

To study future sales growth, we estimate a variant of Eq. 7a where the dependent variable, *Change in Sales Growth*, is sales growth in year $t + 1$ less sales growth in year t where t is the year of the recommendations. The control variables in this specification are identical to those in Eq. 7a except we exclude *Sales Growth* and replace *Return on Equity* with *Return on Assets*.

Finally, to study future delisting events we estimate the following logistic regression with standard errors clustered by firm:

$$\begin{aligned} Pr(\textit{Delist}) = {} & \alpha_0 + \alpha_1 \textit{Initiation} + \alpha_2 \textit{All-Star} + \alpha_3 ln(\textit{Brokerage Size}) \\ & + \alpha_4 \textit{Experience} + \alpha_5 \textit{Number of Firm} + \alpha_6 ln(\textit{Size}) + \alpha_7 \textit{Book-to-Market} \\ & + \alpha_8 \textit{Return on Assets} + \alpha_9 \textit{Altman Z} - \textit{Score} + \alpha_{10} \textit{Past Returns} \\ & + \alpha_{11} \textit{Analyst Following} + \alpha_{12} \textit{IPO} + \textit{Year Fixed Effects} + \upsilon \end{aligned} \tag{7b}$$

The dependent variable, *Delist*, is an indicator variable that is equal to one if the firm is delisted within the 2-year window after the recommendation date and zero otherwise. We limit our definition of delisting to firms that liquidate or that are dropped by exchanges as a result of poor performance. We include *Altman Z-Score* to control for firms' bankruptcy risk and thus drop control variables that are subsumed by and are highly correlated with this variable (that is, *Sales Growth* and *Leverage*).

Table 6 Panels A and B present the results. Panel A shows that industry-adjusted future return on equity is statistically (but not economically) significantly lower for

Table 6 Subsequent operating performance

Panel A: Future return on equity and change in sales growth

	Future Return on Equity			*Change in Sales Growth*		
	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)	*Strong Buy and Buy* Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Intercept	−0.0825***	−0.0777***	−0.0862***	−0.3252***	−0.2919***	−0.3483***
	(−6.00)	(−5.11)	(−5.86)	(−9.46)	(−7.30)	(−9.43)
Initiation	−0.0002	−0.0052*	0.0036	−0.0341***	−0.0444***	−0.0259***
	(−0.11)	(−1.95)	(1.43)	(−4.92)	(−4.50)	(−3.07)
All-Star	0.0111***	0.0115***	0.0109***	0.0312***	0.0421***	0.0235**
	(3.71)	(2.83)	(3.30)	(3.66)	(3.35)	(2.47)
ln(*Brokerage Size*)	0.0008	0.0001	0.0016	0.0046	0.0026	0.0072**
	(0.80)	(0.08)	(1.40)	(1.54)	(0.64)	(2.01)
Experience	0.0008***	0.0007***	0.0009***	0.0042***	0.0034***	0.0047***
	(4.46)	(3.14)	(3.94)	(7.44)	(4.88)	(6.80)
Number of Firms	−0.0001	0.0001	−0.0001	0.0014***	0.0016***	0.0013***
	(−0.63)	(0.53)	(−1.36)	(5.80)	(4.77)	(4.71)
ln(*Size*)	0.0142***	0.0133***	0.0148***	0.0069	0.0035	0.0086*
	(6.95)	(6.31)	(6.84)	(1.42)	(0.67)	(1.68)
Book-to-Market	−0.0753***	−0.0769***	−0.0739***	0.3220***	0.3068***	0.3332***
	(−8.99)	(−8.40)	(−8.12)	(12.79)	(11.64)	(12.31)
Sales Growth	−0.0703***	−0.0616***	−0.0776***			
	(−11.66)	(−10.20)	(−11.88)			
Return on Equity	0.3959***	0.3887***	0.4010***			
	(23.79)	(20.70)	(23.06)			

Table 6 continued

Panel A: Future return on equity and change in sales growth

	Future Return on Equity			*Change in Sales Growth*		
	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)	*Strong Buy and Buy* Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Return on Assets				0.9412***	0.7791***	1.0707***
				(9.62)	(8.18)	(9.84)
Leverage	−0.0054	−0.0017	−0.0100	0.1970***	0.1793***	0.2064***
	(−0.34)	(−0.10)	(−0.58)	(4.69)	(4.21)	(4.53)
Past Returns	0.0263***	0.0223***	0.0293***	0.0599***	0.0460***	0.0712***
	(6.69)	(5.43)	(6.62)	(4.90)	(3.91)	(4.99)
Analyst Following	−0.0001	−0.0001	−0.0001	−0.0020*	−0.0006	−0.0029**
	(−0.22)	(−0.11)	(−0.23)	(−1.72)	(−0.56)	(−2.28)
IPO	−0.0360***	−0.0372**	−0.0364**	−0.4848***	−0.5434***	−0.4340***
	(−2.62)	(−2.51)	(−2.26)	(−8.50)	(−7.94)	(−7.40)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	117,392	52,239	65,153	124,891	55,520	69,371
Adjusted R^2 (%)	23.40	22.20	24.30	9.82	8.20	11.30

Panel B: Probability of being delisted

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Intercept	−2.4455***	−2.5726***	−2.4009***
	(−6.05)	(−5.06)	(−5.10)

Table 6 continued

Panel B: Probability of being delisted

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Initiation	0.1271**	0.1683**	0.1082
	(2.10)	(2.06)	(1.39)
All-Star	0.0317	0.0198	0.0509
	(0.27)	(0.12)	(0.37)
ln(Brokerage Size)	−0.0466	−0.0551	−0.0448
	(−1.44)	(−1.35)	(−1.16)
Experience	−0.0007	−0.0014	−0.0003
	(−0.11)	(−0.17)	(−0.04)
Number of Firms	−0.0201***	−0.0203***	−0.0202***
	(−4.88)	(−3.63)	(−4.04)
ln(Size)	−0.3263***	−0.3065***	−0.3295***
	(−4.97)	(−4.52)	(−4.58)
Return on Assets	−2.5137***	−2.2874***	−2.6369***
	(−13.42)	(−11.60)	(−12.44)
Altman Z-Score	−0.0251***	−0.0302***	−0.0225**
	(−2.82)	(−3.24)	(−2.35)
Past Returns	−0.4521**	−0.2547	−0.6705***
	(−2.04)	(−1.31)	(−2.91)
Analyst Following	0.0184	0.0196	0.0152
	(0.95)	(0.96)	(0.77)
IPO	0.6226***	0.8530***	0.4464*
	(2.90)	(3.91)	(1.75)

Table 6 continued

Panel B: Probability of being delisted

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Year fixed effects	Yes	Yes	Yes
N	134,308	59,604	74,704
Pseudo R^2 (%)	13.70	12.20	15.20

Panel A presents regression results for Eq. 7a in the paper, where the dependent variable is *Future Return on Equity* or *Change in Sales Growth*. Panel B reports the results for Eq. 7b in the paper, where the dependent variable, *Delist*, is equal to one if the firm is delisted within the 2-year window after the recommendations and zero otherwise. In each panel, the number of observations is limited to the sample for which the control variables are not missing. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Reported *t*-statistics are based on standard errors estimated using the Huber (1967)–White (1980) procedure, with firm-level clustering (Rogers 1993). All variables are defined in the "Appendix"

initiation firms with *Strong Buy* recommendations ($\alpha_1 = -0.0052$, $t = 1.95$).[22, 23] Initiation firms with *Strong Buy* and *Buy* recommendations experience significantly lower change in sales growth ($\alpha_1 = -0.0444$ for *Strong Buy* recommendations, $t = 4.50$; $\alpha_1 = -0.0259$ for *Buy* recommendations, $t = 3.07$), although these results may be partially due to mean reversion in sales growth. Finally, Panel B shows that initiation firms with *Strong Buy* recommendations are more likely to delist due to poor performance during the subsequent 2-year window than non-initiation firms ($\alpha_1 = 0.168$, $t = 2.06$).

Collectively, we find some evidence that initiation firms with *Strong Buy* recommendations experience poorer future operating performance than non-initiation firms, consistent with the results for long-run under-performance in stock returns for *Strong Buy* initiations.

5.3 Subsequent earnings announcement returns

Previous results show that *Strong Buy* and, to a lesser degree, *Buy* initiation recommendations systematically underperform non-initiation recommendations. Similar to any long-term over-/underperformance study, one concern with the above results is that the underperformance of initiations is due to model misspecification, missing variables that we do not control for or both. To alleviate such concerns, we study whether the predictable stock returns are concentrated around subsequent quarterly earnings announcements when fundamental information becomes available to the market. Expected returns are trivial at the daily basis (Fama 1998), suggesting any controls and model specifications become less important for earnings announcement returns. Specifically, we estimate the following regression model for the pooled sample and separately for *Strong Buy* and *Buy* recommendations:

$$\begin{aligned} EA\,Returns = {} & \alpha_0 + \alpha_1 Initiation + \alpha_2 All\text{-}Star + \alpha_3 ln(Brokerage\,Size) \\ & + \alpha_4 Experience + \alpha_5 Number\,of\,Firms + \alpha_6 Revision\,Time \\ & + \alpha_7 ln(Size) + \alpha_8 Book\text{-}to\text{-}Market + \alpha_9 Sales\,Growth \\ & + \alpha_{10} Return\,on\,Assets + \alpha_{11} Past\,Returns \\ & + \alpha_{12} Analyst\,Following + \alpha_{13} IPO + Year\,Fixed\,Effects + \upsilon \end{aligned} \quad (8)$$

[22] We also estimate Eq. 7a without industry-adjusting the *Future Return on Equity*. Results (not tabulated) are similar to the results in Table 6 Panel B ($\alpha_1 = -0.0050$, p-value $= 0.064$ for the *Strong Buy* sample).

[23] McNichols and O'Brien (1997) also study return on equity after coverage initiations. In univariate tests, they report higher median return on equity and median industry adjusted return on equity for firms with continuous coverage (corresponding to non-initiations in our setting) than for added stocks (corresponding to initiations in our setting). They focus on return on equity in the fiscal year during which analysts initiate coverage. In contrast, we focus on return on equity in the year after the fiscal year during which the recommendation is issued. This focus is appropriate for our setting because we are interested in whether the long-run returns to stock recommendations reflect firm fundamentals. When we estimate Eq. 7a with industry-adjusted contemporaneous return on equity as the dependent variable, the coefficient of *Initiation* is insignificant for the sample of *Strong Buy* recommendations ($\alpha_1 = 0.0002$, p-value $= 0.930$).

The dependent variable, *EA Returns*, is the market-adjusted earnings announcement returns over the [−1, 1] window, where day 0 is the earnings announcement date. We focus on earnings announcements between the recommendation date and the revision date. If there is more than one earnings announcement during this period, we use the average returns over the earnings announcements. $\alpha_1 < 0$ for *Strong Buy* and *Buy* recommendations will suggest that market reacts to unfavorable fundamental information (such as poor *ROE* or sales growth) when it becomes publicly available.

Table 7 displays the results. The coefficient of *Initiation* is negative and significant for both *Strong Buy* and *Buy* recommendations ($\alpha_1 = -0.004$ in the *Strong Buy* sample and $\alpha_1 = -0.002$ in the *Buy* sample). These results lend support to the idea that adverse fundamental information becomes available for initiations during the subsequent earnings announcements, resulting in lower long-term stock returns for initiations.

5.4 The exclusion of IPO firms from our sample

Prior literature shows that IPO stocks underperform the market in the post-IPO period (Ritter 1991). Because the proportion of IPO firms in our initiation sample is greater (4% of initiations are issued for IPO firms compared with 1.5% of non-initiations, see Table 2 Panel A), we want to ensure that our results are not driven by IPO firms. To address this issue, we exclude recommendations issued within 1 year of the IPO date from our sample and rerun all our analyses. We find qualitatively similar results with or without IPO firms across a variety of tests (including the additional analysis we conduct on operating performance, delistings, and earnings announcement returns). For example, the coefficient of *Initiation* for *Strong Buy* recommendations is −0.036 and significant at 1% level when we estimate Eq. 1 after excluding IPO firms, comparable with the reported results in Panel B of Table 2. The only exception in our tests is that, in the *p*-score matched design (Panel C of Table 4), the mean return difference between initiations and non-initiations becomes statistically insignificant, although the median difference is still strongly significant.

6 Conclusion

We evaluate the reporting, selection, and processing explanations for the favorable distribution of analyst recommendations. We focus on coverage initiations, which are known to be more optimistic than other recommendations, and compare them with non-initiation recommendations. Our research objective is to distinguish between the reporting, selection, and processing explanations for optimism in initiations in particular and in all recommendations in general, using differences in long-run stock performance and properties of accompanying earnings forecasts.

We find that *Strong Buy* initiation recommendations underperform uniformly their non-initiation counterparts in a variety of tests after controlling for analyst, brokerage, and firm characteristics associated with the initiation decision and the

Table 7 Subsequent earnings announcement returns

	Strong Buy and Buy Coefficient (*t*-statistic)	*Strong Buy* Coefficient (*t*-statistic)	*Buy* Coefficient (*t*-statistic)
Intercept	−0.013***	−0.019***	−0.009***
	(−5.07)	(−5.85)	(−2.99)
Initiation	−0.003***	−0.004***	−0.002***
	(−5.92)	(−6.29)	(−2.80)
All-Star	−0.000	−0.001	0.000
	(−0.01)	(−0.55)	(0.34)
ln(Brokerage Size)	0.000**	0.000	0.001*
	(2.13)	(0.91)	(1.80)
Experience	−0.000	−0.000	−0.000
	(−0.79)	(−0.60)	(−0.56)
Number of Firms	0.000	0.000	0.000
	(1.42)	(0.73)	(1.45)
Revision Time	0.000***	0.000***	0.000***
	(15.18)	(14.64)	(9.07)
ln(Size)	−0.000	0.000	−0.001*
	(−0.71)	(0.85)	(−1.83)
Book-to-Market	0.003**	0.004**	0.002*
	(2.28)	(2.37)	(1.65)
Sales Growth	−0.003***	−0.003***	−0.003***
	(−4.24)	(−3.27)	(−4.32)
Return on Assets	0.016***	0.017***	0.016***
	(5.13)	(4.47)	(4.46)
Past Returns	0.000	0.000	−0.000
	(0.09)	(0.33)	(−0.04)
Analyst Following	0.000	−0.000	0.000*
	(0.84)	(−0.58)	(1.76)
IPO	−0.003	−0.008**	0.001
	(−1.23)	(−2.45)	(0.43)
Year fixed effects	Yes	Yes	Yes
N	115,583	51,835	63,748
Adjusted R^2 (%)	1.04	1.57	0.76

The table presents regression results for Eq. 8 in the paper, where the dependent variable subsequent earnings announcement returns (*EA Returns*). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Reported *t*-statistics are based on standard errors estimated using the Huber (1967)–White (1980) procedure, with firm-level clustering (Rogers 1993). All variables are defined in the "Appendix"

long-run returns to recommendations. The underperformance is weaker for *Buy* initiations. We also find that earnings forecasts accompanying favorable initiations are more accurate and less optimistic than those accompanying non-initiation

recommendations. Taken together, these results lend support to the reporting explanation for the optimism in recommendations.

There are a number of key takeaways from our study. First, although the reporting, selection, and processing explanations are not mutually exclusive, the reporting explanation appears to be the dominant explanation for analyst optimism. Second, reporting incentives are not limited to those stemming from affiliation. Thus, studies that rely on the affiliated/unaffiliated partition understate the implications of conflicts of interest, which may arise in a variety of contexts. Finally, initiation recommendations have lower future stock returns yet are accompanied by more accurate earnings forecasts than non-initiation recommendations, suggesting that investors should rely more on earnings forecasts than on recommendations for initiations.

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Appendix

See Table 8.

Table 8 Variable definitions

Variables used in the recommendation returns regressions	
Returns	Market-adjusted buy-and-hold returns to recommendations calculated as the raw return less the value-weighted market returns measured over the window starting 1 day before the recommendation date and ending 1 day after the revision date. If the revision date is missing or the revision is issued longer than 1 year after the recommendation date, we set the ending day of the return period as 1 year after the recommendation date
Initiation	An indicator variable that is equal to one for initiations and zero otherwise
All-Star	An indicator variable that is equal to one for analysts that have All-Star status at the time of the recommendation
Brokerage Size	Brokerage size calculated as the number of analysts at the brokerage that issued annual earnings forecasts during the year of the recommendation
Experience	Analyst experience in the year of the recommendation measured as the number of years since the analyst's first earnings forecast in I/B/E/S
Number of Firms	Number of firms for which analyst issues an annual earnings forecast during the year of the recommendation
Revision Time	Number of days between the recommendation date and the revision date
Size	Market capitalization calculated as COMPUSTAT annual item *csho* multiplied by COMPUSTAT annual item *prcc_f* measured at the end of the most recent fiscal year ending at least 3 months before the recommendation date

Table 8 continued

Book-to-Market	Book-to-market ratio measured as COMPUSTAT item *ceq* divided by *Size*
IPO	An indicator variable that is equal to one if the firm had an IPO during the 1-year period preceding the recommendation
Sales Growth	Annual sales growth calculated as COMPUSTAT item *sale* in year t less *sale* in year $t-1$ scaled by *sale* in year $t-1$ where year t is the most recent fiscal year ending at least 3 months before the recommendation date
Return on Assets	Return on assets of the firm for the most recent fiscal year ending at least 3 months before the recommendation date, calculated as COMPUSTAT item *ib* divided by average assets
Past Returns	Market-adjusted buy-and-hold return for the year that ends at the beginning of the month of the recommendation
Analyst Following	Number of other analysts who issue recommendations for the company during the year of recommendation
Variables used in the earnings forecast regressions	
Relative Forecast Accuracy	Forecast accuracy calculated as $\left(-1 \times \frac{AFE_{ijk}-\overline{AFE}}{\overline{AFE}}\right)$ where AFE_{ijk} is the absolute forecast error for annual earnings forecast k that analyst i issues for firm j. $\overline{AFE}$ is the mean absolute error (forecast less the actual) of all forecasts that are issued by other analysts for firm j during the 60-day period prior to and including the issue date of forecast k. This measure controls for firm-year effects by subtracting the mean absolute forecast error, $\overline{AFE}$, from the analyst's absolute forecast error. Higher values correspond to higher levels of accuracy
Relative Forecast Optimism	Relative forecast optimism calculated as $\left(\frac{FE_{ijk}-\overline{FE}}{\overline{AFE}}\right)$ where FE_{ijk} is signed forecast error (forecast less the actual) for forecast k issued by analyst i for firm j
Relative Experience	*Experience* less average experience of all analysts issuing a forecast for the same firm during the 60-day period prior to and including the issue date of forecast k
Relative Number of Firms	*Number of Firms* less average following of all analysts issuing a forecast for the same firm during the 60-day period prior to and including the issue date of forecast k
Relative Number of Forecasts	*Number of Forecasts* less average number of forecasts of all analysts issuing a forecast for the same firm during the 60-day period prior to and including the issue date of forecast k
Relative Horizon	The number of days between forecast date and report date of earnings (*Horizon*) less average horizon of the forecasts issued by other analysts for the same firm during the 60-day period prior to and including the issue date of forecast k
Variables used in conflict of interest and subsequent performance regressions	
Non-IBank	An indicator variable that is equal to one if the analyst works for a brokerage with a Carter-Manaster rank of zero during the year of the recommendation
IBank	An indicator variable that is equal to one if the analyst works for a brokerage with a Carter-Manaster rank between 1.1 and 8.1 during the year of the recommendation
Toptier	An indicator variable that is equal to one if the analyst works for a brokerage with a Carter-Manaster rank of 9.1 during the year of the recommendation
Future Return on Equity	Future return on equity for the fiscal year after the fiscal year in which the recommendation is issued, calculated as COMPUSTAT item *ibcom* scaled by average equity

Table 8 continued

Change in Sales Growth	*Sales Growth* in fiscal year $t + 1$ less *Sales Growth* in fiscal year $t - 1$ less where fiscal year t is fiscal during which the recommendation is issued
Delist	An indicator variable that is equal to one if the firm is delisted due to liquidation or poor performance (CRSP delisting codes 400–799) within the 2-year window after the recommendation date and zero otherwise
Return on Equity	Return on equity for the most recent fiscal year ending at least 3 months before the recommendation date, calculated as COMPUSTAT item *ibcom* scaled by average equity
Leverage	Leverage for the most recent fiscal year ending at least 3 months before the recommendation date, calculated as COMPUSTAT item *dd1* plus *dltt* scaled by total assets
Altman Z-Score	*Altman's Z-score* measured in the most recent fiscal year ending at least 3 months before the recommendation date. Following Altman (1968), the Z score equals 1.2(net working capital/total assets) + 1.4(retained earnings/total assets) + 3.3(earnings before interest and taxes/total assets) + 0.6(market value of equity/book value of liabilities) + 1.0(aales/total assets). Lower *Altman's Z-scores* indicate poorer financial health

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