J Bus Ethics (2018) 151:761–783
https://doi.org/10.1007/s10551-016-3244-1

The Integrity of Financial Analysts: Evidence from Asymmetric Responses to Earnings Surprises

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Received: 21 September 2015 / Accepted: 16 June 2016 / Published online: 6 July 2016

Abstract This paper investigates the integrity of financial analysts by examining their recommendation responses to large quarterly earnings surprises. Although there is no significant difference in recommendation changes between affiliated and unaffiliated analysts in response to positive earnings surprises, affiliated analysts are more reluctant than unaffiliated analysts to downgrade stock recommendations in response to negative earnings surprises. The evidence implies that conflicts of interest undermine the integrity of financial analysts. We further examine the effects of reputation concern and the Global Research Analyst Settlement as informal and formal mechanisms, on restoring analysts' integrity. The results show that the positive bias in recommendations remains prevalent for affiliated analysts from reputable investment banks and for the postreform period. Finally, evidence from market reactions suggests that investors fail to notice that analysts' integrity is compromised by conflicts of interest and are misled by affiliated analysts.

Keywords Integrity · Analysts' response · Conflicts of interest · Earnings surprises

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Introduction

Financial analysts provide professional expertise and communication channels for both managers and investors. Their role in protecting investors and ensuring investor well-being in capital markets has received increasing attention from investors, regulators, and researchers. As important participants in the stock market, analysts collect and analyze firm financial information and other publicly available information, forecast revenues and earnings, and issue stock recommendations. The information and recommendations contained in analyst reports help investors to identify investment opportunities and risks. Previous studies have generally concluded that analysts provide valuable information that enhances market efficiency (e.g., Schipper 1991; Brown 2000). They also serve as whistleblowers on corporate fraud, accounting for 16.9 % of fraud detection (Dyck et al. 2010), and deter managers from engaging in opportunistic behavior, thereby decreasing earnings management, corporate fraud, and the modification of audit opinions (Yu 2008; Chen et al. 2014 and Chen et al. 2015a, b).

However, a number of studies have raised concerns about the integrity of financial analysts in capital markets. Jensen (2011) defines analysts with integrity as those who keep their word, i.e., honor their commitments and fulfill their promises on time, and who are honest and straightforward. Using data collected by a mail survey of security analysts, Veit and Murphy (1996) document that approximately 25 % of the analysts in the sample had experienced or observed unethical behavior by a colleague, such as a lack of diligence and thoroughness in making recommendations, or writing reports with predetermined conclusions. Cote and Goodstein (1999) question the ethics of analysts' practice of withholding their private opinions and argue

that analysts' herding behavior has long-term ramifications for the efficient pricing of securities and the preservation of public trust in the financial services industry. Other studies show that conflicts of interest reduce analysts' integrity, as reflected in biased recommendations (Lin and McNichols 1998; Michaely and Womack 1999; O'Brien et al. 2005; Palazzo and Rethel 2008; Kolasinski and Kothari 2008; Wu et al. 2015). In the Financial Market Integrity Outlook Survey conducted by the CFA Institute in 2011, financial advisors in the global markets received a score of only 3 out of a possible 5 for integrity. Financial advisory services are considered to have the most serious ethical issues.[1]

The aim of this study is to shed further light on the topical yet under-researched issue of the integrity of financial analysts by taking earnings surprises into account to investigate how conflicts of interest determine analysts' recommendation responses. We also examine the effectiveness of informal (reputation concern) and formal mechanisms (the Global Research Analyst Settlement of 2003, hereafter the Global Settlement) in restoring their integrity and explore whether the market recognizes the systematic bias caused by the reduced integrity of financial analysts.

Conflicts of interest may arise when sell-side analysts, who are employed by investment banks or brokerage firms,[2] are under pressure from their employers (i.e., investment banks) to produce favorable research reports either to maintain relationships with current investment banking clients or to attract such clients. Underwriting equity or bond offerings are an important revenue source for investment banks, and optimistic reports may encourage clients to buy securities and increase brokerage commissions (e.g., Cowen et al. 2006). Analysts also have an incentive to maintain good relationships with the managers of the firms they follow, as management provides an important information source (e.g., Francis et al. 1997; Das et al. 1998). Analysts employed by a merger and acquisition (M&A) advisor also tend to make optimistic recommendation revisions over a 180-day period surrounding the M&A announcement (e.g., Kolasinski and Kothari 2008; Wu et al. 2015). Sell-side analysts, regarded as affiliated analysts, are subject to more conflicts of interest than unaffiliated analysts whose employers have no investment banking relationships with the firms they follow.

We extend the studies of analyst optimism by focusing on analysts' responses to earnings surprises, which represent important new information released to the market.[3] We argue that conflicts of interest may impede affiliated analysts from incorporating negative earnings surprises in their recommendations. Large negative earnings surprises usually indicate a firm's unexpected financial deterioration and are a red flag to investors, alerting observant analysts to the need to revise their earnings forecasts and recommendations (Brown and Rozeff 1979; Stickel 1989).[4] A set of firms with earnings surprises thus provides an interesting context in which to investigate analysts' recommendation changes and any possible bias involved in these changes. While large positive earnings surprises represent good news for the market and for both affiliated and unaffiliated analysts, large negative earnings surprises make conflicts of interest more severe for affiliated analysts than for unaffiliated analysts.

In the absence of conflicts of interest, we expect to observe a symmetric pattern in the recommendation changes made by affiliated and unaffiliated analysts following both positive and negative earnings surprises. However, when conflicts of interest deteriorate integrity, the responses of affiliated and unaffiliated analysts to large positive and negative earnings surprises are expected to be asymmetric. More specifically, we do not expect to observe any significant difference in recommendation changes between affiliated and unaffiliated analysts following large positive earnings surprises, whereas the following large negative earnings surprises, affiliated analysts with conflicts of interest are less likely than unaffiliated analysts to downgrade their stock recommendations.

We analyze 52,862 firm-quarter-analyst observations from the period 1994–2005 on 7568 large quarterly earnings surprises (4591 positive and 2977 negative) reported by firms publicly listed in the US. The results confirm our

[1] Source: the CFA Institute Financial Market Integrity Outlook Survey (http://www.cfainstitute.org/ethics/topics/Pages/financial_market_integrity_index.aspx).

[2] In contrast, buy-side analysts are employed by pension-fund or mutual-fund companies and manage money on behalf of their clients. These analysts research stocks and make recommendations to the funds' financial managers. Conflicts of interest are generally of less concern among buy-side analysts.

[3] Prior studies report that large earnings surprises, particularly large negative earnings surprises, are costly to firms (e.g., Mikhail et al. 2004; Doyle et al. 2006; Ng 2007). Managers are thus motivated to avoid large negative earnings surprises and report earnings that are consistent with market expectations (e.g., Kasznik and NcNichols 2002; Matsumoto 2002). Firms facing large negative earnings surprises are also more likely to make discretionary disclosures to warn investors about disappointing earnings (Kasznik and Lev 1995).

[4] In comparison with earnings that meet or marginally exceed analysts' expectations, which many researchers interpret as the outcome of earnings management (e.g., Burgstahler and Dichev 1997; Hayn 1995), large positive earnings surprises are less likely to be the result of managers' earnings manipulation. Likewise, large negative earnings surprises are less likely to be the result of firms' use of the "big bath" technique. Large negative earnings surprises may be interpreted as an indication of a firm's financial distress because it is relatively difficult for management to boost earnings through earnings management to an extent that they can substantially meet analysts' earnings expectations.

expectations. We find that in response to large positive earnings surprises, there is no significant difference in recommendation changes between affiliated and unaffiliated analysts—they both upgrade their stock recommendations in a similar way to reflect the favorable information content of large positive earnings surprises. In response to large negative earnings surprises, however, affiliated analysts are less likely than unaffiliated analysts to downgrade stocks. The reluctance of affiliated analysts to issue negative recommendations (in the form of stock downgrades) to investment banking clients provides evidence of the violation of integrity when conflicts of interest occur.

We proceed to examine whether informal and formal disciplinary mechanisms can be used to enhance the integrity of financial analysts. As a good reputation in capital markets can provide financial intermediaries with benefits such as perceived credibility and trustworthiness, which are critical to their success in attracting clients, we argue that reputation concern may be an informal mechanism motivating unbiased recommendations. More prestigious investment banks have greater reputation concern as they have more to lose, are more visible in the market, and are thus subject to more public scrutiny. Therefore, we attempt to determine whether patterns of responses to positive and negative earnings surprises are different among analysts from prestigious investment banks. The results show that analysts at prestigious investment banks do not behave differently from analysts at less prestigious banks, implying that reputation concern fails to enhance integrity by promoting independent and unbiased recommendations. This is in line with Fang and Yasuda's (2009) finding that a bank's reputation concern does not offset the effects of conflicts of interest.

The formal mechanism for restoring analysts' integrity examined in this study is the Global Settlement. Aimed to mitigate analysts' conflicts of interest, this reform explicitly prohibits the tying of analysts' compensation to investment banking business, and requires investment banks to prevent internal communication and interaction that could lead to conflicts of interest by separating their securities underwriting departments from their stock research departments using "Chinese walls" or other information barriers.[5] We attempt to determine whether the Global Settlement reduces analysts' conflicts of interest and encourages analysts to issue unbiased recommendations. Our results show that the positive bias in recommendations remains prevalent after the introduction of the Global Settlement. In line with Boni's (2005) finding that regulatory reform is incapable of eliminating positively biased recommendations, our results enrich the studies of the Global Settlement. Wu et al. (2015) document that the benefits of the reform is only limited to the reduction of optimism estimated over a 180-day period surrounding the M&A announcement. When the optimism is estimated in the 90-day period prior to the announcement, the impact is no longer effective. It is worth noting that biased recommendation during this period is more likely to mislead investors because the market has not yet known whether the analyst's brokerage had won an advisory contract with the "to be announced" acquirer. Likewise, Boni and Womack (2003) suggest that although the new rules encourage more independent research, financial analysts may still be under pressure to issue positively biased reports to retain their relationships with the managers of client firms.[6]

Finally, we examine the extent to which investors are aware of the compromised integrity posed by conflicts of interest by examining the market reactions to recommendation changes made by affiliated and unaffiliated analysts. As affiliated analysts are more likely to be biased, investors should regard unaffiliated analysts as more credible (Kroszner and Rajan 1994; Gompers and Lerner 1999). However, the results show that investors do not react differently to recommendation changes issued by affiliated and unaffiliated analysts, suggesting that investors fail to recognize integrity risks and are misled by positively biased recommendations made by affiliated analysts.

This study contributes to the literature in various ways. First, we extend the literature on the integrity of financial analysts by examining whether they adjust their recommendations when firm earnings are inconsistent with their predictions. While the literature focuses on recommendation optimism in general without taking earnings surprises into account, we examine analysts' reactions when they are proved wrong, a circumstance in which analysts' conflicts of interest become a salient issue. We provide original evidence of the positively biased changes in recommendations made by sell-side analysts in response to large quarterly earnings surprises. The results indicate that analysts' private interests may take precedence over their obligation to provide accurate recommendations, i.e., conflicts of interest undermines the integrity of financial analysts.[7]

[5] See the news release by the Securities and Exchange Commission (SEC) at http://www.sec.gov/news/press/2003-54.htm.

[6] According to *The Wall Street Journal* (Dec. 11, 2014), Goldman Sachs, Citigroup, and eight other investment banks were collectively fined $43.5 million by the Financial Industry Regulatory Authority in 2014. The banks were accused of offering favorable stock research reports to attract underwriting business in an initial public offering by Toys'R' Us. This case suggests that conflicts of interest remain to be an issue for some investment banks.

[7] The CFA Institute, a global association of professional financial analysts, recently published a Code of Ethics and Standards of Professional Conduct (effective from July 1, 2014), which defines principles that help analysts to manage their conflicts of interest.

Second, we add to the literature on the ethical implications of reputation by examining the role of the reputation concern of investment banks in mitigating conflicts of interest (i.e., Carter and Manaster 1990; Fang 2005). Our findings show that the effectiveness of reputation as an informal disciplinary mechanism to mitigate the self-interest of financial analysts is essentially limited.

Third, our study enriches the growing literature on the Global Settlement (i.e., Kadan et al. 2009; Clarke et al. 2009; Wu et al. 2015) by examining the extent to which the reform promotes independent and unbiased recommendations. The findings show that the reform has failed to restore the integrity of financial analysts, as the recommendations made by affiliated analysts continue to be positively biased. The results are broadly in line with the literature which concludes that the impact of the reform is rather limited, at least not as effective as hoped by regulators. Further actions should be taken and policies introduced to cultivate analysts' moral resolution and integrity. Investors should also be made aware of the compromise of financial analysts' integrity as reflected in their positively biased recommendations.

The remainder of this study is organized as follows. We provide a motivating example in the next section. In "Literature Review and Development of Hypotheses" section, we review the relevant literature and develop our hypotheses. We report the data and research design in "Methodology and Data" section, and the empirical results in "Empirical Results" section. "Conclusion" section concludes the study.

A Motivating Example

We consider the example of New Century Financial Corporation, a subprime mortgage lender delisted on March 13, 2007 when the price of its stocks fell to \$0.67 (from \$51.97 in May 2006). As illustrated in Appendix, the firm reported a negative earnings surprise of 41 % in the third quarter of 2006, following an initial negative surprise of 2 % in the previous quarter. Despite this large earnings surprise, analysts continued to issue optimistic recommendations. Of the 10 ratings given within the month after the firm's earnings surprise announcement in the third quarter of 2006, two were "strong buy," five were "buy," two were "hold," and only one was "sell." Analysts remained relatively optimistic about the stock until as little as 1 week before the delisting; the 12 recommendations issued that week still included one "buy" rating and seven "hold" ratings. The consensus recommendation level was 3.4 (equivalent to a "strong hold" rating), despite a sharp decline in the firm's stock price due to massive publicized mortgage losses. Further examination reveals that two investment banks underwrote the firm's securities issuances by \$100 million in 2006. None of the analysts from these investment banks issued a "sell" rating for the stock.[8]

This example clearly shows how analysts' responses to a firm's earnings surprises may be compromised by incentives related to maintain or create underwriting relationships—perhaps to generate more revenue by underwriting a firm's securities in the future.[9] The example motivates us to examine analysts' responses to important news events—namely large earnings surprises—when updating their stock recommendations in the presence of conflicts of interest.

Literature Review and Development of Hypotheses

Analyst Recommendations and Positive Earnings Surprises

Financial analysts respond promptly to new information, and their stock reports and information dissemination promote market efficiency by helping investors to more accurately value companies (Schipper 1991; Brown 2000). Brown and Rozeff (1979) find that analysts revise their forecasts in response to new information by decreasing (increasing) their quarterly earnings forecasts in response to previous high (low) predictions. Stickel (1989) reports that revisions increase following earnings announcements because analysts reevaluate a firm's stock after new earnings information is published. Large earnings surprises represent important information. Analysts are expected by both investment banks and investors to update their valuations subsequent to quarterly earnings announcements to help investors to process the new information.

Large positive earnings surprises represent good news for the market and for both affiliated and unaffiliated analysts and do not induce conflicts of interest. As a result, we expect to observe similar pattern of changes in the recommendations of affiliated and unaffiliated analysts following large positive earnings surprises. That is, both affiliated and unaffiliated analysts are expected to upgrade their recommendations in the same way to reflect the favorite information content of large positive earnings surprises. We develop our first hypothesis as follows.

[8] We collected analysts' recommendation ratings and earnings surprises from Yahoo! Finance (http://finance.yahoo.com). The information on the firm's securities issuance was drawn from its 2006 10Q form.

[9] Responses may also be compromised merely by analysts' ignorance or lack of research. We indirectly investigate these possibilities by adding analyst experience as a control variable in our regression analysis.

H1 There is no significant difference between affiliated and unaffiliated analysts' responses to positive earnings surprises.

Analyst Recommendations and Negative Earnings Surprises

When firms report large negative earnings surprises, conflicts of interest become more pronounced for affiliated analysts, because unfavorable changes to their stock recommendations may reduce commissions and harm their business relationships with investment banking clients. Large negative earnings surprises therefore induce more conflicts of interest for affiliated analysts than unaffiliated analysts, as the latter are more independent.

Although sell-side analysts are professionally obliged to make downward forecast revisions and downgrade stocks to maintain forecast accuracy in response to negative surprises, pressure from investment banks to write favorable reports to maintain or create underwriting relationships may take precedence over their integrity, leading to a positive bias in the earnings forecasts and stock recommendations made by affiliated financial analysts. Therefore, we expect to observe differences in the patterns of recommendation changes made by affiliated and unaffiliated analysts in response to large negative earnings surprises, as stated in our second hypothesis below.

H2 Affiliated analysts are less likely than unaffiliated analysts to downgrade stock recommendations subsequent to negative earnings surprises.

Financial Analysts and Reputation Concern

Reputation is a critical source of material benefits for investment banks. Studies of the relation between investment banks' reputation and performance in initial public offerings (IPOs) show that the IPOs contracted by more prestigious underwriters are associated with short-term (e.g., Logue 1973; Tinic 1988; Carter and Manaster 1990) and long-term (Carter et al. 1998) outperformance. Similar findings are reported for the bond market. Fang (2005) shows that prestigious banks obtain lower bond yields and charge higher fees. Kim et al. (2005) show that clients are willing to pay higher loan rates to borrow from banks with better reputations. As a result, investment banks—especially prestigious banks, which are under great public scrutiny—have strong incentives to build and protect their reputation as financial intermediaries. Biased recommendations from financial analysts at prestigious investment banks could mislead investors and jeopardize the banks' perceived credibility and trustworthiness. Therefore, we regard reputation as an informal mechanism for enhancing the integrity of financial analysts and expect reputation concern to motivate investment banks to encourage their analysts to engage in independent and high-quality stock research, thereby mitigating analysts' conflicts of interest. We propose the following hypothesis in relation to reputation.

H3 The asymmetric responses of affiliated financial analysts are mitigated by reputation concern.

Financial Analysts and Regulatory Reform

The Global Settlement was an enforcement agreement reached in 2003 by the SEC, the New York Stock Exchange (NYSE), the National Association of Securities Dealers (NASD), the New York State Attorney General's Office, and 10 of the largest investment banks in the US. The main purpose of the agreement was to reduce analysts' conflicts of interest and enhance their integrity. Together with Rule 2711, previously issued by the NASD, and the NYSE's amended Rule 472, the Global Settlement explicitly prohibits the tying of analysts' compensation to investment banking business and requires every investment bank to prevent internal communication and interaction that could lead to conflicts of interest by separating its underwriting department from its stock analysis department with a "Chinese wall" or other information barrier.

Several recent studies have investigated the effects of the Global Settlement on the research conducted by sell-side analysts, but their results are not conclusive. Kadan et al. (2009) find that optimistic recommendations have been less frequent and more informative since the regulations, and pessimistic or neutral recommendations have been more frequent and less informative. Clarke et al. (2009) report that since the Global Settlement, both affiliated and unaffiliated analysts have been less likely to issue "strong buy" recommendations. However, Boni (2005) reports that analysts have been even more optimistic since the Global Settlement, providing evidence that the number of high recommendations has remained constant and the number of low recommendations has decreased. As the aim of the Global Settlement is to reduce analysts' conflicts of interest, our final hypothesis is stated as follows:

H4 The asymmetric responses of affiliated financial analysts have been mitigated by the Global Settlement and other relevant rules.

Methodology and Data

Sample and Variables

We measure earnings surprises based on analyst forecasts. Earnings surprises are defined as the International Brokers'

Estimate System (I/B/E/S) actual earnings per share for quarter q minus the most recent I/B/E/S median earnings forecast preceding the earnings announcement date (EAD), scaled by the absolute value of analysts' median forecasts.[10] We estimate analyst median forecasts based on the I/B/E/S Detail History file and use them as consensus forecasts, as medians are less sensitive than means to outliers. We select the most recent consensus earnings forecast before an earnings announcement because previous studies report that recent forecasts are more accurate (e.g., O'Brien 1988).

Consistent with Doyle et al. (2006), we use decile portfolios to classify large quarterly earnings surprises as either positive or negative. We begin by sorting the earnings surprises into two groups: a positive group (including zero surprises) and a negative group. We then sort each group into deciles based on the magnitude of the earnings surprises in that quarter. An earnings surprise is classified as a large positive earnings surprise if it is classified in decile 8, 9, or 10 in the positive group. An earnings surprise is classified as a large negative earnings surprise if it is classified in decile 1, 2, or 3 in the negative group.[11] Moderate earnings surprises (deciles 4, 5, 6, and 7 in both the positive group and the negative groups) comprise our control groups. Large positive (negative) earnings surprises indicate that a firm's reported earnings are well above (below) analysts' consensus expectations and generally represent good (bad) news about the firm for investors.

We define an affiliated analyst as an analyst whose employer has an investment banking relationship with the firm recommended by the analyst. We obtain the identity of the underwriter of every IPO, seasoned equity offering (SEO), and bond offering from the New Issues Database of the Securities Data Company (SDC). We obtain information on the investment bankers for target and acquirer companies from the Thomson Financial SDC Platinum mergers and acquisitions (M&A) database. Consistent with previous research (e.g., Lin and McNichols 1998; Michaely and Womack 1999), we identify an analyst as affiliated if her brokerage firm (1) was the lead underwriter of an IPO of the recommended stock in the past 5 years; (2) was the underwriter of an SEO or bond offering of the recommended stock in the past 2 years[12]; or (3) advised on an M&A deal made by the firm with the recommended stock in the past 3 years. We use the I/B/E/S Broker Code Key to combine the recommendation data with the SDC investment banking data.

Regression Models

Two dates are considered important in this study: quarterly EAD and analysts' recommendation report date. Figure 1 illustrates the timeline of events. We begin by identifying a firm's EAD for quarter q from the I/B/E/S Detail History file. We take the most recent recommendation before the quarter q EAD as the recommendation before the earnings announcement, or REC_{before}.[13] We then take the very first (earliest) recommendation subsequent to the earnings announcement for quarter q (REC_{after}) to examine the analysts' recommendation changes in response to earnings surprises reported in quarter q ($REC_{\text{after}} - REC_{\text{before}}$). We also make sure that this recommendation (REC_{after}) is issued prior to quarter $q + 1$ EAD.[14]

[10] Previous researchers also scale the difference between I/B/E/S earnings per share and analysts' consensus earnings forecasts by assets per share (Core et al. 2006), the standard deviation of earnings forecasts (Mendenhall 2003), and market price per share at the beginning (or end) of quarter q (Franzoni and Marin 2006). We use each of these measures of earnings surprises in our robustness checks and obtain similar results. Another measure of earnings surprises is standardized unexpected earnings. This measure is predicated on the assumption that earnings follow a seasonal random walk model with a drift and is commonly used in the literature on postearnings announcement drift. However, as the focus of the current study is analysts' reactions to unexpected earnings, we measure earnings surprises relative to analysts' forecasts rather than using a time-series model of firms' prior earnings.

[11] In simple terms, we focus on the 30 % of earnings surprises with the largest absolute values.

[12] Conrad et al. (2006) assume that an investment banking relationship exists if any debt, IPO, SEO, or M&A transaction is conducted by the analysts' firm at any time during the sample period. We repeat our tests using this definition of affiliated analysts and obtain results similar to those presented here.

[13] As presented in Fig. 1, this recommendation may be made either after the firm's quarter q fiscal period (illustrated by a solid line) or during the quarter q fiscal period (illustrated by a dotted line). We make sure that this recommendation is before the next quarterly EAD.

[14] Unlike some prior studies, we select the earliest stock report following the earnings announcement for quarter q rather than the most recent forecast report for the next quarter, $q + 1$, for the following reasons. First, approximately 26.9 % of the recommendations in our sample are made within 7 trading days (i.e., the EAD plus the next 6 trading days) of the firms' announcements of their quarterly earnings news. Another 37.2 % of the recommendations are made between the next 8th and 15th trading days. Collectively, more than 60 % of the recommendations are made within 15 trading days of the EAD. Therefore, the earliest report reflects analysts' immediate response to the arrival of new information and is most relevant to our study. Second, forecast immediacy, or the speed with which analysts respond to a significant change in publicly available information, is positively related to forecast usefulness (Mozes 2003). Third, as the focus of this study is analysts' responses to large earnings surprises reported in the previous quarter, we need to control for changes made to analysts' recommendations in response to important firm information other than quarterly earnings announcements. Using the earliest forecast report minimizes the effects of other information on analysts' recommendation changes in the time window between large earnings surprises and subsequent analysts' recommendation changes.

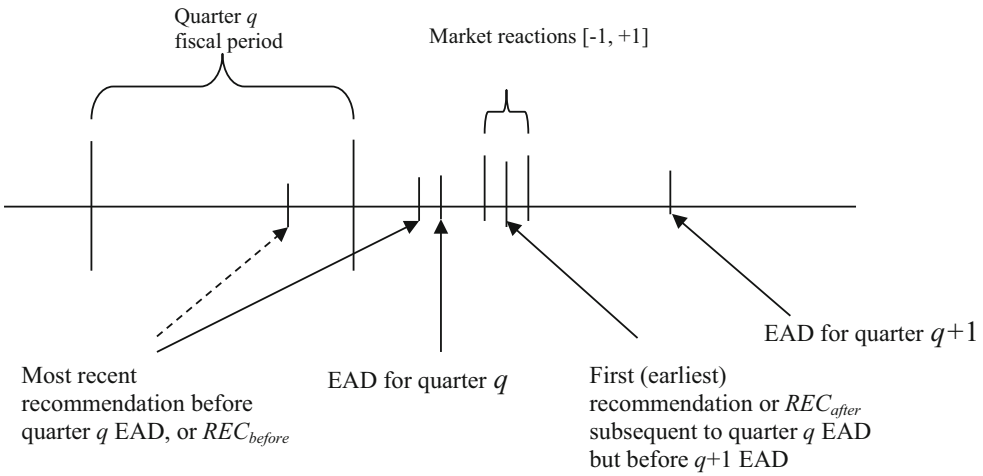

Fig. 1 Timeline of events—analysts' recommendations change following large earnings surprises. This figure illustrates the timeline of events examined in the study. We begin by identifying each firm's EAD for quarter q from the Compustat quarterly file. We take the most recent recommendation before the quarter q EAD as the recommendation before the earnings surprise, or REC_{before}. This recommendation may be made either after the firm's quarter q fiscal period (illustrated by a *solid arrow*) or during the quarter q fiscal period (illustrated by a *dotted arrow*). We choose the latest analyst recommendation. We then take the very first (or earliest) analyst report (recommendation rating) subsequent to the earnings announcement for quarter q (REC_{after}) to examine the changes in the analysts' recommendations in response to the earnings surprises reported in quarter q ($REC_{\text{after}} - REC_{\text{before}}$). To investigate investors' reactions to analysts' earnings revisions and recommendation changes, we examine the abnormal stock returns and trading volume for 3-day event windows centered on the recommendation changes [−1, +1] using the market model, the market-adjusted model, and the Fama–French 3 factor and momentum model (Carhart 1997)

We are particularly interested in whether affiliated analysts with conflicts of interest react to large earnings surprises in a significantly different way from unaffiliated analysts. Consistent with Kolasinski and Kothari (2008) and Wu et al. (2015), we use an ordered logit model to test our hypotheses. The regression model is constructed as follows:

$$\begin{aligned} UPGRADE = {} & \alpha + \beta_1 SURPRISE + \beta_2 AFFIL \\ & + \beta_3 (SURPRISE \times AFFIL) \\ & + \beta_4 MEANREC + \beta_5 LREC + \beta_6 ABRET \\ & + \beta_7 EXP + \beta_8 BRKSZ \\ & + \beta_9 LOGMKV + \beta_{10} INST + \varepsilon \end{aligned} \quad (1)$$

Stock recommendations in the I/B/E/S dataset are subject to standardized coding with assigned numerical values (1 = "strong buy," 2 = "buy," 3 = "hold," 4 = "underperform," and 5 = "sell"). Consistent with the literature (e.g., Clarke et al. 2006), we reverse the ordering so that larger numbers indicate more positive recommendations. Following Kadan et al. (2009), Kolasinski and Kothari (2008), and Wu et al. (2015), we define the dependent variable, the recommendation changes *UPGRADE*, according to whether an analyst's recommendation becomes more (less) optimistic. In particular, *UPGRADE* is a categorical variable that can take on three values: 1 if a recommendation change is an upgrade in response to an earnings surprise; 0 if the recommendation does not change; and −1 if a recommendation change is a downgrade. We do not use the raw change in recommendation levels based on the I/B/E/S's 5-tier coding system (−4, −3, −2, … 2, 3, 4) as the dependent variable because some brokerages use a 3-tier recommendation system, and thus the level of recommendation changes are not comparable between brokerages.[15]

We define *AFFIL* as a dummy variable equal to 1 if an analyst's brokerage shares an investment banking relationship with the firm for which the recommendation is issued, and 0 otherwise. *SURPRISE* × *AFFIL* is the interaction term between *SURPRISE* and *AFFIL*. The coefficient of the interaction item *SURPRISE* × *AFFIL* is a

[15] In particular, as discussed by Kadan et al. (2009), Kolasinski and Kothari (2008), and Wu et al. (2015), not all brokerages use a 5-tier recommendation system. Prior to the Global Settlement, about 17 % of recommendations were issued using a 3-tier (buy/hold/sell) system, and this proportion rose to over 75 % following the Global Settlement. Although I/B/E/S has coded the recommendation levels at a 5-tier system, the calculated changes in recommendation levels across brokerages and analysts using different tier-systems are not comparable. We are grateful to one of the referees for sharing the insight regarding this issue.

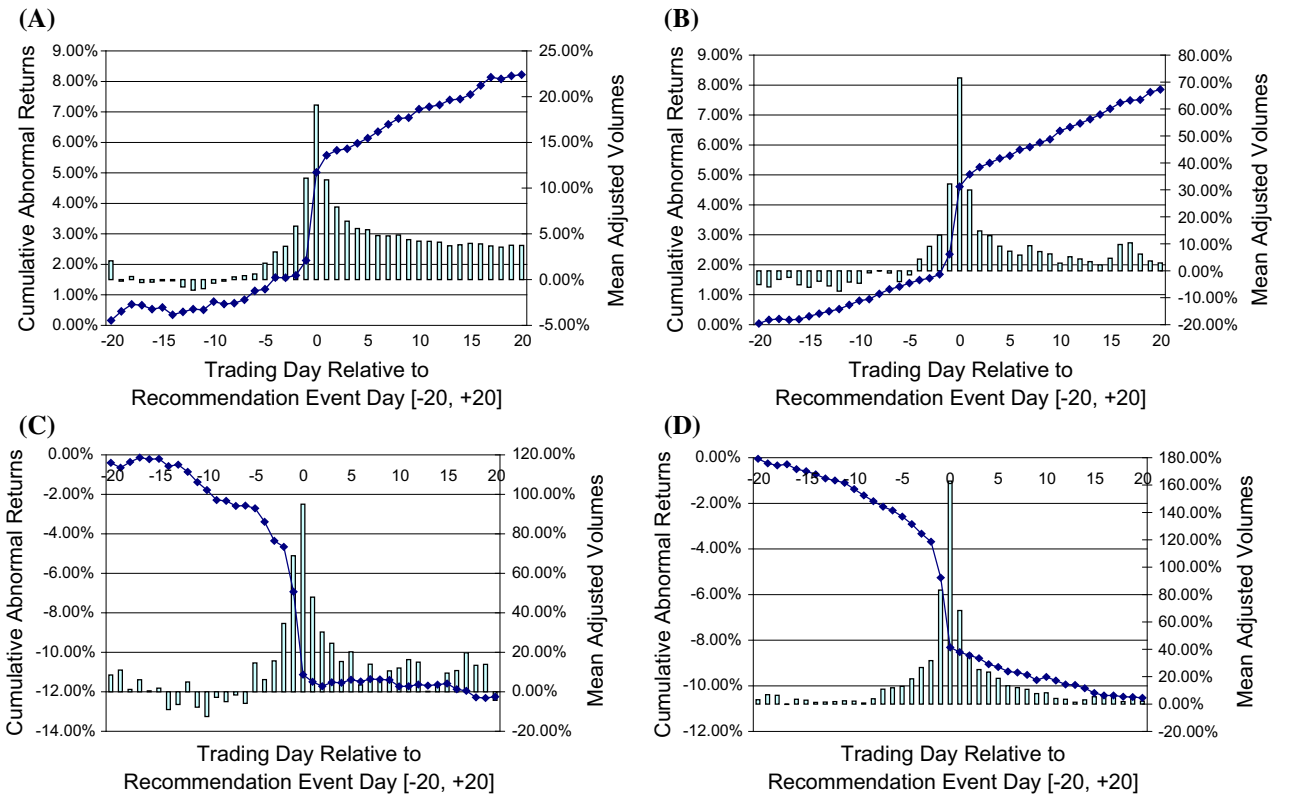

Fig. 2 Market reactions to stock recommendation changes following large earnings surprises. This figure plots the market reactions (abnormal stock returns and trading volumes) to changes in the recommendations of affiliated and unaffiliated analysts following large earnings surprises for 41 days [−20, +20] centered on the recommendation change event date. The CAR values are calculated using the market-adjusted model (CRSP value-weighted index). Abnormal volumes are comparison period mean-adjusted volumes and are determined by subtracting the arithmetic mean volume of the stock of the *j*th firm calculated over the estimation period $\hat{V}_j$ from its volume on day *t*. The estimation period comprises 250 trading days before the event window. Panel A: Market reactions to affiliated analysts' recommendation upgrades following large positive earnings surprises. Panel B: Market reactions to unaffiliated analysts' recommendation upgrades following large positive earnings surprises. Panel C: Market reactions to affiliated analysts' recommendation downgrades following large negative earnings surprises. Panel D: Market reactions to unaffiliated analysts' recommendation downgrades following large negative earnings surprises

measure of whether affiliated and unaffiliated analysts respond differently to large earnings surprises. Other independent variables are defined as follows.

SURPRISE Firm earnings surprise defined as the I/B/E/S actual earnings per share minus the most recent I/B/E/S median earnings forecast preceding the EAD and scaled by the absolute value of analysts' median forecasts. We estimate median forecasts based on the Detail History file.

MEANREC Average recommendation changes for a firm 5 days before a recommendation change.

LREC Previous recommendation level before a recommendation change.

ABRET 10-day cumulative average abnormal returns (market-adjusted model) for a firm before a recommendation change.

EXP Analyst experience measured as the natural logarithm of 1 plus the number of prior quarters in which an analyst has issued an earnings forecast report for the firm.[16]

BRKSZ Size of a brokerage house measured as the natural logarithm of 1 plus the number of analysts employed by the brokerage house.

LOGMKV Firm size measured as the logarithm of the market capitalization of firm equity.

INST Institution ownership measured as the percentage of a firm's total outstanding shares held by institutional investors.

[16] A shortcoming of this measure of analyst experience is that it does not accommodate analysts' research reports before October 1993, the first month for which I/B/E/S recommendation data are available. An alternative measure is to count analysts' research reports only after a specific year (e.g., 1995). We use this measure as a robustness check and obtain similar results on this issue.

Our first hypothesis states that there is no significant difference between affiliated and unaffiliated analysts' responses to large positive earnings surprises. If this hypothesis holds, we expect that $\beta_3 = 0$ for the positive earnings surprise sample.

The second hypothesis concerns analysts' conflicts of interest: although both affiliated and unaffiliated analysts tend to make recommendation changes in a same way following large positive earnings surprises, affiliated analysts are less likely than unaffiliated analysts to downgrade their stock recommendations following large negative earnings surprises. We estimate the preceding equation using the large negative earnings surprises. If the second hypothesis holds, we expect that $\beta_3 < 0$ for the negative earnings surprise sample.

To control for analyst herding (e.g., Welch 2000; Hong and Kubik 2003), we follow Conrad et al. (2006) in using *MEANREC* (mean recommendation changes) for 5 days prior to a recommendation change. We also include the previous recommendation level (*LREC*) in the equation, as the higher (lower) the previous recommendation, the less (more) room the analyst has to upgrade it. In addition, some analysts may change their recommendations for certain practical reasons. For example, some brokerage firms have their own explicit stock-valuation models and require a strict relation between recommendation levels and 1-year stock price targets. If abnormal returns at the time of the earnings surprise are sufficiently large, analysts may have to change their recommendations to ensure consistency with their firms' valuation models and internal policies. To ascertain the probability of this outcome, we use *ABRET*, the 10-day cumulative average abnormal returns (market-adjusted model) for a firm before a recommendation change, as a control variable in the regression model. Prior studies (e.g., Mikhail et al. 1997; Clement 1999) have found that analysts with more experience make more accurate earnings forecasts. We use the control variable *EXP* as a proxy for analyst experience. Finally, we use *BRKSZ* to control for the effect of the size of a brokerage house or an investment bank and include firm size (*LOGMKV*) and institutional holdings (*INST*) as possible proxies for the amount of publicly available information about the firm, because larger firms and firms with larger institutional holdings tend to release more information to the public, which facilitates analysts' recommendations.[17]

Our third hypothesis states that the responses of influential analysts to large earnings surprises may differ from those of less influential analysts due to reputation concerns. More influential affiliated analysts are those employed by more prestigious investment banks. To determine whether an affiliated analyst is employed by a prestigious or a less prestigious investment bank, we use a binary classification (*INFLU*) based on the investment bank's market share. *INFLU* takes a value of 1 if the analyst works for one of the top 10 investment banks by market share, i.e., Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, Credit Suisse, Lehman Brothers, JP Morgan, UBS, Barclay Capital, or Citi, and 0 otherwise.[18] The Carter-Manaster (CM), Johnson-Miller, and Ritter rankings are formal systems for ranking investment bank reputation.[19] As our main purpose is to examine changes to the recommendations made by influential analysts in response to large earnings surprises, rather than to comprehensively investigate the effects of investment banks' reputation on analyst recommendations, we follow Fang (2005) in using a binary variable to distinguish between prestigious and less prestigious banks.

We use the following regression equation to test the third hypothesis. The regression includes an interaction between three main effects: *SURPRISE, AFFIL*, and *INFLU*:

$$\begin{aligned} UPGRADE = {} & \alpha + \beta_1 SURPRISE + \beta_2 AFFIL + \beta_3 INFLU \\ & + \beta_4 SURPRISE \times AFFIL \\ & + \beta_5 SURPRISE \times INFLU + \beta_6 INFLU \\ & \times AFFIL + \beta_7 SURPRISE \times AFFIL \\ & \times INFLU + \beta_8 MEANREC_6 + \beta_9 LREC \\ & + \beta_{10} ABRET + \beta_{11} EXP + \beta_{12} BRKSZ \\ & + \beta_{13} LOGMKV + \beta_{14} INST + \varepsilon \end{aligned} \quad (2)$$

We run the regression separately for the large positive and large negative earnings surprises samples. The variable of interest is *SURPRISE* × *AFFIL* × *INFLU*. If investment bank reputation helps reduce affiliated analysts' conflicts of interest (**H3**), we expect $\beta_7 > 0$ for the negative earnings surprises sample.

The fourth hypothesis concerns the effects of the Global Settlement and other regulations on analyst recommendations. We attempt to determine whether the responses of affiliated analysts to large earnings surprises have changed

[17] Our institutional-holdings data are drawn from Thomson Financial/Spectrum.

[18] This list of prestigious investment banks is similar to Fang's (2005) list, which comprises Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, Credit Suisse, Lehman Brothers, JP Morgan, and DLJ. Note that in August 2000, Credit Suisse acquired DLJ. We add three banks (UBS, Barclay Capital, and Citi) to the list based on a recent ranking of investment banks by *The Wall Street Journal* (October 1, 2009). Our results do not change significantly if the top 8 or top 15 banks are selected as prestigious banks.

[19] Jay Ritter's ranking is primarily based on the CM system and can be accessed at http://bear.warrington.ufl.edu/ritter/ipodata.htm.

since the Global Settlement. The regression equation is as follows.

$$\begin{aligned} UPGRADE = {} & \alpha + \beta_1 SURPRISE + \beta_2 AFFIL + \beta_3 DREG \\ & + \beta_4 SURPRISE \times AFFIL \\ & + \beta_5 AFFIL \times DREG + \beta_6 SURPRISE \\ & \times DREG + \beta_7 SURPRISE \times AFFIL \\ & \times DREG + \beta_8 MEANREC \\ & + \beta_9 LREC + \beta_{10} ABRET + \beta_{11} EXP \\ & + \beta_{12} BRKSZ + \beta_{13} LOGMKV + \beta_{14} INST + \varepsilon \end{aligned} \quad (3)$$

Consistent with Kadan et al. (2009), we define *DREG* as a dummy variable that takes the value 1 if an analyst issues a recommendation report for a firm after September 2002, and 0 if the recommendation is made before September 2002.[20] The month of September 2002 and beyond comprise the period after the enactment of NYSE Rule 472 and NASD Rule 2711. These two rules require investment banks to create and enforce firewalls that restrict communication and interaction between investment banking departments and research analysts. If the Global Settlement is effective in restoring analyst integrity, we expect the coefficient of the interaction variable of *SURPRISE* × *AFFIL* × *DREG* in the negative earnings surprises group to be significantly positive ($\beta_7 > 0$).

Descriptive Statistics

We obtain analysts' earnings forecasts and recommendation data from the I/B/E/S database and estimate analyst median forecasts based on the Detail History file. We obtain data on daily stock returns and firm finances from The Center for Research in Security Prices (CRSP) and Compustat, respectively. We include only ordinary common shares; certificates and depository receipts, foreign firms, closed-end fund shares, and real estate investment trusts (CRSP share codes of 10 or 11) are excluded.[21] Our earliest data are drawn from 1994 records, because I/B/E/S recommendation data are only available from October 1993. The sample ends in 2005 because it was the last year for I/B/E/S database to provide analyst and broker translation files. The information is essential in identifying an analyst's employer/broker, from which we are able to determine whether an analyst is affiliated or not. Consistent with Mendenhall (2004), we delete firm quarters with only one analyst forecast in the group.

We report the descriptive statistics for the large earnings surprises in Panel A of Table 1. All of the variables are winsorized at the 1 and 99 % level each year to minimize the influence of outliers. The sample consists of 52,862 firm-quarter-analyst observations of 7568 large quarterly earnings surprises (4591 positive and 2977 negative) reported by firms publicly listed in the US during the period 1994–2005. As shown in Panel A, the mean (median) earnings surprise is 55.9 % (32.4 %) for the large positive earnings surprises group and −119.6 % (−74.2 %) for the large negative earnings surprises group. The standard deviations for large positive and negative surprises groups are 62.4 and 120 %, respectively. We report the mean values of several financial measures in Panel B. The firms reporting large positive and negative surprises are smaller than the firms reporting moderate surprises—the average market capitalization is $1.19 ($0.92) billion for the large positive (negative) surprises sample, compared with more than $3.0 billion for the moderate surprises firms. The large positive (negative) surprises sample has an average beta of 1.15 (1.23), and the moderate surprises samples have beta values well below 1.0. The firms with large positive earnings surprises tend to be growth firms, as indicated by their smaller book-to-market ratios and higher price-to-earnings ratios. The firms with large negative earnings surprises have conspicuously lower growth rates (measured by sales and earnings growth) and poorer operating performance than the firms that report large positive surprises and moderate surprises, as measured by industry-adjusted return on equity (ROE).[22] Overall, the results in Panel B show that firms with large positive surprises and firms with large negative surprises, the control groups vary significantly in terms of firm size, risk, market-perceived growth opportunities, and operating profitability. None of these differences are surprising.

In Panel C of Table 1, we report the cumulative abnormal returns (CARs) for the earnings surprises samples for various event windows around the quarterly EADs. We find that on average, firms with large positive (negative) earnings surprises earn significantly positive (negative) risk-adjusted stock returns. The 3-day [−1, +1] market model (4-factor model) returns are 2.05 % (2.02 %) for the positive earnings surprises sample and −1.25 % (−1.28 %) for the negative earnings surprises sample. A similar pattern exists for the other event windows. The

[20] Our results do not change qualitatively when (1) January 2003, the first month after the Global Settlement was reached, or (2) December 2003, is used as a cutoff to determine the value of *DREG*.

[21] We also exclude utilities (Standard Industrial Classification (SIC) codes between 4400 and 4499) and financial institutions (SIC codes between 6000 and 6999).

[22] The industry-adjusted ROE is equal to net income before extraordinary items divided by book value of equity and adjusted by industry median ROE. The industry classification is based on Fama–French's (1993) system.

Table 1 Descriptive statistics for firms with large earnings surprises

	Mean	Median	SD	Min	Q1	Q3	Max	N
Panel A: Summary statistics for large positive and negative earnings surprises								
Large positive earnings surprises	0.559	0.324	0.624	0.120	0.216	0.600	4.000	4591
Large negative earnings surprises	−1.196	−0.742	1.200	−7.727	−1.267	−0.516	−0.310	2977

	SIZE ($ mil.)	ASSETS ($ mil.)	BM	PE	SALES GROWTH (%)	EARNINGS GRWOTH (%)	ROE (%)	BETA
Panel B: Mean values of financial characteristics of forms with large earnings surprises								
Large positive (+) earnings surprises	1187.01	2065.71	1.12	23.05	67	40	5	1.15
Large negative (−) earnings surprises	918.31	1023.10	–	–	−37	−6	−4	1.23
Moderate earnings surprises (+)	3546.24	4066.89	1.65	16.04	25	15	2	0.85
Moderate earnings surprises (−)	3036.78	3738.78	1.30	15.82	5	−0	0	0.72

Event windows	Large positive earnings surprises (%)		Large negative earnings surprises (%)		Moderate earnings surprises (%)			
					Positive		Negative	
	CAR (market model)	CAR (4-factor)	CAR (market model)	CAR (4-factor)	CAR (market model)	CAR (4-factor)	CAR (market model)	CAR (4-factor)
Panel C: Stock returns of firms with large earnings surprises								
−1	0.51*** (10.43)	0.51*** (11.39)	−0.92*** (−7.04)	−0.91*** (−7.03)	0.19*** (5.49)	0.18*** (5.66)	0.14*** (4.75)	0.13*** (4.49)
0	0.85*** (17.43)	0.82*** (18.44)	−0.43*** (−7.70)	−0.45*** (−7.26)	0.28*** (8.06)	0.26*** (8.51)	0.04 (1.41)	0.03 (1.02)
+1	0.69*** (14.22)	0.69*** (15.42)	−0.83*** (−3.43)	−0.84*** (−13.71)	0.16*** (4.56)	0.15*** (4.86)	−0.10*** (−3.45)	−0.11*** (−3.65)
[−1, +1]	2.05*** (24.29)	2.02*** (26.13)	−1.25*** (−11.7)	−1.28*** (−12.03)	0.63*** (10.46)	0.59*** (10.99)	0.08 (1.56)	0.05 (1.08)
[−1, +4]	1.76*** (14.71)	1.70*** (15.60)	−1.39*** (−9.15)	−1.43*** (−9.53)	0.54*** (6.33)	0.47*** (6.25)	−0.04 (−0.55)	−0.08 (−1.09)

This table provides summary statistics (Panel A), mean values of financial characteristics (Panel B), and stock returns (Panel C) for the firms with large earnings surprises. We define earnings surprises as the I/B/E/S actual earnings per share for quarter q minus the most recent I/B/E/S median forecast preceding the quarterly EAD, scaled by the absolute value of analysts' median forecasts. Following Doyle et al. (2006), we classify earnings surprises into large positive and large negative groups using decile portfolios. In Panel B, we report the mean values of several financial measures. *SIZE* is equal to the closing price at the end of June of year t multiplied by the common shares outstanding at the end of June of year t. *ASSETS* denotes item 6 of the Compustat data at the end of the fiscal year. *BM*, or book-to-market, is calculated as the book value of equity $_{t-1}$/the market value of equity $_{t-1}$, where the book value of equity is the book value of the stockholders' equity (item 216), plus the balance sheet deferred taxes and investment tax credit (item 35, if available), minus the book value of the preferred stock (item 56: preferred stock redemption value; item 10: preferred stock liquidating value; or item 130: preferred stock carrying value, in the order of data availability). PE or price-to-earnings is equal to market capitalization: (item 24*item 25)/the earnings before extraordinary items (item 18). *SALES GROWTH* is calculated as Sales $_{t-1}$/sales $_{t-2}$ (item 12). *EARNIGNS GROWTH* is the earnings before extraordinary items: $_{t-1}$/the earnings before extraordinary items $_{t-2}$ (item 18). *ROE* is equal to the net income before extraordinary items: item 123/the book value of equity adjusted by the industry median ROE. All the variables are winsorized at the 1 and 99 % level each year to minimize the influence of outliers. The industry classification is based on a study by Fama and French (1993). *BETA* is calculated by regressing the stock's daily return on the value-weighted market return using ordinary least squares for 100 trading days' worth of returns data ending on December 31 of year t. In Panel C, the event date (quarterly earnings announcement date) is taken from the I/B/E/S Detail file. The t-statistics are reported in parentheses. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

Table 2 Univariate analysis of analysts' recommendation changes subsequent to large earnings surprises

		REC_{before}	REC_{after}	Recommendation change ($REC_{after} - REC_{before}$)	Recommendation change (bootstrapped p value)
Firms with large positive earnings surprises	Affiliated analysts	3.865	3.910	0.045***	<0.01
	Unaffiliated analysts	3.739	3.792	0.053***	<0.01
	Difference	0.126	0.118	−0.008	<0.18
Firms with large negative earnings surprises	Affiliated analysts	3.425	3.416	−0.009	<0.15
	Unaffiliated analysts	3.356	3.011	−0.345***	<0.01
	Difference	0.069	0.405	0.336***	<0.01

In this table, the recommendation changes made by analysts before and after the firm's quarterly EAD are compared. The recommendation changes are calculated as the difference between the most recent recommendation before the quarter q EAD (REC_{before}) and the very first (or earliest) analyst recommendation subsequent to the quarter q EAD (REC_{after}) but before the next quarter $q + 1$ EAD. For each quarter, we calculate the average recommendation ratings before and after large earnings surprises for both the affiliated and unaffiliated analysts, and the difference in the analysts' recommendation changes following large earnings surprises ($REC_{after} - REC_{before}$). We average the results across the sample period. Following previous studies (e.g., Lin and McNichols 1998; Michaely and Womack 1999), we identify analysts as affiliated if their investment bank (1) was the lead underwriter of an IPO of the recommended stock in the past 5 years, (2) was the underwriter of an SEO or bond offering of the recommended stock in the past 2 years, or (3) acted as an advisor during an M&A deal made by the firm with the recommended stock during the past 3 years. We obtain the M&A, IPO and SEO data from the SDC's datasets. As the distribution of analyst recommendations is non-normal and right-skewed, we report bootstrapped p-values rather than conventional t-statistics in the last column. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

moderate positive earnings surprises control sample has relatively "moderate" stock returns, with significant 3-day [−1, +1] market model returns of 0.63 % and 4-factor adjusted returns of 0.59 %. Although the moderate negative earnings surprises control sample has significantly negative abnormal returns on the trading day after the earnings surprise announcement, the returns are economically quite small. The returns presented in Panel C of Table 1 are consistent with previous findings on market reactions to firms' earnings announcements (e.g., Bernard and Thomas 1990; Doyle et al. 2006).

Empirical Results

Univariate Test

We present the results of a univariate analysis of the analysts' responses to large earnings surprises in Table 2. The panel shows that the average recommendation made by affiliated (unaffiliated) analysts before large positive earnings surprises (REC_{before}) is 3.865 (3.739). This level generally represents a "hold" (3) or "buy" (4) rating. In response to large positive earnings surprises, both affiliated and unaffiliated analysts increase their recommendations. The average recommendation increase for affiliated and unaffiliated analysts is 0.045 and 0.053, respectively, and the difference is not significant, with a bootstrapping p value smaller than 0.18.[23] The responses to large negative earnings surprises are somewhat different. The average recommendation rating made by affiliated analysts before large negative earnings surprises is 3.425 (between "hold" and "buy"). Although this rating decreases to 3.416 after negative earnings surprises, the decrease is not significant. In contrast, the average recommendation made by unaffiliated analysts decreases by 0.345 from 3.356 to 3.011 following large negative earnings surprises. This decrease is significant at the 1 % level. These results are consistent with a difference between affiliated and unaffiliated

[23] As the distribution of analyst recommendations is non-normal and right-skewed, we report bootstrapped p-values rather than conventional t-statistics. Following Hertzel et al. (2002), we perform the bootstrapping procedure as follows. First, we calculate the average recommendation levels for affiliated analysts in the large positive earnings surprises sample before and after the quarterly EAD and obtain the difference between them ($REC_{after} - REC_{before}$). We then group the recommendation ratings and randomly select recommendation ratings with replacements to construct our first pseudosample. Next, we estimate the recommendation change for this pseudosample as the first mean-difference observation (recommendation change). We repeat this procedure 1000 times to obtain 1000 observations of pseudosample recommendation changes. This procedure yields empirical distributions of recommendation changes under the null hypothesis of no mean difference. Finally, the null hypothesis is rejected at the α % level if the recommendation change for our sample firms is less than the $(1 - \alpha)$ percentile recommendation changes in the empirical distribution of the pseudosamples. We apply the same procedure to the large negative and moderate earnings surprises samples.

Table 3 Analysis of analyst recommendation changes following large earnings surprises

	Full sample		Firms covered by affiliated analysts		Firms covered by unaffiliated analysts		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean difference	Median difference
Panel A: Descriptive statistics of main variables used in regression analysis for positive earnings surprises sample								
SURPRISE	0.559	0.324	0.598	0.333	0.548	0.322	0.050	0.011
AFFIL	0.158	0.000	1.000	1.000	0.000	0.000	1.000***	1.000***
INFLU	0.267	0.000	0.274	0.000	0.261	0.000	0.013	0.000
MEANREC	0.041	0.000	0.044	0.000	0.039	0.000	0.005	0.000
LREC	3.596	4.000	3.651	4.000	3.582	4.000	0.069	0.000
ABRET	0.013	0.011	0.018	0.014	0.012	0.010	0.006	0.004
LOGEXP	2.685	2.651	2.675	2.639	2.688	2.657	−0.013	−0.018
LOGBRKSZ	3.518	3.590	3.535	3.601	3.502	3.584	0.033	0.017
LOGMKV	7.450	7.354	7.301	7.276	7.569	7.496	−0.268	−0.220
INST	0.429	0.309	0.444	0.336	0.411	0.301	0.033	0.035
DREG	0.385	0.000	0.380	0.000	0.389	0.000	−0.009	0.000
Panel B: Descriptive statistics for main variables used in the regression for negative earnings surprises sample								
SURPRISE	−1.196	−0.743		−1.270	−0.750	−1.175	−0.739	−0.095
AFFIL	0.170	0.000		1.000	1.000	0.000	0.000	1.000***
INFLU	0.282	0.000		0.292	0.000	0.268	0.000	0.024
MEANREC	−0.123	0.000		−0.137	0.000	−0.113	0.000	−0.024
LREC	3.358	3.000		3.396	3.000	3.347	3.000	0.049
ABRET	−0.015	−0.011		−0.016	−0.013	−0.014	−0.010	−0.002
LOGEXP	2.521	2.405		2.554	2.434	2.506	2.395	0.048
LOGBRKSZ	3.228	3.332		3.262	3.401	3.217	3.332	0.045
LOGMKV	7.058	6.896		6.888	6.772	7.107	6.956	−0.219
INST	0.434	0.215		0.489	0.230	0.425	0.203	0.064
DREG	0.349	0.000		0.351	0.000	0.338	0.000	0.013

	Large positive earnings surprise observations		Large negative earnings surprise observations	
	Model (1)		Model (2)	
	Coefficient	Pr > Chi square	Coefficient	Pr > Chi square
Panel C: Regression analysis of H1 and H2				
SURPRISE	0.019***	0.006	0.014***	0.007
AFFIL	0.135	0.104	0.112**	0.041
SURPRISE × *AFFIL*	0.013	0.155	−0.031***	0.005
MEANREC	0.177***	<0.001	0.329***	<0.001
LREC	−0.022***	0.005	−0.043***	0.005
ABRET	−0.202*	0.061	−0.129*	0.059
EXP	0.046***	0.002	0.067***	<0.001
BRKSZ	0.077	<0.121	0.015*	0.062
LOGMKV	0.013	0.138	0.018	0.126
INST	0.006*	0.058	0.007*	0.063
N	33,084		19,778	

Table 3 continued

	Large positive earnings surprise observations		Large negative earnings surprise observations	
	Model (1)		Model (2)	
	Coefficient	Pr > Chi square	Coefficient	Pr > Chi square
Log likelihood	−36,224.55 ***	<0.001	−24,463.91 ***	<0.001
Incremental marginal effect of AFFIL for SURPRISE (UPGRADE = −1)	−0.015			−0.078***
Incremental marginal effect of AFFIL for SURPRISE (UPGRADE =+1)	0.006			0.042***
Incremental marginal effect of AFFIL for SURPRISE (UPGRADE = 0)	0.009			0.036***

Panel A and B present descriptive statistics of main variables used in the regression model for large positive and negative earnings surprises samples, respectively. Panel C shows the regression results of testing the first and second hypotheses. The regression equation is specified as in Eq. (1). The dependent variable, the recommendation changes or *UPGRADE*, is defined based on whether an analyst's recommendation becomes more (less) optimistic. In particular, *UPGRADE* is a categorical variable that can take on three values: 1 if a recommendation change is an upgrade subsequent to an earnings surprise; 0 if the recommendation does not change; and −1 if a recommendation change is a downgrade. *AFFIL* is an indicator variable of affiliated or unaffiliated analysts. We identify an analyst as affiliated if her brokerage firm (1) was the lead underwriter of an IPO of the recommended stock in the past 5 years, (2) was the underwriter of an SEO or bond offering of the recommended stock in the past 2 years, or (3) advised on an M&A deal made by the firm with the recommended stock in the past 3 years. We use the I/B/E/S Broker Code Key to combine the recommendation data with the SDC investment banking data. The sample starts from 1994 and ends 2005, because it was the last year for I/B/E/S database to provide analyst and broker translation files. *MEANREC* is the average recommendation changes for a firm 5 days before a recommendation change. *LREC* is previous recommendation level before a recommendation change. *ABRET* is 10-day cumulative average abnormal returns (market-adjusted model) for a firm before a recommendation change. *EXP* is analyst experience, measured as the natural logarithm of 1 plus the number of prior quarters in which an analyst has issued an earnings forecast report for the firm. *BRKSZ* is size of a brokerage house, measured as the natural logarithm of 1 plus the number of analysts employed by the brokerage house. *LOGMKV* is firm size, measured as the logarithm of the market capitalization of firm equity. *INST* is institution ownership, measured as the percentage of a firm's total outstanding shares held by institutional investors. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

analysts' behavior following large negative earnings surprises and thus provide preliminary support for the existence of analyst conflicts of interest.

Tests of H1 and H2

We now turn to the results of an ordered logistic regression of the changes made to analysts' recommendations in response to large earnings surprises. We first report descriptive statistics for the variables in the regression models in Panel A and B of Table 3. About 15.8 % (17.0 %) of the recommendation changes are made by affiliated analysts in the large positive (negative) surprises sample; 26.7 % (28.2 %) of the recommendation changes are made by influential analysts employed by prestigious investment banks in the large positive (negative) surprises sample. More importantly, we do not find any significant differences in the means or medians of the major variables across affiliated and unaffiliated analysts in either the large positive or negative surprises samples. This suggests that the potential endogenous determination of analyst affiliation is not a major concern in our sample. That is, it does not appear that affiliated analysts are more likely to follow a certain type of firm, which might cause systematically different recommendation changes when the firms report large positive or negative earnings surprises.

We present the regression results for Eq. (1) in Panel C of Table 3. As shown in model (1), for the positive earnings surprises sample, the coefficient of *SURPRISE* is 0.019 ($p > 0.006$), suggesting a direct relationship between the magnitude of large positive earnings surprises and the likelihood that unaffiliated analysts will increase their stock recommendation ratings. The key variable used to test the first and second hypothesis is *SURPRISE* × *AFFIL*. For the large positive earnings surprises sample, the coefficient of *SURPRISE* × *AFFIL* is 0.013 ($p > 0.155$), which is not statistically significant. Consistent with our first hypothesis, this indicates no significant differences in recommendation changes between affiliated and unaffiliated analysts following large positive earnings surprises—they are equally likely to upgrade stocks.

Model (2) shows the regression results for **H2**. For the negative earnings surprises sample, the coefficient of *SURPRISE* is 0.014 ($p > 0.007$). As a small number indicates a larger negative earnings surprise, the result implies that the larger (smaller) a negative earnings surprise, the more (less) likely unaffiliated analysts are to lower their stock recommendations. The key variable, *SURPRISE* × *AFFIL*, has a coefficient of −0.031 ($p > 0.005$), suggesting that following

Table 4 Analyst recommendation changes and reputation concern

	Large positive earnings surprise observations		Large negative earnings surprise observations	
	Model (1)		Model (2)	
	Coefficient	Pr > Chi square	Coefficient	Pr > Chi square
SURPRISE	0.011**	0.024	0.014***	0.006
AFFIL	0.115	0.165	0.107**	0.030
INFLU	0.060*	0.088	0.019**	0.040
SURPRISE × *AFFIL*	0.014	0.160	−0.022**	0.021
SURPRISE × *INFLU*	0.010	0.137	−0.019*	0.057
INFLU × *AFFIL*	0.014	0.144	−0.011*	0.085
SURPRISE × *AFFIL* × *INFLU*	0.012	0.132	−0.020**	0.038
MEANREC	0.153***	<0.001	0.131***	<0.001
LREC	−0.020***	<0.001	−0.048***	<0.001
ABRET	−0.108*	0.052	−0.147***	0.002
EXP	0.036***	<0.001	0.051***	<0.001
BRKSZ	0.060	<0.137	0.032**	0.023
LOGMKV	0.009	0.180	0.012	0.109
INST	0.005*	0.052	0.006*	0.070
N	33,084		19,778	
Log likelihood	−34,297.76***	<0.001	−26,284.81***	<0.001
		−0.013		−0.075***
Incremental marginal effect of INFLU for SURPRISE × AFFIL (UPGRADE = −1)				
Incremental marginal effect of INFLU for SURPRISE × AFFIL (UPGRADE =+1)		0.005		0.038***
Incremental marginal effect of AFFIL for SURPRISE × AFFIL (UPGRADE = 0)		0.008		0.037***

This table displays the results of testing the recommendation changes made by influential affiliated analysts following large earnings surprises. The regression equation is specified as in Eq. (2). The dependent variable, the recommendation changes or *UPGRADE*, is defined based on whether an analyst's recommendation becomes more (less) optimistic. In particular, *UPGRADE* is a categorical variable that can take on three values: 1 if a recommendation change is an upgrade subsequent to an earnings surprise, 0 if the recommendation does not change, and −1 if a recommendation change is a downgrade. To determine whether an affiliated analyst is employed by a prestigious or a less prestigious investment bank, we use a binary classification (*INFLU*) based on the investment bank's market share. *INFLU* takes a value of 1 if an analyst works for one of the top 10 investment banks by market share and 0 otherwise. Other variables are defined as in Table 3. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

a large negative earnings surprise, affiliated analysts are less likely than unaffiliated analysts to downgrade recommendations. To further interpret the coefficient for the interaction term of *SURPRISE* × *AFFIL*, we follow Wu et al. (2015) and estimate the difference in marginal effect with respect to *AFFIL* for each possible level of the *UPGRADE* (i.e., 1, 0, and −1) for the negative earnings surprises sample.[24] Regarding the probability of recommendation downgrade (*UPGRADE* = −1), the marginal effect is significantly more negative for affiliated analysts than for unaffiliated analysts (*difference in margin effects* = −0.078, $p < 0.001$). Conversely, regarding the probability of recommendation upgrade (*UPGRADE* = 1), the marginal effect of analyst affiliation status (*AFFIL*) for earnings surprises is significantly more positive for affiliated analysts than for unaffiliated analysts (*difference in marginal effects* = 0.042, $p < 0.001$).[25] Collectively, these results are consistent with the findings reported in Panel C of Table 3

[24] The interpretation of interaction effects in nonlinear models (such as a logistic regression used here) is not quite as simple as in linear models. A significant coefficient for an interaction is not necessarily evidence of a significant difference in probabilities across groups. Therefore, following a comment from one of our anonymous referees, we report the difference in marginal effects across groups.

[25] Regarding the probability of no change of recommendation (*UPGRADE* = 0) in response to large negative earnings surprises, the marginal effect of analyst affiliation status (*AFFIL*) for earnings surprises is also significantly more positive for affiliated analysts than for unaffiliated analysts (*difference in marginal effects* = 0.036, $p < 0.001$).

and provide strong support of **H2**: affiliated analysts are less likely to downgrade stocks subsequent to announcements of large negative earnings surprises.

The coefficients of the control variables in the regressions (both model (1) and (2)) generally have the predicted signs. *MEANREC* measures analysts' herding behavior (Conrad et al. 2006), and it has a positive and significant coefficient for both positive and negative earnings surprise samples. This suggests that the probability of a recommendation upgrade (downgrade) is higher if other analysts at the same firm upgrade (downgrade) the stock during the prior 10-day period. This result is consistent with previous findings on analysts' herding behavior (Welch 2000; Hong and Kubik 2003). We also find a strong and highly significant negative relation between the probability of an upgrade and previous recommendation levels (*LREC*). This result is consistent with our expectations, as there is little or no room to upgrade (downgrade) when previous recommendations are already very high (low). The variable *ABRET* has a significant and negative coefficient in both samples. This suggests that if the abnormal returns around a positive earnings surprise are sufficiently large, an analyst may lower his recommendation to ensure its consistency with his valuation model. In contrast, if the abnormal returns around a negative earnings surprise are sufficiently low, an analyst may have to increase his recommendation to ensure consistency with his valuation model.

There is a significant positive association between analysts' research experience and recommendation changes: analysts with more experience tend to be more likely to make recommendation changes. Experienced analysts may be better able to interpret information (e.g., Clement 1999; Mikhail et al. 1997, 1999; Cao and Kohlbeck 2014). Using the number of analysts employed by a firm as a measure of brokerage size, we find that analysts employed by a large brokerage firm or investment bank are more likely to upgrade their recommendations following large negative earnings surprises. These analysts may suffer more severe conflicts of interest because a large proportion of their revenue depends on investment banking (Agrawal and Chen 2008). There is also a positive relationship between recommendation upgrades and institutional holdings (*INST*). Firms with larger institutional holdings tend to release more information to the public, which facilitates analysts' recommendations.

Test of H3

In this section, we test **H3** by determining whether influential and less influential affiliated analysts respond differently to large earnings surprises due to the disciplinary function of reputation concern. Influential affiliated analysts are those employed by more prestigious investment banks. We conduct a regression analysis of the large positive and negative earnings surprises samples separately and report the results of Eq. (2) in Table 4. The coefficients of $SURPRISE \times AFFIL$ are 0.014 ($p > 0.160$) and -0.022 ($p > 0.021$) for the large positive and negative earnings surprise samples, respectively. These results suggest that for less influential analysts, while there is no significant difference in recommendation changes between affiliated and unaffiliated analysts following positive earnings surprises, affiliated analysts are more reluctant than unaffiliated analysts to downgrade stock recommendations in response to negative earnings surprises. The variable of interest is a three-way interaction term of $SURPRISE \times AFFIL \times INFLU$. For the large positive earnings surprise sample, the coefficient of $SURPRISE \times AFFIL \times INFLU$ is 0.012, and it is not statistically significant ($p > 0.132$). This finding implies that the responses of influential and less influential affiliated analysts to large positive earnings surprises are similar—they are equally likely to upgrade stocks. In contrast, for the negative earnings surprise sample, $SURPRISE \times AFFIL \times INFLU$ has a coefficient of -0.020 and it is statistically significant ($p > 0.038$). Further examining the difference in marginal effects across groups for large negative earnings surprises firms, we find that with respect to the probability of recommendation upgrade ($UPGRADE = 1$), the marginal effect of *INFLU* for $SURPRISE \times AFFIL$ is significantly more positive for influential analysts than for less influential analysts (*difference in marginal effects = 0.038*, $p < 0.001$). Conversely, the marginal effect of *INFLU* regarding the probability of recommendation downgrade ($UPGRADE = -1$) is significant more negative for affiliated analysts than for unaffiliated analysts *(difference in margin effects* $= -0.075$, $p < 0.001$). This indicates that following large negative earnings surprises, influential affiliated analysts are less likely to downgrade a firm's stock. These results do not support **H3**, indicating that reputation concern is not an effective mechanism for restoring the integrity of financial analysts.

Our findings here are in line with those of Fang and Yasuda (2009), who show that a bank's reputation does not effectively mitigate the biased forecasts of analysts with conflicts of interest.[26] Concern for their personal reputation may give influential analysts an even stronger incentive to maintain good relationships with managers, who constitute

[26] Under the Global Settlement, 10 of the largest Wall Street banks paid $1.4 billion to federal regulators to settle the charge made by the government that the banks had issued optimistic stock reports to win investment banking clients. Jack Grubman, once a top analyst at Salomon Smith Barney, paid millions in fines and was banned from the investment industry for life. The involvement of highly regarded analysts and banks in the scandal appears to support our findings.

Table 5 Regression analysis of effects of Global Settlement on analysts' recommendation changes in response to large earnings surprises

Independent variables	Positive large earnings surprises sample		Negative large earnings surprises sample	
	Coefficient	Pr > Chi square	Coefficient	Pr > Chi square
SURPRISE	0.012**	0.039	0.021**	0.017
AFFIL	0.124	0.144	0.130*	0.060
DREG	0.012	0.196	−0.062	0.114
SURPRISE × *AFFIL*	0.010	0.151	−0.026**	0.041
AFFIL × *DREG*	0.063	0.128	−0.045	0.180
SURPRISE × *DREG*	0.009	0.197	−0.010	0.166
SURPRISE × *AFFIL* × *DREG*	−0.044	0.141	0.014	0.211
MEANREC	0.190***	<0.001	0.319***	<0.001
LREC	−0.031***	0.004	−0.045***	<0.001
ABRET	−0.210***	<0.001	−0.120***	0.003
EXP	0.050***	0.002	0.139***	<0.001
BRKSZ	0.084	<0.121	0.089*	0.060
LOGMKV	0.012	0.160	0.029**	0.030
INST	0.006*	0.091	0.007**	0.043
N	33,084		19,778	
Log likelihood	−19,342.41***	<0.001	−11,841.62***	<0.001
		−0.012		−0.014
Incremental marginal effect of DREG for SURPRISE × AFFIL (UPGRADE = −1)				
Incremental marginal effect of INFLU for SURPRISE × AFFIL (UPGRADE = +1)		0.007		0.006
Incremental marginal effect of AFFIL for SURPRISE × AFFIL (UPGRADE = 0)		0.005		0.008

This table displays the results of a regression analysis of the effects of the Global Settlement on analysts' recommendation changes in response to large earnings surprises. The regression equation is defined as in Eq. (3). The dependent variable, the recommendation changes or *UPGRADE*, is defined based on whether an analyst's recommendation becomes more (less) optimistic. In particular, *UPGRADE* is a categorical variable that can take on three values: 1 if a recommendation change is an upgrade subsequent to an earnings surprise, 0 if the recommendation does not change, and −1 if a recommendation change is a downgrade. *DREG* is a dummy variable that takes a value of 1 if analyst *j* issues a recommendation report for firm *i* after the Global Settlement (after September 2002), and 0 if the recommendation is made before the Global Settlement. Other variables are defined as in Table 3. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

an important source of information for stock research (e.g., Francis et al. 1997; Das et al. 1998).

Test of H4

We then proceed to test **H4**, which concerns the effects of the Global Settlement and other regulations on analyst recommendations. Table 5 presents the regression results for Eq. (3) for both positive and negative earnings surprise samples. We focus on whether the responses of affiliated analysts to large earnings surprises have changed since the Global Settlement and other relevant rules. *DREG* measures the main effect of the Global Settlement, and it has insignificant coefficient in both models, suggesting that the effectiveness of the Global Settlement is not significant in reducing the optimism in unaffiliated analysts. The coefficients of *SURPRISE* × *AFFIL* are 0.010 ($p > 0.151$) and −0.026 ($p > 0.041$) for the large positive and negative earnings surprise samples, respectively. Consistent with the results reported in previous tables, we find that while prior to the Global Settlement, affiliated and unaffiliated analysts are equally likely to upgrade stock recommendations in response to large positive earnings surprises, and affiliated analysts are more reluctant than their unaffiliated peers to downgrade recommendations following large negative earnings surprises. The variable of interest is the interaction variable *SURPRISE* × *AFFIL* × *DREG*. As shown in Table 5, the coefficients of the variables are not statistically significant in either the large positive or large negative earnings surprises groups. The coefficients of the other variables are qualitatively similar to those reported in Table 3. As this finding indicates little significant change in

Table 6 Stock returns around recommendation changes subsequent to large earnings surprises

			Raw returns	CAR (market model)	CAR (market-adjusted model)	CAR (4-factor model)
Panel A: Stock returns following recommendation changes after large earnings surprises						
Large positive earnings surprises	Recommendation changes—upgrade	Affiliated	4.01 %*** (7.70)	3.62 %*** (6.35)	3.93 %*** (7.39)	3.60 %*** (8.12)
		Unaffiliated	3.47 %*** (9.35)	3.15 %*** (6.14)	3.34 %*** (6.31)	3.09 %*** (8.16)
		Difference	0.54 %* (1.65)	0.47 % (1.26)	0.59 % (1.44)	0.51 % (1.47)
	Recommendation changes—downgrade	Affiliated	−1.83 %*** (−6.27)	−2.24 %*** (−9.15)	−2.19 %*** (−8.75)	−2.22 %*** (−5.00)
		Unaffiliated	−2.40 %*** (−15.24)	−2.82 %*** (−22.43)	−2.80 %*** (−22.60)	−2.72 %*** (−12.25)
		Difference	0.57 % (1.58)	0.58 % (1.49)	0.61 % (1.52)	0.50 % (1.61)
Large negative earnings surprises	Recommendation changes—upgrade	Affiliated	1.82 %*** (4.54)	1.36 %*** (3.61)	1.93 %*** (12.23)	1.71 %*** (4.82)
		Unaffiliated	2.48 %*** (10.38)	2.02 %*** (12.76)	1.72 %*** (7.70)	2.17 %*** (14.30)
		Difference	−0.66 % (−1.61)	−0.66 % (−1.44)	0.21 % (−1.49)	−0.46 % (−1.59)
	Recommendation changes—downgrade	Affiliated	−6.83 %*** (−7.11)	−6.90 %*** (−5.54)	−6.83 %*** (−6.30)	−6.93 %*** (−7.22)
		Unaffiliated	−5.82 %*** (−8.30)	−6.00 %*** (−5.24)	−5.42 %*** (−7.30)	−6.09 %*** (−7.10)
		Difference	−1.01 %* (−1.88)	−0.90 % (−1.43)	−1.41 % (−1.38)	−0.84 % (−1.60)

Independent variables	Model (1)		Model (2)	
	Large positive earnings surprise sample		Large negative earnings surprise sample	
	Coefficient	*t* - statistics	Coefficient	*t* - statistics
Panel B: Results of regressing abnormal stock returns on analysts' recommendation changes				
DRECCHG	0.012***	4.35	0.014***	4.07
AFFIL	−0.053	−0.91	−0.089	−1.48
AFFIL × *DRECCHG*	−0.010	−1.34	0.021	1.27
SURPRISE	0.022***	3.05	−0.002**	−2.27
EXP	0.025	1.59	0.018	1.38
BRKSZ	0.006**	2.75	0.004	0.98
LOGMKV	−0.002	−0.25	−0.001	−0.14
INST	−0.021***	−5.42	−0.025***	−3.47
DRECCHG × *DDAYS*	−0.005	−1.21	0.007	0.51
N	25,465		15,663	
Adjusted R^2	0.09		0.10	

This table displays the stock returns following analysts' recommendation changes subsequent to large positive and large negative earnings surprises, calculated using an event study methodology. "Event" is defined as a change in recommendation, and event dates are drawn from the I/B/E/S files. Changes in recommendations comprise upgrades, downgrades and no-changes (no-changes are not reported in table). The event window is specified as [−1, +1]. We accumulate returns from day −1 to capture the effect of a potential earnings information leakage on stock prices (Patell and Wolfson, 1984). In addition to the raw returns, we use (1) the market model, (2) the market-adjusted model, and (3) the Fama–French 3 factor and momentum model as benchmarks. We report our returns for the affiliated and unaffiliated analysts separately, in addition to the differences in stock returns for affiliated and unaffiliated analysts. The *t*-statistics are reported in parentheses. Panel B reports the results of regressing the abnormal stock returns on the analysts' recommendation changes. The equation is defined as in Eq. (4). The dependent variable CAR is defined as *c*umulative average abnormal returns measured in a [−1, +1] event window using the market-adjusted model (returns are converted from digits to percentages by multiplying their values by 100). *DRECCHG* Dummy variable equal to 1 for an upgrade recommendation for firm i at time t subsequent to earnings surprises in quarter q, and 0 for a downgrade or reiteration. DDAYS is a dummy variable equal to 1 if the earliest recommendation is made within 7 trading days (0 to 6 days) subsequent to the firm's quarterly earnings announcement and 0 otherwise. The symbols ***, **, and * indicate statistical significance at the 1, 5, and 10 % levels, respectively

analysts' reactions subsequent to large earnings surprises after the Global Settlement, our fourth hypothesis is not supported. But our results here are in line with Di Lorenzo's (2007) argument that laws do not necessarily determine corporate conduct. Kadan et al. (2009) report similar finding; that is, affiliated analysts are still reluctant to issue pessimistic recommendations after the Global Settlement.

Corroborative Evidence on Analysts' Dropping Coverage and Other Tests

In the tests reported in Table 3, *UPGRADE* is scored as 1, 0, or −1. *UPGRADE* = 0 indicates that analysts do not alter their recommendations subsequent to large earnings surprises. Some analysts may simply drop their coverage, particularly following large negative earnings surprises.

Therefore, we conduct a further test to determine whether analysts are more likely to drop their coverage or to maintain their previous recommendations in response to large negative earnings surprises. The regression model is similar to that in Eq. (1), except that we use a logit model rather than an ordered logistic model. The dependent variable *DROP* is defined as 1 if an analyst drops his coverage subsequent to firm large earnings surprises, and 0 if an analyst maintains his previous recommendation or does not provide a recommendation update. In the large negative earnings surprises sample, we find 705 cases of analysts' dropping their coverage and 3655 observations in which no recommendation changes are made. We use these observations to conduct the logit regression. The coefficient of $SURPRISE \times AFFIL$ is -0.011 ($p > 0.031$), indicating that affiliated analysts are less likely than unaffiliated analysts to drop their coverage after a firm reports a large negative earnings surprise. This finding provides further support for **H2** regarding analysts' conflicts of interest.[27]

We use mean recommendation changes to control for potential herding behavior in previous regression models; however, the mean changes are likely to be affected by extreme upgrades or downgrades. Alternatively, we use the number of analysts following a firm to control for herding behavior. In addition, we control for the number of days between the earnings reporting date and the date of analysts' recommendations. Our main results remain consistent after these changes to the model specifications.[28]

Market Reactions to Analysts' Recommendation Changes

Panel A of Table 6 presents the stock returns surrounding analysts' recommendation changes. Consistent with prior studies (e.g., Womack 1996), we find a significant market response to analysts' recommendation changes. For the recommendation upgrades issued by affiliated (unaffiliated) analysts subsequent to large positive earnings surprises, the mean 3-day [−1, +1] 4-factor CARs are 3.60 % (3.09 %), and the differences in returns for affiliated and unaffiliated analysts are insignificant at the 5 % level.[29] Panels A and C of Fig. 2 present the stock returns and abnormal trading volume, respectively, around the recommendation changes. We estimate the abnormal volume or mean-adjusted volume for the comparison period by subtracting the arithmetic mean volume of the *j*th firm calculated over the estimation period from its volume on day *t*. The estimation period comprises 250 trading days before the event window. We find that the market reaction in terms of both stock returns and trading volume is identical for recommendation upgrades issued by affiliated and unaffiliated analysts subsequent to large positive earnings surprises.[30] The stock returns following recommendation downgrades after large negative earnings surprises are reported in Panel A of Table 6. We find fairly large negative stock returns for recommendation downgrades. In addition, we find that the differences in the returns following downgrades by affiliated and unaffiliated analysts are insignificant. We plot these returns and abnormal volume values in Panels B and D of Fig. 2, which are similar to Panels A and C. Investors do not appear to react differently to the recommendation changes issued by affiliated and unaffiliated analysts subsequent to large positive and negative earnings surprises.

Some caution is necessary when interpreting the 3-day CARs around the recommendation changes. Approximately 16 % of the recommendation changes in our sample were made on day 0 or day 1 following an earnings surprise. Earnings surprises and recommendation changes may thus confound the measurements of abnormal returns. Therefore, we run the regression again after removing observations in which analysts make recommendation changes 2 days after the earnings announcement; we obtain similar significant results.

Finally, we test whether investors rationally discount or naïvely follow the opinions of analysts (Kroszner and Rajan 1994; Gompers and Lerner 1999). According to the rational discounting hypothesis, investors fully expect sell-side analysts to be subject to potential conflicts of interest and adjust analysts' opinions accordingly when making investment decisions. As affiliated analysts are likely to be more optimistic in their stock recommendations, investors will discount their recommendation upgrades (downgrades) more (less) heavily than those of unaffiliated analysts. However, when affiliated analysts issue unfavorable stock opinions, rational investors expect these opinions to be more valuable because they are expressed despite conflicts of interest. In contrast, the naïve-investor hypothesis states that investors do not take analysts' conflicts of interest into account and make investment decisions merely on the basis of analysts' opinions. To examine these hypotheses, we regress abnormal stock returns on analyst affiliation while controlling for other variables, as follows.

[27] Due to space limitations, this table is not presented here. It is available from the authors upon request.

[28] We thank one of our referees for these suggestions. The results are not tabulated here to save space; they are available from the authors upon request.

[29] We include stock returns 1 day before the issuance of the analyst's recommendation report to incorporate possible information leakage.

[30] The mean-adjusted abnormal volume is much greater in reaction to unaffiliated upgrade announcements than to affiliated upgrade announcements.

$$CAR = \alpha + \beta_1 DRECCHG + \beta_2 AFFIL + \beta_3 AFFIL \times DRECCHG + \beta_4 SURPRISE + \beta_5 EXP + \beta_6 BRKSZ + \beta_7 LOGMKV + \beta_8 INST + \beta_9 DDAYS \times DRECCHG + \varepsilon \quad (4)$$

The new variables are defined as follows.

CAR	Cumulative average abnormal returns measured in a [−1, +1]-day event window using the market-adjusted model.
DRECCHG	Dummy variable equal to 1 for an upgrade recommendation for firm *i* at time *t* subsequent to earnings surprises in quarter *q* and 0 for a downgrade or reiteration.
DDAYS	Dummy variable equal to 1 if the earliest recommendation is made within 7 trading days (0–6) of a firm's quarterly earnings announcement and 0 otherwise.[31]

The other variables are defined as previously described. We include an interaction variable between *DDAYS* and *DRECCHG* to test whether the market reacts differently to earlier versus later recommendations. We perform separate regression analyses for the large positive and negative earnings surprise samples. The rational discounting hypothesis predicts that $\beta_3 < 0$, and the naïve-investors hypothesis predicts that $\beta_3 = 0$.

We present the regression results for Eq. (4) in Panel B of Table 6. For the large positive earnings surprises sample, the coefficient of the dummy variable *DRECCHG* is 0.012 (t = *4.35*), indicating that recommendation upgrades are associated with higher stock returns than recommendation downgrades or reiterations. This finding is consistent with the results reported in Table 2. The affiliation dummy variable *AFFIL* and the interaction term *AFFIL* × *DRECCHG* have coefficients of −0.053 ($t = -0.91$) and −0.010 ($t = -1.34$), which are not statistically significant. This suggests that investors respond similarly to the recommendation changes made by affiliated and unaffiliated analysts. We also find negative but insignificant coefficients for the interaction variables *DDAYS* and *DRECCHG*. This suggests that investors' reactions to earlier recommendations (within 7 trading days of the EAD) are not significantly different from their reactions to later recommendations. The results for the large negative earnings surprise sample are similar to those obtained using model (2).

[31] As a robustness check, we also use *DDAYS*, the number of trading days after the firm's quarterly EAD when recommendations are made, as an independent variable in the regression equation. This yields similar results.

Conclusions

Financial analysts play a vital role in disseminating information in capital markets. Their activities enhance the overall well-being of capital markets, as their reports and recommendations help investors and can be used to monitor managers. However, the extent to which analysts fulfill their professional responsibility depends on their integrity, a fundamental component of ethical behavior. Using a sample of analysts' recommendation changes in response to earnings surprises, we test four hypotheses concerning the causes and prevention of threats to the integrity of financial analysts. We find empirical support for the hypotheses that conflicts of interest encountered by affiliated analysts reduce their independence and thus their integrity. The recommendation responses of affiliated analysts are asymmetric. Specifically, whereas there is no significant difference in recommendation changes between affiliated and unaffiliated analysts subsequent to positive earnings surprises, affiliated analysts are more reluctant than unaffiliated analysts to downgrade their recommendations or drop their coverage of stocks in response to large negative surprises.

We also predict that the reputation concern of prestigious investment banks and the Global Settlement have a disciplinary function in enhancing analysts' integrity. Biased reports in which overvalued stocks are recommended to investors lead to losses, which injure the reputation of both financial analysts and investment banks. The Global Settlement removed the connection between analysts' compensation and investment banking business and required firms to limit internal communication and interaction by separating their securities-offering departments from their stock analysis departments to mitigate conflicts of interest. However, we find no empirical support for these hypotheses. In fact, we find that positively biased recommendations continue to mislead investors, as investors often fail to recognize the threat to integrity of conflicts of interest, despite distinguishing between recommendations made by unaffiliated and affiliated financial analysts.

The findings raise further concerns regarding the ethics and standards for the professional conduct of financial analysts. Despite the efforts made by regulators and organizations of financial analysts (such as the *CFA Institute*), *conflicts of interest in the capital market continue to threaten the integrity of financial analysts, who often disseminate misleading information through biased recommendations. We advise future researchers to investigate more effective mechanisms for disciplining financial analysts and encouraging them to retain their integrity when conflicts of interest occur.*

Appendix

See Table 7.

Table 7 Analysts' recommendations and earnings forecasts for new century financial corporation subsequent to quarterly earnings surprises

	Q3:06	Q2:06	Q1:06	Q4:05	
EAD	11/2/2006	8/3/2006	5/4/2006	2/2/2006	
Consensus (Mean)	$1.89	$1.85	$1.46	$1.82	
Actual	$1.12	$1.81	$1.79	$2.00	
Earnings surprise	−41 %	−2 %	23 %	10 %	
Recommendations summary as of	3/2007 (delisting week)		12/2006 (1 month after Q3:06)		
Strong buy	0		2		
Buy	1		5		
Hold	7		2		
Underperform	2		0		
Sell	2		1		
Number of analysts	12		10		
Consensus rating	3.4 (hold)		2.3 (buy)		
Earnings revisions in 12/2006	Q4:06	Q1:07	FY:06	FY:07	
Upward revisions	0	0	0	0	
Downward revisions	0	0	0	0	
Earnings revisions in 3/2007	Q4:06	Q1:07	FY:06	FY:07	
Upward revisions	0	0	0	0	
Downward revisions	2	1	1	1	
Corporate event	$50 Million Private Placement of Trust Preferred Securities on 9/13/2006				
	$50 Million Cumulative Redeemable Preferred Stock on 8/16/2006				
Underwriters	Bear, Stearns & Co. and Morgan Stanley were the co-book running lead managers for the offering, with Stifel Nicolaus and Jefferies & Company as co-managers.				
Stock closing prices as of	3/14/2007	3/1/2007	12/1/2006	8/1/2006	5/1/2006
	$0.67	$15.85	$35.71	$44.35	$51.97

Sources: Finance.Yahoo.com and various New Century Financial Corporation 10Q forms

References

Agrawal, A., & Chen, M. (2008). Do analyst conflicts matter? Evidence from stock recommendations. *Journal of Law and Economics, 51*, 503–537.

Bernard, V., & Thomas, J. K. (1990). Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *Journal of Accounting and Economics, 13*, 305–340.

Boni, L. (2005, September). Analyzing the analysts after the Global Settlement. In *Conference presentation,* Brookings-Nomura Seminar, Brookings Institution, Washington, DC.

Boni, L., & Womack, K. L. (2003). Wall Street research: Will new rules change its usefulness? *Financial Analysts Journal, 59*(3), 25–29.

Brown, L. D. (2000). *I/B/E/S research bibliography* (6th ed.). New York: I/B/E/S International Inc.

Brown, L. P., & Rozeff, M. (1979). Univariate time-series models of quarterly accounting earnings per share: A proposed model. *Journal of Accounting Research, 17*, 179–189.

Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics, 24*(1), 99–126.

Cao, J., & Kohlbeck, M. (2014). Analyst quality, optimistic bias, and reactions to major news. *Journal of Accounting, Auditing & Finance, 26*(3), 502–526.

Carhart, M. (1997). On persistence in mutual fund performance. *Journal of Finance, 52*, 57–83.

Carter, R., Dark, F., & Singh, A. (1998). Underwriter reputation, initial returns, and long-run performance of IPO stocks. *Journal of Finance, 53*, 285–311.

Carter, R., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *Journal of Finance, 45*, 1045–1064.

Chen, J., Cumming, D., Hou, W., & Lee, E. (2014). Does the external monitoring effect of financial analysts deter corporate fraud in China? *Journal of Business Ethics, 134*, 727–742.

Chen, J., Ding, R., Hou, W., & Johan, S. (2015a). Do financial analysts perform a monitoring role in China? Evidence from Modified Audit Opinions (June 1, 2015). Abacus (Forthcoming). http://ssrn.com/abstract=2039672

Chen, T., Harford, J., & Lin, C. (2015b). Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics, 115*, 383–410.

Clarke, J., Ferris, S., Jayaraman, N., & Lee, J. (2006). Are analyst recommendations biased? Evidence from corporate

bankruptcies. *Journal of Financial and Quantitative Analysis, 41*(1), 169–196.
Clarke, J., Khorana, A., Patel, A., & Rau, P. (2009). Independents' day? Analyst behavior surrounding the Global Settlement. *Working paper*, Georgia Institute of Technology.
Clement, M. (1999). Analysts forecast accuracy: Do ability, resources, and portfolio complexity matter? *Journal of Accounting and Economics, 27*, 285–303.
Conrad, J., Cornell, B., Landsman, W., & Rountree, B. (2006). How do analyst recommendations respond to major news? *Journal of Financial and Quantitative Analysis, 41*(1), 25–49.
Core, J., Guay, W., & Rusticus, T. (2006). Does weak governance cause weak stock returns? An examination of firm operating performance and investors' expectations. *Journal of Finance, 61*, 655–687.
Cote, J., & Goodstein, J. (1999). A breed apart? Security analysts and herding behavior. *Journal of Business Ethics, 18*(3), 305–314.
Cowen, A., Groysberg, B., & Healy, P. (2006). Which types of analyst firms are more optimistic? *Journal of Accounting and Economics, 41*(1), 119–146.
Das, S., Levine, C., & Sivaramakrishnan, K. (1998). Earnings predictability and bias in analysts' earnings forecasts. *Accounting Review, 73*(2), 277–294.
Di Lorenzo, V. (2007). Business ethics: Law as a determinant of business conduct. *Journal of Business Ethics, 71*(3), 275–299.
Doyle, J., Lundholm, R., & Soliman, M. (2006). The extreme future stock returns following the IBES extreme earnings surprises. *Journal of Accounting Research, 44*(5), 849–887.
Dyck, Alexander, Morse, Adair, & Zingales, Luigi. (2010). Who blows the whistle on corporate fraud? *Journal of Finance, 65*, 2213–2253.
Fama, E. F., & French, K. (1993). Common risk factors in returns on stocks and bonds. *Journal of Financial Economics, 33*, 3–56.
Fang, H. (2005). Investment bank reputation and the price and quality of underwriting services. *Journal of Finance, 60*(6), 2729–2761.
Fang, H., & Yasuda, A. (2009). The effectiveness of reputation as a disciplinary device in sell-side research. *Review of Financial Studies, 22*(9), 3735–3777.
Francis, J., Hanna, D., & Philbrick, D. (1997). Management communications with securities analysts. *Journal of Accounting and Economics, 24*(3), 363–394.
Franzoni, F., & Marin, J. (2006). Pension plan funding and stock market efficiency. *Journal of Finance, 61*, 921–956.
Gompers, P., & Lerner, J. (1999). Conflicts of interest and reputation in the issuance of public securities: Evidence from venture capital. *Journal of Law and Economics, 42*(1), 1–28.
Hayn, C. (1995). The information content of losses. *Journal of Accounting and Economics, 20*(2), 125–153.
Hertzel, M., Lemmon, M., Linck, J. S., & Rees, L. (2002). Long-run performance following private placements of equity. *Journal of Finance, 57*(6), 2595–2617.
Hong, H., & Kubik, J. (2003). Analyzing the analysts: Career concerns and biased earnings forecasts. *Journal of Finance, 58*, 313–351.
Jensen, M. C. (2011) Putting integrity into finance: A positive approach. *Harvard NOM Working Paper No. 06-06; Barbados Group Working Paper No. 06-01*. http://ssrn.com/abstract=876312
Kadan, O., Madureira, L., Wang, R., & Zach, T. (2009). Conflicts of interest and stock recommendations: The effect of the Global Settlement and related regulations. *Review of Financial Studies, 22*, 4189–4217.
Kasznik, R., & Lev, B. (1995). To warn or not to warn: Management disclosures in the face of an earnings surprise. *Accounting Review, 70*, 113–134.
Kasznik, R., & NcNichols, M. (2002). Does meeting earnings expectations matter? Evidence from analyst forecast revisions and share prices. *Journal of Accounting Research, 40*, 727–759.
Kim, M., Kristiansen, E. G., & Vale, B. (2005). Endogenous product differentiation in credit markets: What do borrowers pay for? *Journal of Banking & Finance, 29*(3), 681–699.
Kolasinski, A. C., & Kothari, S. P. (2008). Investment banking and analyst objectivity: Evidence from analysts affiliated with mergers and acquisitions advisors. *Journal of Financial and Quantitative Analysis, 43*(04), 817–842.
Kroszner, S., & Rajan, R. (1994). Is the glass-stegall act justified? A study of the U.S. experience with universal banking before 1933. *American Economic Review, 84*, 810–832.
Lin, H., & McNichols, M. (1998). Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics, 25*(1), 101–127.
Logue, D. E. (1973). On the pricing of unseasoned equity issues: 1965–1969. *Journal of Financial and Quantitative Analysis, 8*, 91–103.
Matsumoto, D. (2002). Management's incentives to avoid negative earnings surprises. *Accounting Review, 77*(3), 483–514.
Mendenhall, R. (2004). Arbitrage risk and post-earnings-announcement drift. *Journal of Business, 77*, 875–894.
Michaely, R., & Womack, K. (1999). Conflict of interest and the credibility of underwriter analyst recommendations. *Review of Financial Studies, 12*(4), 653–686.
Mikhail, M. B., Walther, B. R., & Willis, R. H. (1997). Do security analysts improve their performance with experience? *Journal of Accounting Research, 35*, 131–157.
Mikhail, M. B., Walther, B. R., & Willis, R. H. (1999). Does forecast accuracy matter to security analysts? *Accounting Review, 74*, 185–200.
Mikhail, M. B., Walther, B. R., & Willis, R. H. (2004). Earnings surprises and the cost of equity capital. *Working paper*.
Mozes, H. (2003). Accuracy, usefulness and the evaluation of analysts' forecasts. *International Journal of Forecasting, 19*, 417–434.
Ng, J. (2007). Earnings surprises and changes in liquidity. *Working paper*, Pennsylvania State University, Pennsylvania.
O'Brien, P. (1988). Analysts' forecasts as earnings expectations. *Journal of Accounting and Economics, 10*, 159–193.
O'Brien, P., McNichols, M. F., & Lin, H. W. (2005). Analyst impartiality and investment banking relationships. *Journal of Accounting Research, 43*(4), 623–650.
Palazzo, G., & Rethel, L. (2008). Conflicts of interest in financial intermediation. *Journal of Business Ethics, 81*(1), 193–207.
Schipper, K. (1991). Analysts' forecasts. *Accounting Horizons, 5*, 105–132.
SEC News Release. *Ten of nation's top investment firms settle enforcement actions involving conflicts of interest between research and investment banking*. Retrieved August 8, 2009, from http://www.sec.gov/news/press/2003-54.htm.
Stickel, S. (1989). The timing of and incentives for annual earnings forecasts near interim earnings announcements. *Journal of Accounting and Economics, 11*, 275–292.
Tinic, S. M. (1988). Anatomy of initial public offerings of common stock. *Journal of Finance, 43*, 789–822.
Veit, E. T., & Murphy, M. R. (1996). Ethics violations: A survey of investment analysts. *Journal of Business Ethics, 15*(12), 1287–1297.

Welch, I. (2000). Herding among security analysts. *Journal of Financial Economics, 58*, 369–396.

Womack, K. (1996). Do brokerage analysts' recommendations have investment value? *Journal of Finance, 51*, 137–167.

Wu, M., Wilson, M., & Wu, Y. (2015). Was the global settlement effective in mitigating systematics bias in affiliated analyst recommendations? *Journal of Business Ethics,*. doi:10.1007/s10551-015-2888-6.

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Yu, F. (2008). Analyst coverage and earnings management. *Journal of Financial Economics, 88*, 245–271.