Analyst Behavior at Independent Research Firms, Brokerage Houses, and Investment Banks: Conflicts of Interest or Better Information?

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Abstract

In this paper we examine differences in behavior for analysts at investment banks, pure brokerage firms and independent research firms with no investment banking mandates. We find little evidence that analysts at large investment banks provide biased research. They provide less optimistic and more accurate earnings forecasts, and are more likely to provide the first recommendation for a firm in any given quarter. While they provide more positive recommendations than analysts at other financial institutions, their recommendations are viewed as more informative by the market – abnormal returns following recommendation upgrades (downgrades) are significantly more positive (negative) for analysts at large investment banks than those at other financial institutions. Finally, analysts moving to large investment banks from other types of financial institutions do not display any changes in behavior. These findings question whether investors will be better served via a proposed shift in equity research to analysts at independent research firms.

Keywords: Analysts; Investment banks; Independent Research houses; Brokerages; Conflicts of interest; Analyst recommendations; Forecast bias

On April 28, 2003, ten Wall Street investment banks agreed to pay $1.4 billion "to resolve charges that they hyped stocks and produced biased research reports during the late 1990s. The case centered on charges that the reports were designed to land lucrative investment-banking business and came at the expense of small investors."[1] Part of the settlement required the investment banks to put $432.5 million over five years into a fund to provide investors with stock-market analysis from independent research firms, the unstated assumption being that analysts at independent research houses are less prone to conflicts of interest and more likely to provide unbiased research than analysts at investment banks.

The existing academic literature provides some support for the hypothesis that conflicts of interest result in more biased research. In particular, current research documents that analysts at affiliated financial institutions provide more optimistic forecasts than those associated with unaffiliated firms. This is true for analysts at firms providing investment banking business (Dugar and Nathan (1995)), lead underwriters of equity offerings (Lin and McNichols (1998), Michaely and Womack (1999), and Bradley, Jordan and Ritter (2003)), and brokerage-owned mutual funds (Irvine, Nathan and Simko (2003)). The popular press further attributes this bias to pressure on analysts to help generate investment banking business, since analyst compensation has been alleged to be tied to deal flow.[2]

These papers define affiliated analysts as analysts working for banks with investment banking ties to the firms the analysts cover. However, as Bradshaw, Richardson and Sloan (2003) note, unaffiliated analysts also have incentives to issue optimistic research in order to increase their chances of generating investment-banking business from the firms they cover. In this paper, we avoid this problem by testing two alternative, but not mutually exclusive, hypotheses on analyst behavior, for analysts employed at three distinct groups of firms: (1)

[1] See Opdyke and Simon (2003).

[2] The relation between analysts and investment banking deal flow can best be illustrated by the following two examples from an article in the *Wall Street Journal* (see Smith, Craig and Solomon, 2003). "In her 1999 self-evaluation, Ms. [Mary] Meeker says: "Bottom line, my highest and best use is to help MSDW [Morgan Stanley Dean Witter] win the best Internet IPO mandates (and to ensure that we have the appropriate analysts and bankers to serve the companies well) and then to let them work their way through our powerful research and distribution system." In another example, when Craig Kloner, an analyst at Goldman Sachs, was asked by his firm "What his three most important goals were for 2000, [he] wrote, "1. Get more investment banking revenue. 2. Get more investment banking revenue. 3. Get more investment banking revenue."

investment banks, (2) brokerage firms with no investment banking activity, and (3) independent research firms with neither brokerage nor investment banking businesses.[3]

Our first hypothesis, the *bias* hypothesis, posits that analysts at investment banks produce biased research because they face pressure to help generate investment banking business. Conflicts of interest may also exist for analysts at brokerage houses since brokerage houses generate income from trading activity, and research analysts play a role in generating that activity. Any changes in analyst recommendations are likely to generate trading profits for brokerage firms. However, Boni and Womack (2003) note that in 1999, total trading commissions at major firms and national brokerage houses were $9.5 billion, compared to the $24.5 billion investment banks earned in fees, suggesting a greater potential for conflicts of interests at investment banks relative to brokerage firms. Independent research firms are not likely to face such conflicts of interest. Hence, the bias hypothesis suggests that analysts at investment banks are more biased than analysts at brokerage houses, who in turn, are more biased than analysts at independent research firms.

The second hypothesis, which we term the *information* hypothesis, posits that forecasts and recommendations from investment bank analysts are relatively more informative than analysts at other types of financial institutions. There are two reasons why this may be so. First, if as alleged by the press and the New York State Attorney General's office, investment banks breach the "Chinese wall", bringing analysts "over the wall" to help win a deal, analysts at investment banks may have access to information not available to those at brokerages or independent research houses. Better access to strategic information might lead to more informative forecasts as captured by the market's reaction to a recommendation change. Alternatively, investment banks are likely to have more resources than independent research houses. If investment banks use larger compensation packages to attract and retain the best analysts (Boni and Womack, 2003), these analysts might be better at equity research than analysts at other institutions, even if all analysts have access to similar information. Consequently, the information hypothesis predicts that analysts at investment banks will provide more informative recommendations and forecasts than analysts at brokerages or independent research houses.[4]

[3] Examples of purely independent research firms are Standard and Poor's, Sanford Bernstein, and Argus Research. Examples of brokerage firms are A. G. Edwards, and Edward Jones.

[4] These hypotheses are similar to the conflicts of interest hypothesis and the superior information hypotheses discussed in Michaely and Womack (1999). We extend these hypotheses to cover more general conflicts of interest at different types of financial institutions.

We measure optimism bias in two ways. We measure both the optimism bias in the analyst's forecast relative to the consensus and the proportion of Strong Buy or Buy recommendations the analyst issues relative to other analysts. Similarly, we measure informativeness in two ways - by the analyst's timeliness and forecast accuracy. We measure the timeliness of the analyst based on (1) the proportion of instances in which the analyst is the first to issue forecasts for the firm in a given quarter, and (2) when the analyst revises his forecast relative to the firm's earnings announcement date. We also measure analyst accuracy relative to the actual earnings per share value. As discussed above, large investment banks might have greater resources to hire better analysts, for example, than smaller investment banks. Hence, we also distinguish between large and small financial institutions.

We first examine whether analysts at the three types of financial institutions differ across the bias and informativeness dimensions. Second, we examine whether stock market reactions to recommendation changes support either of the two hypotheses. Third, we examine if analyst behavior changes after they move from one type of financial institution to another.

Controlling for other factors that might influence optimism, timeliness and accuracy, we find that analysts at large investment banks issue *less* optimistic analyst *forecasts*, relative to the consensus, than analysts at any other type of financial institution with the exception of analysts at large brokerage houses. They are also significantly more likely to issue the first recommendation for a firm each quarter. Moreover, their forecasts are significantly more accurate than those of analysts at any other type of financial institution with the exception of analysts at small independent research houses.

The distribution of *recommendations* for analysts at different types of financial institutions indicates that analysts at investment banks and brokerages are significantly more likely to recommend a "Strong Buy" or "Buy" rating than analysts at independent research firms. These recommendation changes are more likely to be issued in the week after the earnings announcement date rather than in the week before. Analysts at independent research houses are significantly more likely to revise their recommendations later than analysts at either investment banks or brokerages. Overall, we find that analysts at large investment banks issue less optimistic and more accurate earnings forecasts, while making more favorable stock recommendations. The combination of positive recommendations and less optimistic earnings forecasts is consistent with both the bias and the information hypotheses. It is plausible that an investment bank analyst who makes deeply conservative earnings forecasts, while making Strong Buy recommendations on the same stock may be more influenced by the long-term growth prospects of the company than the short-term earnings forecast (information). Alternatively, the apparent contradiction between the earnings forecast and the recommendation may be driven by pressure from the investment bank (bias). We distinguish between the two hypotheses by examining the stock market's reaction to these recommendation changes.

The market treats recommendations by investment bank analysts as informative. A multivariate regression of abnormal returns around recommendation upgrades (downgrades) on dummies for the analysts employed at the different types of financial institutions shows that the abnormal return following recommendation changes by analysts at large investment banks is significantly higher (lower) than the abnormal returns earned following similar changes by analysts at other types of financial institutions. This finding is consistent with Bradley, Jordan and Ritter (2003) who find that "Buy" recommendations at the end of the quiet period by analysts at affiliated investment banks are more likely to be received positively relative to similar recommendations by analysts at unaffiliated investment banks.

Moreover, long-term abnormal performance is significantly positive for upgrades by analysts across all types of financial institutions and insignificant for downgrades, suggesting that the market under-reacts to recommendation upgrades and reacts correctly to recommendation downgrades. Since the long-term abnormal performance is not negative following recommendation upgrades, our finding is inconsistent with the hypothesis that analysts at investment banks are biased and markets are unaware of this bias. In fact, the under-reaction to recommendation upgrades suggests that markets are aware of the potential for bias in recommendation upgrades and react less to upgrades than to downgrades. Our overall findings for both upgrades and downgrades are consistent with the information hypothesis.

Finally, we use a natural experiment on analyst turnover to test whether analyst behavior changes depending on the type of financial institution where they are employed. If conflicts of interest bias analyst behavior, we should see changes in recommendations when an analyst moves from an independent research firm, or brokerage, to an investment bank, or vice versa. In most (2,258) turnovers in our sample, an analyst leaves one investment bank for another. However, we have 111 cases where an analyst leaves an independent research firm, or brokerage house, for an investment bank, and vice versa. In these instances, the analyst's behavior (optimism bias, timeliness and accuracy) over the year prior to the turnover is statistically indistinguishable from that over the year following turnover. These findings are inconsistent with the bias hypothesis.

Overall, we find little evidence that analysts at large investment banks provide biased research. They provide less optimistic and more accurate earnings forecasts. They are more likely to provide the first recommendation for a firm in any given quarter. While they do provide more positive recommendations than analysts at other financial institutions, their recommendations are more likely to be viewed as informative by the market – abnormal returns following recommendation upgrades (downgrades) are significantly more positive (negative) for analysts at large investment banks than at other financial institutions. Finally, analysts moving to large investment banks from other types of financial institutions do not display any changes in behavior. We conclude that our evidence is more consistent with the information hypothesis than the bias hypothesis.

This study adds to our current understanding of analyst bias based on institutional affiliation in several respects. First, current studies by Agrawal and Chen (2004), Cowen, Groysberg and Healy (2003) and Jacob, Rock, and Weber (2003) focus on earnings forecasts by analysts at investment banks, brokerage houses, and independent research firms. We examine earnings forecasts, recommendation changes, and the immediate and long term (one year) abnormal stock price reaction to recommendation changes. Investigating recommendation changes, in addition to earnings forecasts, allows us to provide insight into whether conflicts of interest result in aggressive recommendations. In addition, examining the market's reaction to the recommendation change, both in the short- and in the long-term, allows us to contrast the bias and the information hypotheses. Second, Cowen, Groysberg and Healy (2003) and Jacob, Rock, and Weber (2003) only examine data between 1998 and 2000, while Agrawal and Chen (2004) examine data for a small subset of investment banks and broker-dealers between January 1994 and March 2003. We, on the other hand, examine all firms on the I/B/E/S database between October 1993 and December 2002, allowing us to also test for structural differences in the post-Regulation Fair Disclosure period. Finally, our unique dataset of analyst turnover across the three types of financial institutions allows us to conduct a natural experiment to more conclusively examine the bias hypothesis.

The remainder of the paper is organized as follows. In Section I we discuss the data and the methodology. Section II provides a discussion of the underlying hypotheses and our main findings. We conclude in Section III.

I. Data and Methodology

A. Data

We use the Nelson's Directory of Investment Research and Nelson's Directory of Investment Managers to classify firms providing research coverage into (1) independent research firms, (2) firms providing research coverage with brokerage activities but without investment banking activities – brokerage only firms, and (3) investment banks providing research coverage of stocks. We also independently contacted senior personnel at investment banks, brokerage houses and independent research firms to help verify our classification of firms into the three categories. Our final categorization is based on input from all the above sources. Overall, we have recommendation data for 10 independent firms, 9 brokerage firms, and 271 investment banks.

We gather individual analysts' forecasts of quarterly earnings-per-share (EPS) from the I/B/E/S Detailed History database over the period from November, 1993 to December, 2002. The Detailed History database tracks the identity of the analyst issuing the forecast, his employer, the date the forecast was issued, and the actual value of the relevant forecast.[5] In order to ensure that we have enough observations to compute our variables, we require that each stock in our sample have at least 5 analysts issuing forecasts on it in a given quarter.[6] Below this number, there might not be a meaningful consensus from which to judge the relative degree of bias for an analyst.

We also obtain analyst stock recommendations from the I/B/E/S database. The I/B/E/S recommendation database begins in October 1993 and contains recommendations from a wide range of brokerage firms.[7] This database tracks, among other things, the analyst issuing the forecast, the analyst's current employer, the recommendation report date, and the recommendation itself. These recommendations are based on a five-point scale and are as follows: (1) strong buy; (2) buy; (3) hold; (4) underperform; (5) sell.

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[5] For a more detailed description of the I/B/E/S database see Philbrick and Ricks (1991).

[6] The mean number of analysts issuing forecasts on a particular stock in a given quarter is approximately four.

[7] Li (2002) notes that I/B/E/S includes recommendations from large investment banks like Merrill Lynch, Goldman Sachs, and Donaldson, Lufkin, and Jenrette, whereas other databases, such as Zacks, do not include recommendations from these investment banks.

We gather data on analyst turnover by using the I/B/E/S detail file. The detail file assigns each individual analyst a numerical code making it possible to track forecasts of EPS across time even if the analyst switches firms. Since the I/B/E/S database only identifies each analyst and his employer by a unique numerical code, we use the Broker Code Key to identify the last name and first initial of each analyst in the database and the identity of his employer. This additional information allows us to identify those analysts that were named to *Institutional Investor's* (*II*) *All-American* Team (all-star analyst) in a given year.[8]

B. Construction of primary variables

We measure optimism bias in two ways. We construct an optimism bias score as in Hong, Kubik and Solomon (2000) to measure the relative optimism of the analyst relative to the consensus. We also examine the proportion of times the analyst recommends a Strong Buy or a Buy recommendation. Both measures examine different aspects of optimism bias. The first is a measure of the bias relating to the short term earnings prospects for the company while the second measures the analysts' view of the longer-term growth prospects of the company. An investment bank analyst who makes deeply conservative earnings forecasts, while making Strong Buy recommendations on the same stock may either be influenced by the long-term growth prospects of the company (information) or by pressure from the investment bank (bias) or both.

Similarly, we measure informativeness across two dimensions – timeliness and accuracy. To measure timeliness and accuracy, we construct timeliness scores and forecast accuracy scores.

Optimism bias score: We follow Hong, Kubik, and Solomon (2000) in using I/B/E/S data to construct a quarterly performance measure based on an analyst's relative optimism bias. We define $F_{i,j,t}$ as the most recent earnings-per-share forecast of quarter-end earnings issued by analyst i on stock j for quarter t. Let $\overline{F}_{-i,j,t} = \frac{1}{n}\sum_{m\in\{-i\}} F_{m,j,t}$, where $\{-i\}$ is the set of all analysts other than analyst i who produce an earnings per share estimate for stock j in quarter t, and n is the number of analysts in $\{-i\}$. Hence, $\overline{F}_{-i,j,t}$ is a measure of the consensus forecast made by all analysts except analyst i following stock j in quarter t. We define optimism bias as:

[8] Leone and Wu (2002) discuss the selection procedure for the all-American team.

$$Optimism\ bias_{i,j,t} = F_{i,j,t} - \overline{F}_{-i,j,t}$$

We then sort the analysts who cover firm *j* in quarter *t* based on their *optimism bias* given by the above equation. We then assign a ranking based on this sorting, with the most optimistic analyst receiving a rank of one. In the case of ties, each analyst is assigned the mean value of the ranks that they take up.[9] Since the maximum rank an analyst can receive for a firm depends on the number of analysts who cover the firm, we scale an analyst's rank by the number of analysts who cover the firm. The formula for the *optimism bias score* measure is given by:

$$optimism\ \ bias\ score_{i,j,t} = 100 - \left[\frac{Optimism\ \ rank_{i,j,t} - 1}{number\ of\ analysts_{j,t} - 1} \right] \times 100$$

where *number of analysts*$_{j,t}$ is the number of analysts who cover the firm in a given quarter. The optimism bias score ranges from zero for the lowest rated analyst covering a firm to a score of 100 for the highest rated analyst covering the firm in a given quarter. Intuitively, optimism bias measures how optimistic an analyst is relative to the other analysts covering the stock – the more optimistic the analyst, the higher his forecast relative to the consensus.

Timeliness: We measure forecast timeliness by examining the likelihood that an analyst is the first to issue a forecast in a given quarter. We create a dummy variable that takes the value of one if an analyst was the first to issue an earnings forecast in a given quarter and zero otherwise. In the case of ties, we assign each analyst who issued on the first day a value of one. The first forecast has been used previously by Hong, Kubik, and Solomon (2000) to examine herd behavior by security analysts. They note that the first analyst to issue a forecast is less likely to be herding.

Forecast Accuracy: Our measure of analyst *i*'s accuracy for firm *j* in quarter *t* is the absolute difference between his forecast and the realized earnings per share of the firm, $A_{j,t}$:

[9] Alternative procedures for handling ties, such as assigning the median value of the ranks they take up or the highest value of the ranks they take up, produce similar results.

$$Forecast\ accuracy = \left| F_{i,j,t} - A_{j,t} \right|$$

We replicate the previous ranking methodology (for constructing the *optimism bias score*) to construct a *relative accuracy score* measure, which ranges from zero for the least accurate analyst covering a firm to a score of 100 for the most accurate analyst covering the firm in a given quarter.

II. Hypotheses and results

A. Descriptive statistics

Table 1 provides descriptive statistics on analyst level and institution level characteristics for the three groups of financial institutions in our sample. Since the data is skewed, we report both mean and median characteristics. Also since the information hypothesis predicts that analysts with greater resources are more likely to provide more informative forecasts, we differentiate between large and small institutions, on the basis of the number of analysts employed at each institution. For each type of institution separately, firms in the top 25th percentile of analysts employed are classified as large while those in the bottom 75th percentile are classified as small.[10]

The mean and median number of stocks and industries covered at independent research firms is lower than that at investment banks and brokerages. The median number of stocks covered by large (small) independent research firms is 190.5 (16) while the corresponding numbers for large (small) investment banks and brokerages are 245 (22) and 248 (34) respectively. The median number of industries covered by large (small) independent research firms is 27 (6). Large (small) investment banks and brokerages cover 32 (7) and 43 (13) industries respectively. Independent research houses also employ fewer analysts. The median large (small) independent research house employs 23 (4) while the median large (small) investment bank and brokerage employ 34

[10] We use this asymmetric cutoff because of the skewness in the data – a few investment banks dominate the ranking of number of analysts employed.

(5) and 29 (6) analysts respectively. All-star analysts are concentrated at a few firms. The number of all-stars at the median level across the different types of financial institutions is zero.

Finally, analysts at independent research houses do not seem to turn over as frequently as analysts at investment banks or brokerages. The median analyst employed at a large (small) independent research house has been employed for 3.76 (1.86) years while the median analyst employed at a large (small) investment bank and brokerage has been employed for 2.12 (1.16) and 1.66 (1.71) years, respectively.

B. Do analysts at investment banks, brokerage firms, and independent research firms exhibit differences in their behavior?

Table 2 provides initial univariate evidence on analyst optimism bias, timeliness and forecast accuracy at the three types of financial institutions. Analysts at large investment banks issue significantly less optimistic forecasts than analysts at any other type of financial institution other than large brokerages. They are also significantly more likely to issue the first forecast on a stock in any given quarter than analysts at any other type of institution. Finally, they are more accurate than analysts at any other type of financial institution other than large brokerages.

We next examine these analyst performance metrics in a multivariate regression framework. Specifically, we want to ascertain whether analysts at a particular type of financial institution are more likely to be optimistic, timely or accurate after controlling for other analyst and firm characteristics. Our dependent variables are the optimism bias score (for the regression on optimism bias), an indicator variable that takes the value 1 if the analyst issues the first forecast for a firm in a given quarter (for the regression on timeliness) and the relative accuracy score (for the regression on forecast accuracy).[11] We estimate the following model:

Optimism bias score / *Probability (Analyst is timely)* / *Accuracy score* = α_0

+ β_1 (*High experience* dummy) + β_2 (*All star analyst* dummy)

+ β_3 (*Number of other analysts covering the stock*)

[11] One problem with the score methodology arises when we compare firms covered by different numbers of analysts. For example, if a firm is covered by 5 analysts, these analysts will be allotted scores of 100, 75, 50, 25 and 0. Another firm covered by 11 analysts will allot scores to the analysts of 100, 90 … 0. In a multivariate regression the differing scales may create problems of interpretation. We therefore also redo the analyses with an indicator variable that takes the value of one if (a) the analyst issues a forecast above the consensus (for the optimism bias regression) or if (b) the analyst accuracy score is above 50 (for the regression on forecast accuracy), and zero otherwise. Our results are qualitatively similar.

$+ \beta_4$ (*Number of other stocks in analyst's portfolio*)

$+ \beta_5$ (*optimism bias score* / *timeliness* / *accuracy*)

$+ \beta_6$ (*Dummy for type of financial institution*) $+ \beta_7$ (*Time dummies*)

$+ \beta_8$ (*Firm dummies*)

We hypothesize that more experienced analysts are more accurate in their earnings forecasts. The *high experience* dummy is an indicator variable that equals one if the analyst has four of more years of work experience measured based on the first time the analysts' name appears in the I/B/E/S database. The *all-star analyst* dummy is an indicator variable that equals one if the analyst is an *Institutional Investor* all-star analyst. The *number of other analysts covering the stock* is the number of other analysts covering the stock, in addition to the analyst under consideration, in the given quarter. The *number of stocks followed* is defined as the number of stocks for which an analyst issues a forecast in a given quarter. In each of the three regressions, we also include measures for the other two analyst characteristics. For example, in the regression on optimism bias, we include variables for timeliness and accuracy, since, as Shroff, Venkataraman and Xin (2003) note, analysts may trade off accuracy for timeliness and vice versa. Finally, we include dummy variables for firm and year effects. Since we include dummies for all types of financial institutions except large investment banks, analysts at large investment banks are picked up in the intercept.

Results in this multivariate framework, reported in Table 3, are consistent with the univariate results in Table 2. Analysts employed at large investment banks are significantly less optimistic than analysts at any other type of financial institution other than large brokerages. Controlling for other factors, they continue to be significantly more likely to issue the first forecast on a stock in any given quarter than analysts at any other type of institution. They are more accurate than analysts at any other type of financial institution other than small independent research firms. These results are inconsistent with the bias hypothesis but consistent with the information hypothesis.

As a robustness check, we examine a sub-sample of firms that are covered by analysts at all three types of financial institutions. While the sample size is reduced, the results are qualitatively similar. Analysts employed at large investment banks continue to be significantly less optimistic than analysts at any other type of financial institution other than large brokerages. They continue to be significantly more likely to issue the first forecast on a stock in any given quarter than analysts at any other type of institution. They are also more accurate than analysts at any other type of financial institution other than larger brokerages.

C. Is the distribution of recommendations different for analysts at the three groups of firms?

While analyst earnings forecasts relative to the consensus measure analyst beliefs about the short term prospects of the firm, analysts' long-term beliefs are likely to be reflected in their stock recommendations. Prior research has suggested that analysts at affiliated investment banks (where an affiliated bank is defined as a bank that has underwritten an equity offering for the firm) issue more optimistic forecasts than analysts at unaffiliated investment banks. Prior research, however, has not compared recommendations for independent research firms against those at brokerage firms or investment banks. If conflicts of interest cause analysts to provide optimistic recommendations, we hypothesize that analysts at investment banks will provide more "Buy" and "Strong Buy" recommendations than analysts at brokerage houses or independent firms. Alternatively, we expect analysts at independent firms to provide more "Hold", "Underperform" and "Sell" recommendations than analysts at brokerage houses or investment banks.

We therefore study the distribution of analyst recommendations for the following five categories reported by I/B/E/S: strong buy, buy, hold, underperform, and sell. Our results are reported in Table 4. While the distribution of recommendations for analysts employed at large investment banks are statistically similar to those employed at brokerage firms, analysts at large investment banks issue a significantly smaller proportion of Buy and Strong Buy recommendations than analysts at small investment banks. Analysts at independent research houses issue the smallest proportion of Buy and Strong Buy recommendations than analysts at any other type of financial institution. Over 56% of the recommendations by analysts at either investment banks or brokerages are either a "Buy" or a "Strong Buy". In contrast, that figure is 46% for analysts at independent research firms. This is consistent with the bias hypothesis if analysts are pessimistic about the firm (reflected in the conservativeness of their earnings forecasts) but are pressured by the bank or brokerage to make strong recommendations. It is, however, also consistent with the information hypothesis if recommendations and earnings forecasts reflect different sets of information.

D. Does the market react differently to recommendation changes by analysts at the three groups of firms?

To distinguish between the two hypotheses, we next examine the timing of, and the short-term market reactions to, analyst recommendation changes in the week before and after the quarterly earnings announcement date, and long-horizon abnormal performance in the year after the recommendation change date. As Ivković and Jegadeesh (2003) note, quarterly earnings announcements are pre-scheduled events when managers publicly reveal significant information about the firm. The timing of, and market reaction to, recommendations by analysts around this date should reveal information on the relative timeliness, optimism and accuracy of analysts at the three types of financial institutions. If analysts at investment banks are biased, and the market is aware of the underlying conflicts of interest, the market should react differently to changes in such recommendations relative to analysts at independent research institutions.

The bias hypothesis suggests that upgrades and downgrades by analysts at investment banks should be received less positively than similar changes in recommendations by analysts at independent firms. More specifically, if conflicts of interest drive these changes in recommendations and the market is aware of these conflicts, the market reaction should be largest for recommendation changes by analysts at independent firms, smaller for those by analysts at brokerage firms, and smallest for those by analysts at investment banks. This finding would be consistent with Michaely and Womack (1999) who analyze initial recommendations following an initial public offering of equity. They find that recommendations made by affiliated investment banks significantly underperform recommendations made by unaffiliated banks over a three-day period surrounding the recommendation announcement date.

In contrast, if markets believe that analysts at investment banks make more informative recommendations than analysts at independent firms, the announcement period market reaction to changes in recommendations by analysts at investment banks should be larger than those for analysts at independent firms. This would be consistent with Lin and McNichols (1998) who find that while lead and co-underwriter recommendations are more favorable than those of unaffiliated analysts, investors earn similar returns by following “Strong Buy” and “Buy” recommendations from affiliated and unaffiliated analysts.

Finally, if markets are unaware of conflicts of interest that exist for the analysts at investment banks, then any announcement period abnormal returns caused by the analyst recommendation change should be reversed in the long-term.

We start by examining recommendation changes (upgrades and downgrades) the week prior to and the week after the earnings announcement date.[12] Table 5 reports data on the timing of the recommendation changes. Consistent with Ivković and Jegadeesh (2003), who find a concentration of analyst recommendation revisions following earnings announcements, we find that analysts issue over three quarters of their recommendations in the week *after* the recommendation as opposed to the week prior to the recommendation. Across the three types of financial institutions, analysts at independent research houses are significantly more likely to issue recommendation changes in the week following the earnings announcement than analysts at the other two types of institutions. Analysts at independent research houses issue 82% (81%) of their recommendation upgrades (downgrades) in the week after the earnings announcement date. In contrast, analysts at investment banks and brokerages issue 78% (78%) and 77% (74%) of their recommendation upgrades (downgrades) respectively, over the same period.

For both upgrades and downgrades separately, we next calculate market adjusted cumulative abnormal returns over a two-day window comprising the recommendation date and the subsequent day using the CRSP value-weighted index as a proxy for the market. Table 6 presents the results for recommendations made in the week prior to and the week after the earnings announcement date. In the week prior to the earnings announcement date, abnormal returns following recommendation changes by analysts at large investment banks are statistically similar to abnormal returns following recommendation changes by analysts at other types of financial institutions. In the week immediately after earnings announcement dates, abnormal returns to upgrades by analysts at large investment banks are significantly higher than that for analysts at any other type of financial institution. Upgrades by analysts at large (small) investment banks earn abnormal returns of 1.68% (0.82%), while upgrades by analysts at large (small) independent research houses and brokerages earn 1.09% (0.39%) and 0.11% (0.73%), respectively.

For downgrades, in the week after the earnings announcement, the abnormal returns following recommendation changes by analysts at large investment banks are significantly lower

[12] We exclude the earnings announcement date to avoid confounding it with the analyst recommendation. When examining all recommendation changes beginning one week before and ending one week after the earnings announcement, analysts across all types of financial institutions tend to issue less than 8% of their recommendation changes on the earnings announcement date.

than that for analysts at any other type of financial institution, except those at small brokerages. Downgrades by analysts at large (small) investment banks earn abnormal returns of -2.25% (-1.22%) in the week after the earnings announcement, while downgrades by analysts at large (small) independent research houses and brokerages earn -1.43% (-0.49%) and -0.81% (-2.13%), respectively.[13]

Since abnormal returns following recommendation changes by analysts at investment banks in the week after the earnings announcement are significantly larger in absolute terms, our findings suggest that the market views recommendation changes by analysts at investment banks as being more informative. The informativeness of the investment bank analyst's recommendations may come from their access to strategic information or from their better analysis of public data.

Overall, these results are more consistent with the information hypothesis than the bias hypothesis. As mentioned above, however, our univariate findings could be driven by differences in experience or reputation of the analyst. For example, if investment banks are able to use compensation to attract the highest quality analysts, the market reaction to their recommendations could be larger because the market believes that these analysts are better able to analyze the firm. We therefore reexamine the issue in a multivariate setting after controlling for analyst-specific factors that could impact the market's reaction to the recommendation changes. More specifically, we estimate the following model:

Announcement period return = α_0

+ β_1 (*Revision*) + β_2 (*High experience dummy*)

+ β_3 (*All-star analyst indicator variable*)

+ β_4 (*Number of other analysts covering the stock*)

+ β_5 (*Number of other stocks in the analyst's portfolio*)

+ β_6 (*Reg FD dummy*)

+ β_7 (*Dummy for forecast issued in week prior to earnings announcement*)

[13] We also compute the median announcement period returns for upgrades and downgrades for a sample of firms that are covered by analysts at all three types of financial institutions. Our results are qualitatively unchanged – the median abnormal returns to recommendation upgrades for analysts at large investment banks is 1.35%, significantly higher than those for analysts at small investment banks (0.27%), independent research houses (0.43%) or brokerages (0.52%). Median abnormal returns to recommendation downgrades for analysts at large investment banks are -2.08%, significantly lower than those for analysts at small investment banks (-0.95%), independent research houses (-1.11%) or brokerages (-0.79%).

+ β_8 (*Dummy for forecast issued in week after earnings announcement*)

+ β_9 (*Dummy for first forecast following earnings announcement date*)

+ β_{10}(*Number of recommendation upgrades/downgrade in month prior to recommendation announcement*)

+ β_{11} (*Dummy for type of financial institution*) + β_{12} (*Time dummies*)

+ β_{13} (*Firm dummies*)

We run four basic sets of regressions for upgrades and downgrades separately. In each regression, we control for several analyst-specific factors. To control for the magnitude of the recommendation change, we include the difference between the previous and current recommendations (*Revision*). A recommendation change from a Strong Buy to a Hold (1 to 3) should load positively on the negative (positive) abnormal return following the recommendation downgrade (upgrade).

We also include a dummy variable to control for analyst experience, specifically, whether the analyst has more than four years of experience (*High Experience* dummy). We also control for the *number of other stocks in the analyst's portfolio*, whether the analyst is an *Institutional Investor* ranked all-star and whether the recommendation change was issued in the post- Reg FD period. The difference in abnormal returns for analysts at investment banks in Table 6 might simply be due to the fact that investment banks are the first to make recommendations. Subsequent recommendations are less informative. Hence we include a dummy variable that takes the value one if the recommendation is the first for the stock following the earnings announcement date. We also control for the number of upgrades/downgrades in the previous month.

The variables of interest are the intercept, which captures the market reaction for recommendation changes by analysts at large investment banks, and the dummy variables that capture the difference in market reaction for recommendation changes by analysts at the other types of financial institutions. Table 7 presents our results. The first three models in Table 7 examine all stocks while the fourth model examines a sample of stocks that are simultaneously covered by analysts at all three types of financial institutions.

Recommendation downgrades convey negative information to the market, while recommendation upgrades convey positive information to the market. Coefficients for the analyst-specific factors have the expected signs. The magnitude of the recommendation change is statistically significant for downgrades in all four regressions, but in only two for upgrades. The experience of the analyst is not a significant factor in explaining abnormal returns to recommendation changes. However, recommendation upgrades by all-star analysts earn significantly more positive abnormal returns on average than those by other analysts, while their downgrades earn significantly more negative abnormal returns. In the sub-sample of stocks covered by all three types of analysts however, recommendations by all-stars do not earn abnormal returns significantly different from non-all-star analysts.

The market reaction is lower for upgrades and more negative for downgrades, the greater the number of other analysts following the stock. The Reg FD dummy is insignificant in explaining abnormal returns to upgrades but highly significant in explaining returns to downgrades. In other words, after the introduction of Reg FD, recommendation downgrades earn significantly smaller negative abnormal returns, consistent with the hypothesis that the market believes that these downgrades are less likely to be driven by strategic inside information not available to the market. While abnormal returns are not affected by recommendations issued in the week before the earnings announcement date, they are significantly smaller in magnitude for recommendations issued in the week after the earnings announcement date. Abnormal returns are significantly higher (lower) for recommendation upgrades (downgrades) if the recommendation is the first following the earnings announcement date. Finally, abnormal returns are significantly smaller in magnitude if there have been a number of recommendation upgrades (downgrades) prior to the current upgrade (downgrade), suggesting the current recommendation is not very informative if preceded by other recommendation changes in the same direction.

After controlling for analyst-specific factors, the market reaction for upgrades by analysts at large investment banks is significantly larger than the market reactions for analysts at any other type of financial institution, except analysts at small independent research houses. Similarly, the market reaction for downgrades by these analysts is significantly more negative than the market reaction for analysts at any other type of financial institution.

These findings are inconsistent with the bias hypothesis. The bias hypothesis suggests that conflicts of interest at investment banks create incentives for analysts to add firms to the “Strong Buy” list in order to win deal flow from the firm. In contrast, our regression findings suggest instead that recommendation changes by analysts at investment banks are not only viewed as informative, but more informative than similar recommendation changes by analysts at independent research firms.

An alternative hypothesis is that the market is unaware of the conflicts of interest faced by investment bank analysts and reacts naively to recommendation changes by these analysts. In this case, there should be a negative drift in long term abnormal returns following recommendation upgrades by these analysts, as the initial over-reaction to the recommendation upgrade is slowly corrected over time. To examine long-horizon performance, we therefore form separate calendar time portfolios for upgrades and downgrades respectively, from the day after the recommendation release date to 250 days later. We regress the average portfolio return on the daily Fama-French factors[14]. Table 8 reports the results.

Contrary to the hypothesis that the market does not recognize the conflicts of interest inherent in investment bank analyst recommendations, the alphas for the calendar year following upgrades are significantly positive for analysts at large investment banks. The alphas are positive across all types of analysts, suggesting that the market under-reacts to analyst upgrades at the announcement since it recognizes the potential for conflicts of interest. In addition, there is no significant difference between the alphas across any of the different types of financial institutions. In contrast, for downgrades, there is no positive drift - the alphas are statistically insignificant across all types of analysts, suggesting that markets react correctly to downgrades. These results are consistent with both Iskoz (2003) and Cliff (2003), who independently find that, following equity issues, the investment performance of recommendations by affiliated and unaffiliated analysts are not statistically different from each other.

E. Using a natural experiment to examine conflicts of interest

Finally, we use analyst turnover as a natural experiment to examine whether conflicts of interest cause analysts to become optimistic and biased in their recommendations. The bias hypothesis suggests that analysts who move from independent research firms to either brokerage houses or investment banks should become more optimistic and biased in their recommendations following the move. In contrast, when analysts move from investment banks to independent

[14] The four Fama-French factors, constructed as in Fama and French (1996), are the excess return to the market portfolio (RMRF), the return to a zero-investment size-mimicking portfolio (SMB), the return to a zero-investment book to market mimicking portfolio (HML), and the return to a zero-investment momentum based portfolio (UMD).

research firms, the removal of any conflicts of interest should cause the recommendations to become less optimistic and biased following the turnover. If the conflicts of interest at brokerage houses are less than those at investment banks, we should also observe a reduction in optimism bias when analysts move from investment banks to brokerage houses. We therefore construct a transition matrix that provides information on analyst turnover across the three categories of banks. Then we examine analyst behavior in terms of forecast accuracy, optimism bias, and timeliness in the year preceding and subsequent to analyst turnover.

Table 9 Panel A presents the transition matrix on analyst turnover. When an analyst leaves an investment bank, he is most likely to move to another investment bank. Of the 2,213 instances of turnover of analysts at investment banks, 2,147 (97%) moved to another investment bank, 26 (1.1%) moved to an independent research firm, while 40 (1.8%) moved to a brokerage house. In contrast, when an analyst leaves a brokerage house, 24 of the 25 instances of turnover were to an investment bank. Similarly, of the 23 analysts who left an independent research firm, 21 of them moved to an investment bank, while two of them moved to another independent research firm.

Table 9 Panel B examines (1) changes in analyst accuracy, optimism, and timeliness for the year preceding the turnover and the year following the turnover, and (2) changes in the median abnormal announcement period return following upgrades and downgrades. We exclude the instances of turnover of analysts between large investment banks (over 90% of the sample) to avoid noise in the regression.[15] When examining changes in accuracy, optimism and timeliness, the dependent variable is the change (post-turnover minus pre-turnover) in the proportion of stocks for which the analyst is optimistic, accurate, and timely. When examining the market's reaction to recommendation changes, the dependent variable is the median abnormal announcement period return for upgrades (downgrades) by the analyst over all stocks covered post-turnover minus the median value for all stocks covered during the pre-turnover period. The change in the number of stocks covered is the change in the number of stocks covered from the pre- to the post-turnover period. We also control for the appropriate level of pre-turnover performance in each regression - the proportion of stocks for which the analyst is optimistic, timely, and accurate, and the median market reaction to recommendation changes during the pre-turnover period. For example, in the regression examining changes in the proportion of stocks for which the analyst is optimistic (accurate), the control variable is the proportion of stocks during

[15] In regressions not reported, we rerun the regression on the entire sample of 2,261 instances of turnover. Our results are qualitatively unchanged.

the pre-turnover period for which the analyst is optimistic (accurate). Finally, we include a series of indicator variables to capture the type of turnover.

In contrast to the predictions of the bias hypothesis, we find no evidence that analysts migrating from independent research firms to investment banks become more optimistic in their forecasts following turnover. Moreover, we also find no evidence that analysts become less optimistic or biased when they migrate from investment banks to either brokerage houses or independent research firms. The coefficient on migrations to (from) independent research houses from (to) investment banks is insignificant indicating no evidence of a change in market perception of conflicts of interest for these movements. This evidence in inconsistent with allegations in the popular press that conflicts of interest cause analysts to become optimistic and biased in their recommendations, or that the market reacts differentially to these potential conflicts.

III. Conclusion

This paper empirically examines whether conflicts of interest at investment banks cause the quality of analyst forecasts and stock recommendations to deteriorate, or whether access to better information causes the quality of the analysis to improve. To investigate this issue, we examine the behavior of analysts at three distinct groups of firms: (1) investment banks, (2) brokerage firms with no investment banking activity, and (3) independent research firms with no brokerage or trading activity, or any investment banking business.

We find that analysts at large investment banks are less optimistic, more timely and more accurate in their forecasts than analysts at any other types of financial institutions. They are significantly more likely to recommend a "Strong Buy" or "Buy" rating than analysts at brokerage houses or independent firms. Similarly, analysts at brokerage firms are also more likely to assign those two recommendations than analysts at independent firms. However, analysts at independent firms are more likely to assign a "Hold", "Underperform" or "Sell" rating on a stock than analysts at a brokerage firm, who are more likely to assign those recommendations than analysts at investment banks.

Analysts across all types of financial institutions issue most recommendation changes in the week after the earnings announcement date. Markets react significantly more positively to analysts at investment banks in the week after the earnings announcement date, suggesting that investment bank analysts are valued for their ability to analyze information, not for their access to strategic information.

To disentangle the impact of analyst-specific versus bank-level factors on behavior, we study instances where an analyst leaves an independent research firm, or brokerage firm, for an investment bank. In these instances, we find that the analysts' behavior (bias, timeliness and accuracy) over the -1, +1 year window surrounding turnover is statistically indistinguishable in the pre- versus post-turnover period. Moreover, in instances when an analyst leaves an investment bank and moves to an independent research firm or a brokerage house, once again, there is no change in analyst behavior. These findings suggest that analyst behavior is driven more by analyst-specific characteristics and less by the underlying influences that can possibly result from the type of institution the analyst is affiliated with.

Our overall findings raise at least two important policy questions. First, will the decision to require investment banks to provide equity research from independent research houses result in better research for investors? The evidence in our study suggests that the market views research by analysts from investment banks as being more informative. Moreover, long term abnormal performance does not indicate any over-reaction to the initial recommendation change, suggesting that the market perception of the value of analyst research is correct.

Second, will investors benefit from better research if analyst compensation is no longer tied to investment banking deal flow? In other words, if investment banks used compensation to attract the highest quality analysts to their firms, will the decision by regulators to separate analyst compensation from deal flow cause high quality analysts to leave investment banks for boutique firms and hedge funds? Will this migration of high quality analysts impact the quality of research and informativeness of recommendations by analysts at investment banks? We leave these questions for future research.

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Table 1
Descriptive Statistics

This table provides descriptive statistics for investment banks, independent research firms, and brokerage only firms. We decompose these respective bank/firm categories into large and small subsets based on number of analysts employed within the respective categories. Firms in the top 25th percentile of analysts employed are classified as large and those in the bottom 75th percentile are classified as small. For each bank, we compile information on the number of analysts the bank employs, the number of stocks covered at the bank, the number of industries followed (based on the GICS industry classifications), the number of Institutional Investor All-American analysts employed at the bank, and the average experience of the analysts (in years) at the bank. These statistics are computed on a bank-year basis over the period October, 1993 to December, 2002.

	Firm years	Number of industries covered	Number of stocks covered	Number of analysts	Number of all-stars	Experience
Investment banks						
Large	411	33.56	348.95	44.86	6.54	2.14
		(32.00)	(245.00)	(34.00)	(0.00)	(2.12)
Small	991	9.38	36.95	6.64	0.12	1.56
		(7.00)	(22.00)	(5.00)	(0.00)	(1.16)
Independent Research firms						
Large	14	31.78	281.64	28.36	3.71	3.11
		(27.00)	(190.50)	(23.00)	(0.00)	(3.76)
Small	48	10.19	48.31	7.25	0.85	2.07
		(6.00)	(16.00)	(4.00)	(0.00)	(1.86)
Brokerage houses						
Large	13	36.92	271.15	36.54	0.00	2.04
		(43.00)	(248.00)	(29.00)	(0.00)	(1.66)
Small	43	13.39	52.09	7.05	0.00	2.39
		(13.00)	(34.00)	(6.00)	(0.00)	(1.71)

Table 2
Analysts forecasting performance measures

This table shows mean (median) measures of analyst optimism, timeliness, and accuracy. *Optimism* is measured as the proportion of one-quarter ahead earnings-per-share forecasts that are above the consensus forecast. Analyst timeliness is measured as the proportion of forecasts that were the first (*first forecast*) to be issued in a given quarter. The *accuracy score* measured as in Hong, Kubik and Solomon (2003) ranges from zero (least accurate) to 100 (most accurate) and is measured relative to the population of other analysts issuing a forecast on the same stock in a given quarter. Median values are reported in parentheses. We also report p-values for differences across the different bank/firm categories.

	N	Optimism	First Forecast	Accuracy Score
Investment banks				
Large	334,083	0.510	0.302	50.25
				(50.00)
Small	73,868	0.525	0.175	49.17
				(50.00)
Independent Research firms				
Large	7,892	0.525	0.195	48.41
				(50.00)
Small	5,293	0.524	0.209	49.17
				(50.00)
Brokerage houses				
Large	8,125	0.512	0.212	50.50
				(50.00)
Small	4,571	0.547	0.213	47.79
				(50.00)

Tests for differences in values			
Investment banks: Large versus Small	0.001	0.001	0.001
Size: Large investment banks versus Large Independents	0.011	0.001	0.001
Size: Large investment banks versus Large Brokers	0.770	0.001	0.484
Size and institution: Large IBs versus small independents	0.038	0.001	0.011
Size and institution: Large IBs versus small brokers	0.001	0.001	0.000

Table 3
Logistic regressions of analyst performance measures

This table reports results from logistic regressions of analyst performance measures on various analyst and bank level characteristics controlling for both quarter and firm level fixed effects. The *optimism bias score* and *relative forecast accuracy score* are defined using a scoring methodology as in Hong, Kubik and Solomon (2000). The f*irst forecast* takes the value of one if the forecast is the first to be issued in a given quarter and zero otherwise. *High experience* is a dummy set equal to one if the analyst has four or more years of experience. *All-star analyst* takes the value of one if the analyst was named to Institutional Investor Magazine's All-America research time and zero otherwise. The *number of stocks followed* is defined as the number of stocks for which an analyst issues a forecast in a given quarter. The *number of other analysts covering the stock* is calculated by counting the number of other analysts covering a stock in a given quarter. Dummy variables for type of financial institution are also included.

	Bias Score	First Forecast	Accuracy Score
Intercept	41.67	-1.03	43.80
	(0.00)	(0.00)	(0.00)
Analyst specific variables			
High Experience	0.11	-0.03	-0.24
	(0.35)	(0.03)	(0.03)
All-star analyst	-0.28	0.13	1.13
	(0.04)	(0.00)	(0.00)
Number of other analysts covering the stock	0.03	-0.003	0.02
	(0.00)	(0.00)	(0.00)
Number of other stocks in the analyst's portfolio	0.01	-0.002	-0.05
	(0.12)	(0.01)	(0.00)
Optimism		0.34	0.12
		(0.00)	(0.00)
First Forecast	5.36		-6.03
	(0.00)		(0.00)
Accurate	0.13	-0.37	
	(0.00)	(0.00)	
Financial institution variables			
Dummy for small investment bank	1.82	-0.64	-1.85
	(0.00)	(0.00)	(0.00)
Dummy for small broker	3.18	-0.61	-1.70
	(0.00)	(0.00)	(0.00)
Dummy for large broker	0.44	-0.65	-1.08
	(0.29)	(0.00)	(0.00)
Dummy for small independent research house	1.60	-0.52	-0.45
	(0.00)	(0.00)	(0.30)
Dummy for large independent research house	2.58	-0.70	-1.96
	(0.00)	(0.00)	(0.00)
Quarter and Firm Effects	YES	YES	YES
Number of Observations	433,832	433,832	433,832
Pseudo R-squared	0.021	0.048	0.023

Table 4
Distribution of analysts recommendations by bank type

This table reports the distribution of analysts' recommendations stratified by bank type. I/B/E/S classifies recommendations into five categories: strong buy, buy, hold, under-perform, and sell. We combine "strong buy" and "buy" categories into one group and the "hold", "under-perform", and "sell" categories into another group. We decompose these respective bank/firm categories into large and small subsets based on number of analysts employed within the respective categories. Firms in the top 25th percentile of analysts employed are classified as large and those in the bottom 75th percentile are classified as small. We report p-values from a chi-square test to test for differences in the distribution across various bank type categories.

	Strong Buy or Buy	Hold, Underperform, Sell
Financial Institutions		
Investment banks	56.73%	43.27%
Independents	46.30%	53.70%
Brokerage	55.97%	44.03%
Investment banks		
Large Investment banks	56.21%	43.79%
Small Investment banks	58.64%	41.36%
Independent Research Houses		
Large Independents	45.47%	54.53%
Small Independents	47.89%	52.11%
Brokerages		
Large Brokers	55.12%	44.88%
Small Brokers	57.74%	42.26%

Tests for differences in distribution:	**p-value from $\chi 2$**
Investment banks versus Independents	0.000
Investment banks versus brokerages	0.331
Independents versus brokerages	0.000
Large Investment banks versus:	
Small investment banks	0.000
Large independent research houses	0.000
Small independent research houses	0.000
Large brokerages	0.256
Small brokerages	0.262

Table 5
Timing of recommendation changes

This table shows the percentage of recommendation revisions released relative to the earnings announcement date for various bank categories. We examine the timing of recommendation Upgrades in Panel A and downgrades in Panel B. We also report p-values from a chi-square test to test for differences in distributions across bank categories.

Day relative to earnings announcement date	Investment Banks			Independent Research Houses			Brokerages		
	All	Large	Small	All	Large	Small	All	Large	Small
Upgrades									
Week prior	21.96%	21.22%	24.92%	18.24%	18.83%	16.81%	23.26%	20.38%	29.42%
Week after	78.04%	78.78%	75.08%	81.76%	81.17%	83.19%	76.74%	79.62%	70.58%
Number of observations	11,132	8,928	2,204	433	308	125	533	363	170
Downgrades									
Week prior	22.17%	21.22%	24.92%	19.09%	18.83%	16.81%	26.07%	20.38%	29.42%
Week after	77.83%	78.78%	75.08%	80.91%	81.17%	83.19%	73.93%	79.62%	70.58%
Number of observations	13,559	10,868	2,691	466	338	128	648	441	207

	Investment Banks versus Independents	Investment Banks versus Brokerages	Independents versus Brokerages	Large investment banks versus				
					Independents		Brokerages	
				Small investment banks	Large	Small	Large	Small
Upgrades	0.07	0.46	0.06	0.00	0.08	0.23	0.70	0.01
Downgrades	0.12	0.02	0.01	0.06	0.31	0.97	0.01	0.69

Table 6
Recommendation announcement period returns

Panel A presents the stock price reaction to analysts' recommendations for the various bank categories at different points in event time relative to the earnings announcement date. The announcement period abnormal return is the percentage compounded stock return minus the compounded return for the CRSP value-weighted index over the two day window comprising the recommendation release day and the following day. P-values are reported in parentheses. Panel B reports p-values from a two-sided Wilcoxon signed-rank test.

Panel A

Day relative to earnings announcement date	Investment Banks			Independent Research Houses			Brokerages		
	All	Large	Small	All	Large	Small	All	Large	Small
Upgrades									
Week prior	1.11	1.19	0.71	0.66	1.12	-0.27	0.56	0.21	0.95
	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.63)	(0.04)	(0.11)	(0.24)
Week after	1.54	1.68	0.82	0.79	1.09	0.39	0.34	0.11	0.73
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.17)	(0.00)	(0.01)	(0.08)
Median across both periods	1.45	1.58	0.81	0.71	1.095	0.34	0.42	0.16	0.765
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.30)	(0.00)	(0.00)	(0.04)
Number of observations	11,132	8,928	2,204	433	308	125	533	363	170
Median across -30 to +32 day period	1.14	1.36	0.45	0.67	0.73	0.60	0.53	0.52	0.72
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of observations	36,376	28,726	7,650	1,250	816	434	1,826	1,239	587
Downgrades									
Week prior	-1.24	-1.53	-0.62	-1.44	-1.63	-1.01	-0.74	-0.74	-0.81
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.22)	(0.00)	(0.00)	(0.02)
Week after	-2.01	-2.25	-1.22	-1.09	-1.43	-0.49	-1.17	-0.83	-2.13
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
Median across both periods	-1.84	-2.04	-1.05	-1.2	-1.49	-0.55	-1.035	-0.81	-1.76
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
Number of observations	13,559	10,868	2,691	466	338	128	648	441	207
Median across -30 to +32 day period	-1.50	-1.72	-0.74	-1.03	-1.20	-0.66	-0.89	-0.75	-1.30
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of observations	49,209	38,817	10,392	1,521	1,005	516	2,337	1,573	764

Panel B

	Investment Banks versus Independents	Investment Banks versus Brokerages	Independents versus Brokerages	Large investment banks versus				
				Small investment banks	Independents		Brokerages	
					Large	Small	Large	Small
Upgrades								
Week prior	0.23	0.06	0.73	0.01	0.68	0.02	0.07	0.2
Week after	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.0
Median across both periods	0.00	0.00	0.32	0.00	0.01	0.00	0.00	0.0
Median across -30 to +32 day period	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00
Downgrades								
Week prior	0.96	0.21	0.38	0.00	0.85	0.21	0.09	0.4
Week after	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.5
Median across both periods	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.29
Median across -30 to +32 day period	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00

Table 7

Determinants of Recommendation announcement period returns

This table presents the results from OLS regressions of the two-day recommendation announcement period market adjusted return on various factors controlling for year and firm level fixed effects. The announcement period abnormal return is the percentage compounded stock return minus the compounded return for the CRSP value-weighted index over the two day window comprising the recommendation release day and the following day. *Revision* is equal to the current recommendation minus the previous recommendation for downgrades and the negative value of the same difference for upgrades. *High experience* is a dummy is set equal to one if the analyst has four or more years of experience. *All-star analyst* takes the value of one if the analyst was named to Institutional Investor Magazine's All-America research time and zero otherwise. The *number of other stocks followed* is defined as the number of stocks for which an analyst issues a forecast in a given quarter. The *number of other analysts covering the stock* is calculated by counting the number of other analysts covering a stock in a given quarter. *Reg FD* takes the value of one if the recommendation was issued in the post Reg-FD period and zero otherwise. The *week prior* (*week after*) variable takes the value of one if the recommendation was issued in the week prior to (after) the earnings announcement date. The *first forecast following earnings announcement* variable takes the value one if the recommendation is the first to be issued following the earnings announcement date. The number of upgrades (downgrades) in the previous month count the number of recommendation upgrades (downgrades) for the stock in the month prior to the recommendation announcement date. P-values are reported in parentheses.

	Upgrades				**Downgrades**			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	3.13	3.18	3.31	8.01	0.67	0.74	0.25	-3.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.48)	(0.44)	(0.79)	(0.35)
Analyst specific variables								
Revision	0.12	0.15	0.22	-0.24	1.02	1.06	1.16	0.88
	(0.13)	(0.05)	(0.01)	(0.49)	(0.00)	(0.00)	(0.00)	(0.02)
High Experience	-0.09	-0.13	-0.15	-1.00	-0.21	-0.15	-0.10	-0.33
	(0.35)	(0.17)	(0.10)	(0.01)	(0.10)	(0.24)	(0.43)	(0.49)
All-star analyst	1.12	1.06	0.86	0.26	-1.16	-1.06	-0.72	-0.18
	(0.00)	(0.00)	(0.00)	(0.60)	(0.00)	(0.00)	(0.00)	(0.74)
Number of other analysts covering the stock	-0.05	-0.05	-0.05	-0.27	-0.12	-0.12	-0.12	0.08
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.44)
Number of other stocks in the analyst's portfolio	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.03
	(0.39)	(0.25)	(0.17)	(0.29)	(0.18)	(0.38)	(0.37)	(0.17)
Reg FD	0.10	0.12	0.15	-0.41	1.10	1.09	1.11	2.54
	(0.74)	(0.70)	(0.63)	(0.69)	(0.00)	(0.00)	(0.00)	(0.01)
Week prior	0.15	0.15	0.16	-0.42	0.33	0.32	0.33	0.43
	(0.31)	(0.30)	(0.27)	(0.52)	(0.10)	(0.10)	(0.09)	(0.61)
Week after	-0.87	-0.85	-0.86	-1.04	2.26	2.24	2.20	3.16
	(0.00)	(0.00)	(0.00)	(0.09)	(0.00)	(0.00)	(0.00)	(0.00)
First forecast following earnings announcement	2.44	2.41	2.37	3.35	-4.56	-4.52	-4.41	-4.76
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of upgrades over previous month	-0.16	-0.16	-0.16	-0.10				
	(0.01)	(0.00)	(0.01)	(0.64)				
Number of downgrades over previous month					0.96	0.95	0.95	0.78
					(0.00)	(0.00)	(0.00)	(0.00)

	Upgrades				Downgrades			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Financial institution variables								
Brokerage firm dummy		-0.84				1.27		
		(0.00)				(0.00)		
Independent research house dummy		-1.06				1.67		
		(0.00)				(0.00)		
Dummy for small investment bank			-1.02	-1.03			1.74	1.27
			(0.00)	(0.06)			(0.00)	(0.06)
Dummy for small broker			-1.37	0.95			1.52	1.48
			(0.00)	(0.25)			(0.00)	(0.13)
Dummy for large broker			-0.96	-1.81			1.75	1.65
			(0.00)	(0.00)			(0.00)	(0.02)
Dummy for small independent research house			-0.59	-1.08			0.87	1.10
			(0.11)	(0.19)			(0.08)	(0.30)
Dummy for large independent research house			-1.62	-2.21			2.61	2.83
			(0.00)	(0.00)			(0.00)	(0.00)
Year and Firm Effects	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	39,452	39,452	39,453	1,713	53,067	53,068	53,068	2,496
Adjusted R^2	0.032	0.034	0.038	0.011	0.020	0.230	0.027	0.051

Table 8
Long-term price impact of recommendation upgrades and downgrades

This table reports long-horizon abnormal returns to upgrades and downgrades respectively. We form calendar time portfolios from the recommendation release date+1 to recommendation release date+250 and regress the average portfolio return on the daily Fama-French factors and the momentum factor. R_{mkt}-Rf is the value-weighted market return on all NYSE/AMEX/Nasdaq firms in excess of the risk-free rate. *SMB* is the difference in returns across small and big stock portfolios. *HML* is the difference in returns between high and low book-to-market equity portfolios. *Momentum* is a momentum factor computed by subtracting from the equally-weighted return of firms with the highest 30% 11-month return lagged one month, the corresponding return for firms with the lowest 30% 11-month return, which is also lagged one month. P-values are reported in parentheses.

Panel A: Upgrades

	Investment bank		Independent Research House		Brokerage firm	
	Large	**Small**	**Large**	**Small**	**Large**	**Small**
Intercept	0.037	0.0304	0.0382	0.0332	0.0282	0.0249
	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.088)
$R_{mkt} - R_f$	1.174	1.100	1.126	1.117	1.046	1.145
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SMB	0.525	0.641	0.272	0.483	0.337	0.44
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HML	0.209	0.296	0.483	0.194	0.266	0.295
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Momentum	-0.225	-0.176	-0.194	-0.273	-0.186	-0.373
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.948	0.931	0.869	0.777	0.901	0.749
# of Observations	2,309	2,305	2,013	2,255	2,256	2,298

Panel B: Downgrades

	Investment bank		Independent Research House		Brokerage firm	
	Large	**Small**	**Large**	**Small**	**Large**	**Small**
Intercept	0.003	0.011	0.0109	0.096	0.0066	0.0049
	(0.663)	(0.127)	(0.314)	(0.407)	(0.391)	(0.751)
$R_{mkt} - R_f$	1.146	1.082	1.098	1.066	1.022	1.121
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SMB	0.620	0.687	0.353	0.52	0.397	0.521
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HML	0.205	0.292	0.462	0.182	0.3442	0.243
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Momentum	-0.418	-0.277	-0.343	-0.312	-0.275	-0.42
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.937	0.921	0.838	0.801	0.878	0.735
# of Observations	2,308	2,305	2,013	2,280	2,264	2,298

Table 9
Changes in analyst behavior surrounding turnover

This table examines the changes in analyst behavior surrounding turnover. Panel A reports the turnover transition matrix indicating the sample sizes for analyst movements across various categories of banks. Panel B excludes the sample of turnover from a large investment bank to a large investment bank, and examines changes in analyst accuracy, optimism, and timeliness for the year preceding the turnover and the year following the turnover in a regression framework. *Change in the proportion optimistic* is the change (post-pre) of the proportion of stocks for which the analyst is above the consensus. *Change in Announcement period returns* is the change in the median two-day announcement period return from the pre-turnover period to the post turnover period. *Change in the first forecast proportion* is the change in the proportion of stocks covered by the analyst for which he is the first to issue a forecast. Change in the proportion accurate is the change in the proportion of stocks for which the analyst's accuracy score is greater than 50. *Change in the number of stocks covered* is the change in the number of stocks covered from the pre to the post-turnover period. In each specification, we control for the level of the performance measure before the turnover. We include a series of indictor variables to capture the type of turnover. Finally, we control for the proportion of stocks for which the analyst is optimistic, timely, and accurate in the pre-turnover period. When the dependent variable is the announcement period return, the pre-turnover performance measure for upgrades is the median abnormal announcement period return across all-stocks upgraded by the analyst in the year prior to turnover. For recommendation downgrades, it is the median abnormal announcement period return for stocks downgraded by the analyst in the year prior to turnover.

Panel A: Turnover transition matrix

			Moved to						
			Investment bank		Independent Research House		Brokerage firm		
			Large	Small	Large	Small	Large	Small	Total
Moved From	Investment bank	Large	1,323	228	9	1	7	19	1,587
		Small	329	267	5	11	6	8	626
	Independent research house	Large	11	5	0	0	0	0	16
		Small	2	3	2	0	0	0	7
	Brokerage firm	Large	9	4	0	0	0	1	14
		Small	5	6	0	0	0	0	11
	Total		1,679	513	16	12	13	28	2,261

Panel B: Regression results

Variable	Change in Proportion Optimistic		Change in announcement period returns - Upgrades		Change in announcement period returns - Downgrades		Change in first forecast proportion		Change in proportion accurate	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	48.77	<0.001	2.64	<.0001	-5.02	<.0001	20.43	<.0001	44.88	<.0001
Change in the number of stocks covered	-0.02	0.38	0.03	0.69	0.17	0.04	0.13	<.0001	-0.01	0.77
Pre-turnover performance measure	-0.95	<0.001	-0.91	<.0001	-1.13	<.0001	-0.80	<.0001	-0.96	<.0001
Type of turnover:										
Large Investment bank to:										
Large Independent research house	1.83	0.78	-1.29	0.85	3.12	0.57	11.79	0.08	10.23	0.11
Small Independent research house	-15.92	0.41	-1.11	0.87	2.93	0.76	-28.48	0.16	1.18	0.95
Large Brokerage	-2.43	0.74	-2.45	0.62	4.37	0.42	7.80	0.31	-10.86	0.13
Small Brokerage	1.68	0.71	-1.80	0.44	0.49	0.88	-7.27	0.12	-4.56	0.30
Small to Large Investment bank:	2.42	0.04	0.34	0.67	-1.46	0.15	3.10	0.01	1.81	0.11
Large Independent research house to large investment bank:	3.13	0.59	-1.21	0.65	0.34	0.93	-2.85	0.64	5.56	0.33
Small Independent research house to large investment bank:	5.28	0.70	0.07	0.99	5.45	0.56	4.11	0.77	-1.09	0.94
Large Brokerage to large investment bank:	1.70	0.79	-2.56	0.61	-2.66	0.63	-4.81	0.48	1.01	0.87
Small Brokerage to large investment bank:	-2.89	0.74	-2.93	0.68	NA	NA	12.70	0.16	-3.33	0.70
R^2	51%		46%		40%		45%		51%	