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Abstract:

Research optimism among securities analysts has been attributed to incentives provided by underwriting activities. We examine how analysts' forecast optimism varies with the business activities used to fund research. We find that analysts at firms with underwriting and trading businesses are actually less optimistic than those at pure brokerage houses, who perform no underwriting. The relatively less optimistic forecasts for underwriting firms are not fully explained by bank reputation. Nor is the relative optimism of brokerage firms explained by the types of clients they serve (retail or institutional). We conclude that sales and trading activities used to fund research create strong incentives for analyst optimism.

JEL classification: M41, G14, G29

Keywords: analyst forecast optimism, analysts' incentives, types of security firms, earnings forecasts, target prices

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1. Introduction

The reputation of sell-side financial analysts, particularly those at the leading investment banks, has been seriously impaired during the last two years. First, they were criticized for their optimistic reports on dot-com stocks following the dot-com collapse. They were then censured for failing to detect the accounting and over-valuation problems at Enron. Finally, there is evidence that some of the leading telecom and internet analysts publicly touted firms about which they were privately skeptical.

The popular explanation for all of these failures is that analysts working for investment banks have either been compromised by the hefty bonuses that they can earn from writing positive reports on investment banking clients, or have been pressured to write favorable reports by investment bankers at their firms. Optimistic research presumably helps attract new investment banking clients, and provides the sales pitch used to place new issues with investors. Optimistic analyst earnings forecasts, particularly long-term forecasts, also appear to temporarily boost stock prices at the issue date (see Rajan and Servaes (1997) and DeChow, Hutton and Sloan (2000)) and potentially explain the poor performance of firms after IPO.

In response to regulatory concern about optimistic analyst research at leading investment banks, on April 28, 2003, ten of the largest U.S. investment banks agreed to implement a series of analyst reforms, and to pay penalties for prior indiscretions. Reforms included new operating procedures by banks to separate research from investment banking, refocusing security analyst compensation on stock-picking ability, disclosure in analyst reports of any conflicts of interest faced by analysts' firms, disclosure of analyst forecasting and stock-picking performance, and elimination of

'spinning" (providing shares in "hot" IPOs to executives of favored clients). The ten banks agreed to pay $900 million in fines and disgorgement of profits. In addition, they were required to pay $85 million for investor education and $450 million (over the next five years) to acquire and distribute three independent research reports along with their own reports for every company covered.

The optimism observed in equity research during the tech boom of late 1990s, as well as the regulatory responses raise a number of important research questions. First, how important were investment banking conflicts in explaining analysts' research optimism? Regulators' focus on investment bank analysts suggests that they believe that banking conflicts were the primary source of research optimism. Analysts at investment banks were certainly rewarded handsomely for helping to sell new equity offers, and were allegedly pressured by their firms' investment bankers to make optimistic earnings and price forecasts. There is also evidence of unethical behavior by some investment bank analysts. However, it is unclear whether this behavior was widespread.

Second, given the requirement that investment banks fund independent research, it is worth examining the performance of non-investment bank analysts who will be providing this research. Are these analysts independent? Are their forecasts less optimistic than those made by investment bank analysts?

Finally, more broadly, what factors other than underwriting affect analyst research optimism? In section 2, we describe the major sources of funding for equity research (investment banking, institutional equity, and retail sales) and analyze how they affect analysts' incentives to provide optimistic research. We hypothesize that analysts' role in

trading and sales creates incentives for optimistic research that are potentially as powerful as those provided by underwriting.

To examine the impact of underwriting, and sales and trading incentives on analyst forecast optimism we classify analyst firms into four major firm types: lead underwriters (who fund research through underwriting, and sales and trading), new equity issue syndicate members (who fund research through modest fees from distributing new issues, and from sales and trading), brokerage firms (who generate only sales and trading revenues), and pure research firms (who sell research as a stand-alone service)[1]. Our tests then compare earnings and target price forecast optimism across these firm-types.

As discussed in section 3, the earnings forecast sample comprises 4,505 analysts that cover 5,006 companies, and who work for 259 firms during the period January 1998 to December 2000. Approximately 80.5% of the sample earnings forecasts are made by analysts who work for investment banks that perform underwriting; 14.6% work for syndicate firms; 4.4% are by brokerage firm analysts; and 0.5% by analysts at research firms. The target price forecast sample is somewhat smaller, with 3,457 analysts who work for 170 firms, and cover 3,069 companies. It is also more heavily dominated by lead underwriter firms (85.3% of the forecasts, versus 13.2% for syndicate firms, 1.4% for brokerage firms, and less than 0.1% for research firms).

The results, reported in section 4, indicate that, on average, short- and medium-term earnings forecasts made by analysts working at lead underwriter firms are less optimistic than those made by syndicate or brokerage firm analysts. The least accurate

[1] Note that we do not examine whether investment bank relationships with specific clients are associated with forecast optimism or inaccuracy, the subject of earlier research. Instead, we examine the analyst forecast optimism for a large sample of analysts to infer whether there are systematic differences across types of analyst firms, as alleged by regulators.

earnings forecasts are actually made by brokerage analysts. Tests for target price forecasts show a similar pattern: on average, analysts at underwriter firms made less optimistic price forecasts than analysts at syndicate and brokerage firms.

In subsequent tests, we find that the optimism of brokerage firm analysts does not appear to be driven by firms that specialize in the retail business. Analysts at brokerage houses that serve both institutional and retail investors are not systematically more optimistic than those working for brokers that specialize in institutional trading. Analysts at both types of brokerage firm are typically more optimistic than underwriter analysts.

We also examine whether the lower relative optimism for underwriter analysts is explained by bulge firms that attract underwriting clients through their reputations, rather than through optimistic research. There is some evidence that bank status is negatively associated with research optimism. Forecasts of short-term earnings are less optimistic for bulge investment banks than for non-bulge underwriter, syndicate or brokerage firms. Target price forecasts are less optimistic for bulge firms than for syndicate or brokerage firms. However, even non-bulge underwriters are less optimistic than brokerage firms.

Finally, we find that long-term earnings forecasts and price forecasts are more optimistic for analysts with more experience covering a stock, suggesting that over time analysts develop relations with management that makes it difficult to be independent.

As discussed in section 6, the findings in this paper contribute to our understanding of factors that underlie analyst research optimism. They also raise a number of opportunities for future research. Finally, our results raise questions about whether current analyst reforms are likely to reduce analyst optimism.

2. Research Implications of Investment Research Funding

2.1 Research Funding and Analyst Remuneration[2]

Most analyst firms do not sell investment research directly to their clients. Instead, clients pay for research indirectly through mark-ups on other services that are acquired directly from the analyst firm. The types of services that are used to support research, however, differ across analyst firms. Based on the research funding and analyst remuneration, we classify analyst firms into: full service investment banks that provide underwriting, trading, and other activities (lead underwriters and syndicate members are both included in this category); brokerage firms that offer securities trading; and pure research firms that sell research as a stand-alone product.

Full Service Investment Banks: Full service investment banks typically fund research through a combination of investment banking (underwriting), institutional equity, and retail sales.[3] For example, in 2001 Goldman Sachs reported that 50% of its $321 million research budget was funded through investment banking, and the other 50% was funded through institutional equity (Hintz and Tang, 2002).

Underwriting fees are used to fund research because banks use research to attract new banking clients and to market new offers to investors.[4] Investment banking departments fund research in two ways. First, in the annual budget negotiations, they agree to support a certain share of the research budget. In addition, at year-end

[2] Our descriptions of research funding and analyst remuneration practices draws heavily from interviews with research directors at leading investment banks and brokerage firms.

[3] Full service banks also use fees from their money management business to fund research, which potentially creates a conflict of interest. Analysts interviewed at several banks noted that they face pressure to make optimistic forecasts and recommendations on a stock that is held by bank's money managers. This paper does not examine this potential conflict.

[4] Up until 1975, banks charged fixed commissions for trading, and used some of these funds to finance research by in-house sell-side analysts, which they distributed free to large institutional clients. In May 1975, fixed commissions were deregulated and began to bring in much less revenue, leading brokerage houses to a search for other sources of funding for research, such as investment banking ((Strauss, 1977)).

underwriter departments award significant bonuses to analysts who have helped to attract new underwriting business and market new issues to investors.

Institutional equity trading helps to cover research through two forms of remuneration: directed commissions and "soft dollars through a third party." Under directed commissions, institutional clients reimburse banks for research they value by directing future security trades (and commissions) to the banks. The largest institutional investors typically designate commission payments to specific research, noting the particular company research that is being reimbursed. This permits the banks to track the performance of their analysts, and for the analysts to identify their most valuable clients. Reimbursement from "soft dollars through a third party" works in a similar manner, except that the institutional client directs its trades to a third party and requests that the third party channel a portion of the commissions received to the bank that provided research. Once again, the largest institutions typically designate which particular research report they valued.

Retail investors also cover the costs of research through commissions. Banks quote retail customers a commission structure that implicitly incorporates charges for both research and trade execution. Retail investors are then expected to trade on the basis of research recommendations made by bank analysts, enabling the bank to infer the value placed on research about a specific company from trading volume. In 2001, Merrill Lynch reported that 22% of its $579 million research budget was funded through the retail business (Hintz and Tang, 2002).

At full service investment banks, analysts' bonuses and salary increases reflect the diversity of the different business activities undertaken at the bank. It is common for

analysts to be remunerated on the basis of as many as nine different performance criteria, including feedback on research quality from institutional clients, trading volume by retail clients, feedback from internal institutional sales force, traders, and money managers, as well as contributions to underwriting, and merger and acquisition divisions.

Brokerage Firms: Brokerage firms focus exclusively on trading (either institutional, retail or both), and do not undertake underwriting. They, therefore, rely exclusively on trading commissions to fund research. For institutional brokerage firms this takes the form of directed commissions and soft dollars through a third party. Retail brokerage firms fund their research through retail commissions. And firms that provide trading services to both institutional and retail clients use all three sources of funding for research. Because commissions are their primary source of revenue, brokerage firms typically reward their research analysts using a single measure of performance: trading volume in the stocks that they cover.

Research Firms: Research firms sell equity research to their clients and provide no investment banking or trade execution services. They use two sources of funding for research: soft dollars through a third party, discussed above, and hard dollars. Hard dollars are fees for access to research, typically charged per report or as an annual subscription. Nelson's (2003) reports that 36% of research firms are compensated using hard dollars alone, 10% using only soft dollars, and 54% using a combination of soft and hard dollars.

Soft dollar fees from the large institutional investors specify which particular research the client valued, enabling research firms to monitor the performance of their

analysts. Hard dollar funding also enables the research firm to track performance of the analyst by the number of reports sold for companies the analyst covers.

2.2 Research Implications

How do differences in research funding and analyst compensation arrangements across banks affect analyst incentives to provide impartial research to their clients? The above discussion suggests that, at a minimum, analysts' research incentives are likely to be affected by the types of businesses their firms pursue (full service banks versus brokerage firms versus pure research firms).

Underwriting Incentives: Regulators and researchers have generally argued that underwriting incentives are likely to make analysts at full service banks more optimistic than analysts at brokerage or research firms. Optimistic research presumably helps attract new investment banking clients, and provides the sales pitch used to place new issues with investors.

Research indicates that analysts' long-term earnings growth forecasts are more optimistic for investment banking clients (Dechow, Hutton and Sloan, 2000; Lin and McNichols, 1998a; Lin and McNichols, 1998b; Michaely and Womack, 1999).[5] Further, optimistic long-term earnings forecasts appear to temporarily boost stock prices at the issue date (see DeChow, Hutton and Sloan (2000)), permitting investment banks to

[5] The direction of causality is difficult to interpret in these studies (see Kothari (2000)). Do bank analysts bias their research to help investment bankers sell their client's stock, or do clients select investment banks that have more optimistic opinions of their prospects, thereby facilitating the stock sale?

reward their firms' best investors (primarily institutions), who are able to "flip" the stock soon after the issue for an attractive short-term gain (see Aggarwal (2002)).[6]

Lin, McNichols and O'Brien (2003) provide a more detailed analysis of analyst performance surrounding new offers. They show that subsequent to new issues, analysts with investment banking ties are slower to downgrade stocks with bad news than analysts at unaffiliated firms. Hong and Kubik (2003) also find evidence consistent with investment banking business affecting analyst incentives. They show that analysts who are optimistic relative to the consensus tend to be given better assignments, are less likely to be fired from a top brokerage house, and are more likely to be promoted or hired by a better house. This pattern was particularly strong for analysts who covered stocks underwritten by their brokerage houses, and during the mid to late nineties.

While the underwriting business undoubtedly induces some analysts to provide optimistic research, bank and analyst reputations potentially limit this incentive. IPO firms look for more from their investment bank than simply optimistic analysts. They rely on the bank to create a liquid market for their stock, not just at the time of the IPO, but during the post-IPO period. Banks with strong reputations for IPO placement and the leading analysts in the IPO firm's industry are the best placed to perform this task and to land new underwriting business.[7] High status banks and analysts have strong incentives to preserve their reputations, and to avoid attracting new business by simply being overly optimistic relative to other banks and analysts.

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[6] Ritter and Welch (2002) show that in the period 1980 to 2001, the average first-day return on IPOs was 18.8%. During the height of the dot com IPO market, this daily return was 65%. The average three-year buy-and-hold return for firms making IPOs in the period 1980 to 2001, adjusted for the market, was -23.4% (see Ritter and Welch (2002)).

[7] Podolny (1993) found that the reputational hierarchy among investment banks creates a perception among customers of legitimacy, reliability, trust, and competence. Eccles and Crane (1988) argue that customers use investment bank reputations as signals of professional quality.

Brokerage Incentives: Performance metrics used to evaluate the role of research from a trading business perspective also create incentives for analysts to issue optimistic research reports that encourage investors to purchase shares. Positive reports are more effective than negative reports in increasing trading volume because *any* investor can act on a buy recommendation at relatively low cost by buying the stock. In contrast, negative reports can only be acted on by investors that already own the stock, or by investors willing to incur the additional costs of short-selling.[8]

For institutional investors, analysts' incentives for optimism are likely to be mitigated by several factors. Institutional clients make no contractual commitment to pay for research prior to receiving it. They determine whether research has value after the fact, when they have had sufficient time to fully analyze it and to judge its quality, and compensate the bank accordingly. Because they have access to research from many of the large banks, institutional investors are likely to be in a good position to evaluate research quality across banks. This leaves the bank to bear the risk that clients decide their analysts' research is worthless. Banks manage this risk by tying analysts' remuneration to feedback from institutions on the value of research on companies they follow, creating an incentive for analysts to provide high quality research to institutional clients.[9]

In theory, funding research through commissions should also provide incentives for analysts to provide unbiased research to retail investors. Analysts that produce biased

[8] Asquith and Meulbroek (1998) provide evidence that the costs of shorting a stock are significant, and explain several apparent market anomalies.

[9] Soft dollars also create the risk for the bank that the client finds the research valuable but refuses to pay for it. However, this risk is reduced by the ongoing relationship between the bank and its client - if the client refuses to provide adequate reimbursement for past research, the bank can refuse to provide it with any future research.

research that encourages investors to trade may benefit them in the short term. Yet in a well-functioning market, this is type of investment advice is likely to be unsustainable. Investors that base their trading decisions on biased research will earn disappointing returns. Over time, they will learn to discount research from biased analysts and to seek other investment advice. Firms and analysts that produce less biased research are therefore likely to develop reputations for research quality and to attract investors.

However, in practice, several factors are likely to reduce the alignment between the incentives of analysts and retail investors. First, retail investors typically have relationships with only one investment advisor. This makes it difficult for them to evaluate research quality differences across firms. Consequently, retail investors have to rely on the outcome of investment advice to evaluate research quality, which is a noisy signal given the volatility of the market. If it is costly for retail investors to distinguish high and low quality research, there is likely to be a lemons problem in the market, driving out all but the lowest quality (most optimistic) retail analysts.[10]

The rise of discount retail brokers, internet brokerage firms, and low cost internet investment advice also potentially threatens the quality of retail research. These services allow investors to purchase research and trade execution separately, a challenge to firms that continue to bundle the two. Discount brokers do not undertake research, and are therefore able to offer retail investors substantially lower commissions. Internet investment advisors do not provide trade execution, but offer low cost research to retail investors. This has created a serious challenge for traditional brokerage firms, since investors have access to competing research to help make investment decisions, and can

[10] One way for retail investors to infer quality is to rely on the brokerage firms' reputation among institutions, for which the costs of judging research are lower. This may work for brokerage firms that serve both retail and institutional investors. But many firms specialize in only one of the client types.

direct their trading to discount firms. Investors can also free ride on brokerage research by channeling most of their trades to discount brokers.

The disintermediation of trading and research has put severe downward pressure on commissions for traditional brokerage firms. For example, for the fourth quarter of 1996, Charles Schwab's commission per trade averaged $66.89 (see McFarlan, 2001). By 2002, it had fallen to $35.02 (see McVey, Patrick and McNellis, 2002). In mid-2003, Ameritrade offered internet investors a rate of $11 per trade (see Ameritrade.com). Retail brokerage firms have responded to competitive pressure on commissions by cutting research budgets, and focusing even more intensely on increasing trading volume to cover the cost of research.

In summary, it seems clear that sales and trading create incentives for analysts to be optimistic rather than pessimistic. However, it is unclear whether these incentives are more or less powerful than those for underwriting firms. Our research attempts to answer this question.

Research Firm Incentives: Analysts at pure research firms are expected to have the least incentives to provide optimistic forecasts. They are not rewarded for trading activity, but presumably for providing institutional and retail investors with investment insights on the companies that they cover.

3. Sample and data

Our tests examine differences in analyst earnings and price forecast optimism across firms. Our initial earnings forecast sample comprises all companies on the *I/B/E/S* (Institutional Broker Estimates System) database during the period January 1998 to December 2000. For each company on the database during this period, we downloaded

the company name and CUSIP, all analyst earnings forecasts made for that company, the dates that the earnings forecasts were issued, *I/B/E/S's* codes for analyst and analyst firm names, and *I/B/E/S's* values for actual earnings. To estimate earnings forecast horizons, we also collected quarterly earnings announcement dates for each sample company forecast from Standard & Poor's Compustat.

A similar approach was followed to create a sample of target price forecasts using the companies listed on *First Call* during the period January 1999 to September 2001.[11] Again, for each listed company we downloaded the company name and CUSIP, analyst target prices, the dates the price forecasts were made and their horizon (typically 12 months), as well as *First Call's* codes for analyst and analyst firm names. We then use *CRSP* to collect the stock price on the day of the price forecast, and at the end of the forecast horizon.

Analyst Affiliation

As discussed above, analyst firms are key explanatory variables of interest in the paper. Each firm listed on *I/B/E/S* that employed financial analysts was manually classified into one of four categories: (1) Underwriter banks that served as a lead underwriter on at least one US equity offerings between 1998 and 2001. (2) Syndicate banks which distributed new equity offerings, but did not act as lead underwriters during the period 1998-2001. Syndicate firms underwriting incentives are likely to be significantly weaker than those of underwriter firms, since the fees from distribution are only a small portion of those earned by underwriters (Bloch, 1989). (3) Brokerage firms

[11] The difference in start dates between the two samples arises because target price forecasts were not widely available prior to January 1999.

that were exclusively sales and trading operations. (4) Pure research firms, which sold research, but did not undertake any investment banking, syndicate or trading activities.

Two data sources were used to classify the firms. Nelson's Directory of Investment Research (1998-2001) was used to make a preliminary classification. Firms listed in Nelson's as independent research firms and which did not receive any directed commissions were classified as pure research firms. Firms that received directed commissions and were not identified as investment banks by Nelsons were classified as brokerage firms. Any remaining investment banks were separated into underwriter banks and syndicate banks using information on SDC (Securities Data Co.) Platinum. Firms listed by SDC Platinum as "bookrunners" (i.e. lead underwriters) in any of the sample years were classified as underwriter banks. Firms that were listed in the SDC database as participating in the syndicate of new equity, but not as bookrunners, were classified as syndicate member banks. Firms identified by Nelson's as investment banks/brokers, but which did not appear as either bookrunners or syndicate firms in the SDC database, were reclassified as brokerage firms. Finally, firms that did not appear in Nelson's were classified using the SDC database, or by referring to disclosures of core activities in their annual reports and web sites.[12]

Firms classified as pure research firms included research boutiques such as JSA Research Inc., Argus Research Corp., Shonstrom Research Associates and Red Chip Review. Brokerage houses included firms such as Standard & Poors, First Tennessee Securities, Brown Brothers Harriman & Co., and Taglich Brothers Inc. Syndicate member banks included H & R Block Financial Advisors, Hibernia Southcoast Capital, Inc., Pacific Growth Equities, and Sanford C. Bernstein & Co., Inc. Lead underwriter

[12] Five firms could not be classified due to a lack of sufficient information.

banks included the large bulge banks (Credit Suisse First Boston, Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Smith Barney, and Lehman Bros) as well as firms such as ABN AMRO, William Blair & Company, LLC, Lazard Freres & Co., and Raymond James Limited.

Forecast Optimism

To measure analyst forecast optimism, we adopt a similar approach to Jacob, Lys and Neale (1999), Clement (1999), and Hong and Kubik (2003), who compare the accuracy and optimism of a given analyst's forecast for a particular company and quarter to the mean accuracy and optimism for all analysts who make forecasts for the same company and quarter within a comparable forecast horizon.[13] This relative performance metric, therefore, controls for any company or time-specific factors that affect forecast optimism.

Relative earnings forecast optimism (*REOPT*) is estimated for each an analyst forecast as follows:

$$REOPT_{itj}^{t-k} = \frac{EFERR_{itj}^{t-k} - \overline{EFERR_{it}^{t-k}}}{\overline{ABS(EFERR_{it}^{t-k})}} \quad (1)$$

$EFERR_{itj}^{t-k}$ is the forecast error for analyst j's forecast of company i's earnings for quarter t, where the forecast is made with horizon t-k. This forecast error is then compared to the average forecast error for all analysts making forecasts for company i's earnings at quarter t, again within the same forecast horizon ($\overline{EFERR_{it}^{t-k}}$). The relative forecast error

[13] Positive (negative) relative forecast optimism indicates that an analyst is more (less) optimistic about a company's earnings or price than the average benchmark analyst. However, this metric provides an incomplete picture of an analyst's forecasting performance, since optimistic analysts can be either more or less accurate than their peers. We therefore replicate all of our findings using analyst forecast accuracy. The results are similar to those reported for optimism.

is then standardized by the mean absolute forecast error across all analysts forecasting earnings for company i in quarter t, again within the same forecast horizon.

Relative forecast earnings optimism is estimated for three different forecast horizons, short-term forecasts made less than 91 days prior to the quarterly earnings announcement date, medium–term forecasts made more than 90 days and less than 181 days before the earnings announcement, and long-term forecasts made more than 180 days before the quarterly earnings announcement.

A similar approach is used to measure the relative forecast optimism for target prices. The relative price optimism (*RPOPT*) is estimated as follows:

$$RPOPT_{itj}^{t-k} = \frac{PFERR_{itj}^{t-k} - \overline{PFERR_i^{t-k}}}{\overline{ABS(PFERR_i^{t-k})}} \quad (2)$$

$PFERR_{itj}^{t-k}$ is the forecast error for analyst j forecasting company i's price for month t at month t-k (99.2% have a horizon of 12 months). $\overline{PFERR_i^{t-k}}$ is the average price forecast error for all analysts forecasting price for company i in month t-k. Finally, $\overline{ABS(PFERR_i^{t-k})}$ is the mean absolute price forecast error for all analysts forecasting price for company i in month t-k.

Sample Data

Table 1 shows the selection procedure for the earnings and price forecast samples. During the sample period, 579,820 earnings forecasts were available on *I/B/E/S*. Forecasts were excluded from the sample if the earnings forecast horizon data was missing (45,038 forecasts), multiple forecasts were made by the same analyst for a given company, forecast period and horizon (148,468 forecasts), only one forecast was

available for a given firm, forecast period and horizon (33,056 forecasts), analyst firm data was missing (109 forecasts), or there were forecast coding errors or outliers (3,612 forecasts). The final earnings forecast sample comprised 349,537 forecasts.

For the target price sample, 153,195 price forecasts were reported on *First Call*. Of these, 22,014 were eliminated because actual price data was missing, 41,590 were omitted because there were multiple forecasts by the same analyst for a given company, forecast period and horizon, 29,781 were eliminated because only one forecast was available for a given firm, forecast period and horizon, and 558 were omitted because of missing analyst firm information. The final price sample was 59,252 forecasts.

Multiple forecasts by the same analyst for a given firm, forecast period and horizon were excluded to increase the independence of the sample observations. The final sample, therefore, included only an analyst's first forecast for the company, forecast period and horizon. Single forecasts for a given company, forecast period and horizon were excluded because at least two forecasts have to be available to estimate relative forecast optimism.[14]

As shown in panel A of table 2, the final earnings forecast sample contains 119,946 short-horizon forecasts (0-90 days), 104,252 medium-horizon forecasts, and 125,339 long-horizon forecasts (more than 180 days). Roughly 80% of these forecasts are made by analysts working for underwriter banks, versus only 20% for non-underwriter banks. Among the non-underwriter banks, the bulk of the forecasts come from syndicate

[14] We also performed our analysis after requiring that at least three forecasts are issued for each firm and forecast period. The results are similar to those presented in the paper.

banks (15% of the total). Only 5% of the forecasts are from pure brokerage houses, and less than half of one percent is from pure research firms.[15]

Panel B of table 2 provides summary data on the 59,252 price forecasts included in the sample. Analysts working for underwriter banks make 85.3% of these forecasts, compared to 14.7% for non-underwriter bank analysts. Forecasts by syndicate member banks accounted for 13.2% of total forecasts, versus 1.4% for brokerage houses and less than 0.1% for research firm analysts.

Table 3 shows how the frequency of forecast coverage varies across analyst firm types. For the earnings forecast sample, 56% of the forecasts are made for company-quarters covered simultaneously by analysts at underwriter, syndicate and brokerage firms. A further 25% of the forecasts are for company-quarters covered by both underwriter and syndicate analysts. Not surprisingly, given the low number of research firm forecasts, there are relatively few company-quarters that include research firm coverage, raising questions about the power of our tests for research firms.

For the target price sample, 53% of the forecasts are for company-quarters covered by both underwriter and syndicate firm analysts. A further 26% of the forecasts are for company-quarters where analysts from underwriter, syndicate and brokerage firms all provide coverage. Once again, there are relatively few company-quarters covered by analysts at research firms.

The sample includes earnings and price forecasts made during the technology boom as well as post-boom forecasts. Eighty-two percent of the earnings forecasts occur during the boom period, versus 72% for the price forecast sample. Subsequent tests will

[15] We explored the low frequency of pure research firms further, and discovered that I/B/E/S covers only a small fraction of these firms.

examine whether the findings are sensitive to market performance by separating the sample forecasts into those made before and those made after April 2000, when the NASDAQ market collapse began.

We present summary statistics on several dimensions of earnings and price forecast performance in table 4. Earnings forecast horizons average 54.6, 138.8 and 289.5 days respectively for the short-, medium-, and long-term horizons. The most variation is exhibited for the long-term horizon with the first quartile being 237 days and the third quartile 349 days. The mean forecast error (deflated by the absolute value of the earnings estimate) for the short-term horizon is 0.055 and increases with the forecast horizon. The mean forecast error rises to 0.192 for the medium-term and 0.304 for the long-term. All of these estimates are affected by a small number of very large values which arise when the earnings forecast, the deflator, is close to zero. The median forecast errors are -0.021, 0.000 and 0.024 for the short-, medium- and long-term horizons. For the short-term horizon, 33.2% of forecasts are optimistic. This number increases with the forecast horizon, rising to 52.5% for the long-term forecasts. Finally, the mean absolute earnings forecast error is 0.415 for the short-term and also increases with the forecast horizon. The mean absolute earnings forecast error is 0.583 for the medium-term and 0.757 for the long-term. The medians are 0.097, 0.148 and 0.214 respectively.

Descriptive data for price forecasts is reported in panel B of table 4. More than 99% of the price forecasts have 12-month horizons. The mean, median, as well as the first and third quartiles are, therefore, all 12 months. Analysts typically projected that prices would increase in the coming year: 95% of the estimates forecasted positive growth, the first quartile for expected price growth was 14.1%, the median was 25.5%,

and the third quartile was 44.7%. These predictions turned out to be optimistic, in part because they were aggressive given the historical performance of stocks,[16] and in part because of the market decline in 2000. Approximately 73% of the price forecasts were ex post optimistic. The mean forecast error (deflated by the forecasted stock price) was 20.1% and the median was 24.3%. Finally, the mean absolute forecast error (also as a percent of forecasted stock price) was 42%.

4. Tests and Results

4.1 Univariate Tests

Earnings Forecast Optimism

Panel A of table 5 presents univariate results for earnings forecast optimism by analyst firm. Relative forecast optimism (see panel A) is negative for underwriter bank analysts, and positive for non-underwriter bank analysts for each of the forecast horizons. Mean short- and medium-term forecast optimism is –0.007 for underwriter analysts, compared to 0.027 for non-underwriter analysts. The differences between these estimates are statistically significant at the 1% level. There is no significant difference in mean relative long-term forecast optimism for the two groups.

There are also important differences in relative optimism across finer analyst firm partitions, particularly for short- and medium-term horizons. Underwriter analysts are typically least optimistic, with mean estimates of –0.007 for both horizons, versus 0.010 and 0.018 for syndicate firms, and 0.087 and 0.051 for brokerage firms. Statistical tests indicate that the differences between underwriters, and either syndicate or brokerage means for these horizons statistically reliable at the 5% level or lower. Medium-term

[16] See Ibbotson Staff (2003) for market results from 1926-2002.

forecasts for underwriter analysts are also significantly lower than those for research analysts.

In contrast, brokerage analysts tend to make the most optimistic forecasts. Mean relative optimism for brokerage firms exceeds that for all other firm classes in the short-term and for all classes except for research in the medium-term. These differences are all statistically significant.

These findings suggest that analyst optimism is more closely linked to sales and trading, the sole source of research funding brokerage firms, than to underwriting. Results for syndicate firms are also consistent with this tentative conclusion. Mean relative optimism estimates for syndicate firms lie between the underwriting and brokerage estimates, reflecting syndicates greater reliance on trading than underwriter firms, and greater emphasis on underwriting than brokerage firms.

Finally, the findings for research firms are generally inconclusive. On average research firms' relative optimism is relatively low for short-term horizons, and relatively high for medium-term horizons.

Price Forecast Optimism

Panel B of table 5 presents mean relative price forecast optimism for analysts by firm class. The findings are generally consistent with those reported for earnings. On average, underwriter analysts are less optimistic (with mean relative forecast optimism of –0.011), than syndicate firm analysts (with a mean of 0.061), and brokerage firm analysts (with a mean of 0.102). The mean estimate for underwriter analysts is significantly different from that for both syndicate and brokerage analysts. Once again, syndicate estimates lie in between the underwriter and brokerage extremes. Research analysts

appear to make the least optimistic price forecasts of any firm-type (with a mean of –0.038), but there are too few observations to draw any reliable statistical inferences from this estimate.

In summary, univariate results for earnings and prices indicate that underwriter analysts make systematically less optimistic forecasts than non-bank analysts, and that brokerage analysts are generally more optimistic than analysts at other types of firms.

4.2 Multivariate Tests

Our relative forecast optimism measure controls for many of the factors that earlier research indicates is likely to be associated with analysts' forecast performance. For example, it controls for differences in the volatility of earnings and stock performance across companies that are likely to affect forecast optimism, since an analyst's performance is benchmarked to that of all analysts following the same company. It also controls for the timing of forecasts, which may reflect any general optimism or pessimism about the economy, a sector, or a company, since each analyst is benchmarked against all analysts forecasting for the same company, quarter and forecast horizon.

However, earlier studies indicate that forecast horizon is an important explanatory variable for accuracy (see O'Brien, 1990, Clement, 1999, and Jacob, Lys and Neale, 1999), although its impact on optimism is not as clearly documented. Also, there is some evidence that analyst company experience is associated with earnings forecast accuracy. As discussed below, there is reason to believe that this variable could also be related to forecast optimism. We therefore use multivariate tests to examine the association

between relative forecast optimism and analyst firm type after controlling for these factors.

Forecast Horizon Control: Forecast horizon is partially controlled for by benchmarking analysts' performance against all analysts forecasting for the same company, quarter and horizon. However, for earnings forecasts this design controls for only three broad horizons (short-, medium-, and long-term). We therefore use a finer measure of forecast horizon, the number of days between the forecast issue date and the subsequent earnings announcement date. For price forecasts, analysts' forecasts typically have the same forecast horizon (twelve months), so no finer horizon control is required.

Summary statistics for analyst earnings forecast horizons for the four analyst classes are reported in table 6. On average, analysts' earnings forecasts are made 164 days before the earnings announcement. The mean forecast horizons are remarkably similar across analyst firm types: underwriter firm analyst forecasts have a horizon of 164 days, versus 165 days for syndicate firms, 162 days for brokerage firms, and 162 days for research firms.

Analyst Company Experience Control: Several studies have documented that experience is an important variable to consider for forecast accuracy models (see Clement, 1999; Jacob, Lys and Neale, 1999). Experience could reflect superior private information that analysts develop about a company's economics the longer they follow it, leading to more accurate forecasts. Alternatively, it could reflect selection bias - better performing analysts with more accurate and less optimistic forecasts are more likely to be retained.

However, company experience could also be associated with forecast optimism in a different way. Analysts who follow a company for long periods develop a close

relationship with management, making it difficult to challenge or question management's performance.[17] This reduced objectivity is likely to be reflected in relatively more optimistic and less accurate forecasts.

To examine these potential effects, we use the variable "Analyst Company Experience," defined as the number of quarters that have elapsed between the analyst's first forecast for the test firm and the current forecast observation, as an independent variable in our analysis.[18]

Summary statistics for company experience by analyst firm type are reported in table 6. For our earnings sample, analysts have on average 10.9 quarters of experience following a particular company. However, experience varies considerably across analyst classes. Pure research firm analysts have only 7.6 quarters of company experience, versus 9.4 quarters for brokerage house analysts, 9.3 quarters for syndicate firms, and 11.3 quarters for underwriters firms. For the target price sample, analysts have on average 7.5 quarters of experience issuing target prices for a particular company. However, the patterns observed for the target prices across the five classes of analyst firms are different from our earnings sample. Pure research firm analysts have 13.2 quarters of company target price experience, versus 17.5 quarters for brokerage house analysts, 6 quarters for syndicate firms, and 7.5 quarters for underwriter firms.[19]

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[17] The effect of personal interaction on independence was first documented in the social psychology literature by Festinger, Schachter, and Back (1950).

[18] One potential limitation of these estimates is that we have access to *I/B/E/S* forecast data only from 1983 onwards. Consequently, we could understate experience for analysts that entered the profession prior to 1983. However, this is not a serious problem; only 4 of our 4,505 sample analysts are listed on *I/B/E/S* in 1983.

[19] The differences between earnings and price sample estimates of Analyst Company Experience arise for two reasons. First, First Call begins recording a start date for analysts in its database at the beginning of 1990, whereas the first analyst start date for I/B/E/S is at the beginning of 1983. This leads our measure of company experience to be more truncated for the price sample than the earnings sample. Second, there is a

Earnings Forecast Optimism Tests and Results

Our multivariate tests use relative earnings forecast optimism as the dependent variable. The independent variables are the analyst-firm class indicator variables, and the Forecast Horizon and Analyst Company Experience controls. The following two models are estimated:

Model 1: *REOPT= g(Non-underwriter bank, Analyst company experience, Forecast horizon)*

Model 2: *REOPT = g(Syndicate firm, Brokerage firm, Research firm, Analyst company experience, Forecast horizon)*

Model 1 is used to test whether there is any difference in forecast optimism for underwriter and non-underwriter firms. Non-underwriter bank is an indicator variable that takes the value one for all non-underwriter bank analysts. The estimated intercept coefficient is the average relative optimism for underwriter bank analysts, and the indicator coefficient measures the incremental relative optimism for non-underwriter bank analysts.

The second model tests for differences in optimism across different types of analyst firms. Indicator variables are included for Syndicate banks, Brokerage firms, and Research firms. The estimated intercept coefficient is therefore the average relative optimism for underwriter bank analysts, and the indicator coefficients measure the incremental relative optimism for other analyst firms.

One issue for our tests is that the model errors for forecasts made by the same analyst are likely to be serially-correlated. Also, forecasts for different analysts may suffer from heteroskedasticity. To control for these problems, the forecast optimism

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larger frequency of long-lived brokerage and research firm analysts in the price sample than the earnings sample.

models are estimated using the robust cluster estimators of variance (Huber/White/sandwich). This approach produces "correct" standard errors (in the measurement sense). In comparison to the conventional estimator of variance, the robust cluster estimate of variance requires only that the observations be independent across the individual analysts (clusters).

Table 7 presents the model estimates for earnings forecast optimism. The results generally confirm the univariate findings. As indicated by the Model 1 estimates, analysts at non-underwriter firms make more optimistic short- and medium-term earnings forecasts than underwriter firms. Non-underwriter indicator coefficients are 0.036 and 0.029 for the short- and medium-term forecasts respectively, and are both statistically significant.

Model 2 findings indicate that the underwriter banks make significantly less optimistic short-and medium-term forecasts than analysts at syndicate or brokerage firms. The indicator estimates for syndicate and brokerage firms are respectively 0.018 and 0.099 for the short horizon, and 0.021 and 0.051 for the medium horizon. All but one of these estimates is significant at the 5% level or less, and the other is significant at the 10% level.

Further, brokerage firms continue to have the most optimistic forecasts in the short-term horizon. Brokerage is also more optimistic than all other firm classes except for research in the medium-term horizon. The estimated coefficients for brokerage firms are significantly different from all other firm types for the short horizon, and for all but the research firms for the medium horizon. Estimates for syndicate firms lie in between

those for underwriter and brokerage firms. Finally, the findings for research firms are inconclusive.

The estimated coefficients for company experience are insignificant for short- and medium-term forecasts, but are positive and significant for long-term forecasts for both models. This suggests that analysts who cover a company for longer periods find it more difficult to take a negative long-term view on the company relative to their peers, either because their relation with management boosts their confidence about management's ability to deliver strong performance, or because they rely more heavily on management's input. Finally, the control for forecast horizon indicates that longer-horizon forecasts are more optimistic.

Price Forecast Optimism

The two models estimated for earnings optimism are also estimated using relative price forecast optimism as the dependent variable. The one difference is that the forecast horizon variable is excluded since almost all forecast horizons are for twelve months. The optimism results are presented in Table 8.

Model 1 estimates show that analysts' price forecasts are more optimistic for non-underwriter banks than for their underwriter firm counterparts. The non-investment bank estimate is 0.077, and is statistically reliable. Model 2 indicates that analysts at underwriter firms are less optimistic than analysts at either syndicate or brokerage firms. The estimated coefficients for these firm-type indicators are 0.075 and 0.104 respectively, both statistically significant. The estimated coefficient for research firm analysts (-0.035) implies that research firms are even more accurate than underwriter firms.

However, this estimate is not statistically significant. There is no significant difference between the price forecasts for syndicate and brokerage firms.

The company experience estimates confirm the findings reported for long-term earnings forecasts tests: analysts with longer company experience make significantly more optimistic price forecasts.

4.3 Discussion of Results and Additional Tests

Given the concerns expressed by regulators, practitioners and academics about the impact of underwriting on analysts incentives, our results are somewhat surprising. We examine four potential explanations. First, it is possible that the findings are driven by the stock market boom, and that the results do not generalize to a non-boom period. Second, the less biased forecasts of underwriters could reflect high status underwriters relying at least partially on their reputations to attract new banking clients, rather than on optimistic earnings analyst research. Third, the relative optimism of brokerage firms could reflect brokerage incentives to provide low quality research to retail investors, either because it is more costly for retail investors to infer quality, or because recent industry changes make it difficult to charge retail investors for research. Finally, our tests for underwriters may understate underwriter optimism by pooling firms that make new issues, where underwriters are presumed to be most optimistic, and clients that are unlikely to raise any new public capital. We examine each of these explanations in turn.

Impact of the Stock Market Boom: Our sample period includes both the stock market boom, when underwriter research was most biased, and the subsequent crash period, when underwriting and incentives for research bias plummeted. The relative optimism

measure does not permit us to test whether there has been a shift in bias over time. However, unreported tests indicate that the patterns observed for the different types of analyst-firms during the full sample period also hold for both the period prior to April 2000 (when the NASDAQ was at its peak), and the subsequent period (when it crashed).

Underwriter Firm Status: As noted above, high status underwriters can potentially rely at least partially on their reputations to attract new banking clients, whereas low status firms have no such reputation advantage and may be more prone to using optimistic research to attract new underwriting business. Consistent with this hypothesis, Hayward and Boeker (1998) found that research department reputation moderates analysts' bias—while analysts rated their clients' securities more favorably than other analysts rating the same securities, this bias was lower for analysts at highly reputable departments.

The relatively low level of optimism for underwriters may, therefore, reflect a high frequency of forecasts by high status banks, which dominate the underwriting business. To test this hypothesis, we examine whether underwriter status has any impact on forecast optimism by separating underwriting firms into bulge from non-bulge firms.[20] Bulge investment banks are the six largest and most reputed banks on Wall Street (Credit Suisse First Boston, Goldman Sachs, Merrill Lynch, Morgan Stanley Dean Witter, Salomon Smith Barney, and Lehman Bros).

To test whether the high frequency of bulge firm forecasts explains the low relative optimism of underwriters, we modify Model 2, discussed above, to include a Non-bulge underwriter banks indicator. The revised model is as follows:

[20] This classification is well established in practice and has been used to identify high status investment banks in earlier work (see Eccles and Crane (1988)).

Model 3: *REOP or RPOPT = g(Non-bulge underwriter bank, Syndicate firm, Brokerage firm, Research firm, Analyst company experience, Forecast horizon)*

The intercept represents the average forecast optimism for bulge underwriter firms, and the indicator estimates represent the incremental optimism for Non-bulge underwriter firms, Syndicate banks, Brokerage firms, and Research firms.

The findings are reported in table 7 for the earnings forecast sample, and in table 8 for the price forecast sample. For the earnings forecast, non-bulge underwriter bank analysts make significantly more optimistic short-term earnings forecasts than bulge firms. There is no difference in medium- and long-term forecast optimism for these two classes of underwriter firms. Underwriter status also does not reduce relative target price forecast optimism, since estimates for non-bulge firms are similar for bulge firms. We, therefore, conclude that while reputation may play some role in reducing analyst optimism, it is unlikely to explain the difference in relative forecast optimism for underwriter and brokerage firms.

Underwriter Client Effects: A third explanation for our findings is that optimism by brokerage analysts is driven by firms who focus on retail trading, rather than institutional equity business. As discussed above, it is likely to be more costly for retail clients to judge research quality than institutional investors, creating a lemons problem in the retail market. If retail investors cannot easily distinguish high quality and low quality research, high quality research is likely to be driven out of the market. Also, disintermediation in the retail market makes it more difficult for traditional brokerage firms to cover the costs of research through trading commissions.

To test whether brokerage firms that specialize in retail sales are responsible for the high relative forecast optimism for brokerage firms, we classified brokerage firms by the types of clients they serve (retail or institutional). The first step in our classification was to locate sample brokerage firms in the annual Nelson's Directory of Investment Research. If a firm was listed in the directory, we examined the introductory section that described its business and in some cases client mix. Where possible, this information was used to classify the brokerage firm into those that are focused solely on institutional investors, those that serve retail clients, and those that serve both institutional and retail clients. If the client mix was not described in sufficient detail in Nelson's, we searched the firm's website for information on the type of clients served. If this search was unsuccessful, we called the number listed in Nelson's directory or on the website and asked whether the firm served retail investors, institutional clients, or both. Finally, we used the Securities Industry Association (SIA) reports to cross-check our classification. SIA collects information for many security firms on types of clients, and the number of institutional and retail representatives employed. The breakdown of a firm's sales force (retail/institutional) and clients' accounts (retail/institutional) was provided another way to resolve classification ambiguities for the firms. [21]

Almost all brokerage houses in our sample serve institutional clients because the data is taken from I/B/E/S, which mostly collects data from firms that serve institutional investors. Roughly 79% of earnings forecasts are made by analysts working for brokerage firms serving institutional clients, versus only 21% for brokerage firms serving institutional and retail investors. For the target price sample, analysts working for

[21] Five brokerage firms could not be classified due to a lack of sufficient information. These firms comprised less than 1% of brokerage observations in either sample.

brokerage firms serving institutional clients make 66% of the forecasts, compared to 34% for brokerage firms serving institutional and retail investors.

To test whether the brokerage firms that specialize in retail investors explain the relative optimism of brokers, we modify Model 2 by replacing the Brokerage firm indicator with two variables, one for Brokerage firms that focus on institutions, and the other for brokers that serve retail or both institutional and retail investors. The revised model is as follows:

Model 4: *REOPT or RPOPT = g(Syndicate firm, Institutional brokerage firm, Mixed brokerage firm, Research firm, Analyst company experience, Forecast horizon)*

The constant represents the average forecast optimism for underwriter banks, and the indicator estimates reflect the incremental optimism for Syndicate banks, Institutional brokerage firms, Combined retail/institutional brokerage firms, and Research firms.

The findings, reported in table 7 for the earnings forecast sample and in table 8 for the price forecasts, are inconclusive. For short-term earnings forecasts the estimated coefficients for pure institutional brokers are 0.093, versus 0.115 for brokers that either serve retail investors or a mix of retail and institutional investors. Both estimates are significant, indicating the analysts at both types of brokerage firms are more optimistic than underwriter analysts. Tests of differences in coefficients also indicate that analysts at both types of brokerage firms are significantly more optimistic than syndicate and research firm analysts. But there is no statistical difference in optimism for analysts at the two types of brokerage firms.

Medium-term earnings forecast tests provide some support for optimism being lower for brokerage firms that specialize on the institutional equity business. The

institutional brokerage coefficient is 0.039, and weakly significant, whereas the coefficient for brokerage firms that serve retail or combined retail and institutional investors is 0.091, highly significant, and also significantly greater than the institutional brokerage estimate.

However, the price forecast results show exactly the opposite effect. The estimated coefficient for institutional brokers is 0.135 and significant, whereas the combined firm coefficient is 0.049 and insignificant.

Given the mixed evidence, we conclude that there is no strong evidence that brokerage firm optimism is driven by firms that focus on the retail business. However, we recognize that these tests are weakened by our inability to adequately distinguish the relative importance of retail and institutional clients for many of our sample firms.

Differences in Optimism for Issuing and Non-Issuing Companies: We examine forecast optimism for all sample firms, whereas the underwriting incentive effects are most pronounced for firms that make new issues (Bradshaw, Richardson, and Sloan, 2003). Analysts at underwriter firms have incentives to make optimistic forecasts to win these firms' business; they are less likely to be optimistic for firms that do not raise new equity capital. To examine this explanation, we test whether there were any differences in relative forecast optimism for firms making IPOs and secondary offering during the sample period across the five classes of analyst firms. Our results again confirm those reported earlier in the paper.

5. Conclusions

In summary, our findings provide several insights for those concerned about conflicts of interest faced by security analysts. Prior research suggests that underwriter conflicts play an important role in explaining analyst forecast optimism. Our findings on price and earnings forecasts show that on average underwriter analysts make less optimistic earnings and price forecasts than analysts at non-underwriter firms, suggesting that there are also important non-underwriter factors that affect analyst bias.

Several such factors appear to be important in explaining analyst forecast optimism. We show that brokerage firm analysts make the most biased forecasts, suggesting that sales and trading incentives are important factors underlying analyst research bias. Analyst firm status also appears to partially explain research optimism, since forecasts of both short-term earnings and prices are less optimistic for bulge firms than for non-bulge firms. Finally, long-term earnings and price forecast optimism increases with analysts' longevity covering a company, suggesting over time analysts develop relations with management that make it difficult to be independent.

Our findings raise several questions for future research and for regulators. For researchers our findings suggest that the primary force underlying analysts' forecast optimism is not analysts' underwriting incentives, but the sales and trading incentives faced by most analyst firms, and brokerage firms in particular. Our findings indicate that brokerage analyst optimism does not depend on whether their firms focus on institutional investors or a mix of retail and institutional investors. Yet these findings are incomplete since very few of our firms focus purely on retail investors, and for firms that serve both types of clients we do not have data on the relative importance of each type.

Consequently, we are not able to provide a powerful test of how retail investors affect analyst forecast optimisms.

We are also unable to conduct a very powerful test of the performance of analysts at pure research firms. As we discuss above, these analysts are likely to have less incentive to be optimistic than brokerage, underwriter or syndicate analysts, since they do not use research to sell other services, such as trading and underwriting. However, our sample of research firms is quite small; we believe this is largely a product of I/B/E/S coverage.

The high level of relative forecast optimism for analysts working for institutional brokers raises questions about how institutional trading affects analysts' incentives. Are trading incentives similar for large and small institutions? As noted earlier, large institutions typically provide analyst firms with detailed feedback on the specific research they value, whereas small institutions typically do not. As a result, trading firms that serve the large institutions have more precise information on analyst performance, enabling more effective analyst reward systems. In contrast, firms that serve small institutions are forced to use a single metric to reward analysts, trading volume in the companies they follow. This is likely to be a noisy measure of analyst research quality and the focus on a single performance metric may lead analysts to attempt to game the system.

For regulators, our findings indicate that recent attempts to eliminate investment banking conflicts are unlikely to significantly reduce analyst research optimism, since analyst bias is even more prominent for pure brokerage firms than for firms that also

perform underwriting.[22] Requiring sanctioned underwriters to supplement their own research on each company they cover by acquiring and publishing additional research from three independent sources is also unlikely to improve research quality.[23] Presumably this requirement is intended to increase the level of independent research available to investors. However, analysts at underwriter firms were not the most biased in their earnings and price forecasts – they were among the least biased. Unless the additional resources provided by the ten sanctioned banks dramatically changes incentives at the brokerage firms that are stepping up their research offerings to take advantage of this opportunity,[24] this requirement seems as likely to reduce overall research quality as to increase it.

Finally, our finding that analyst optimism increases the longer an analyst covers a company suggests that analysts develop a close relation to management over time which either consciously or subconsciously affects their independence. Regulation Fair Disclosure, which reduces the ability of managers to provide selective disclosures to

[22] We also compare forecast optimism for lead underwriters that were sanctioned by the SEC to that of non-sanctioned underwriters, syndicate firms, brokerage firms, and research firms. The results show that, on average, short-term earnings forecasts made by analysts working at sanctioned underwriters were less optimistic than analysts at syndicate firms and brokerage houses. Forecasts for sanctioned underwriter bank analysts are significantly less optimistic than brokerage firm forecasts for medium-term horizons. Tests for target price forecasts show a similar pattern: on average, analysts at sanctioned firms made less optimistic forecasts than analysts at syndicate and brokerage firms.

[23] In the settlement independent research was defined as "(i) a research report prepared by an unaffiliated person or entity, or (ii) a statistical or other survey or analysis of research reports (including ratings and price targets) issued by a broad range of persons and entities, including persons and entities having no association with investment banking activities, which survey or analysis has been prepared by an unaffiliated person or entity." (Attorney General of the State of New York, 2003, Addendum A, p. 14). These requirements imply that firms that are most likely to be eligible for research funding will be brokerage firms and pure research boutiques.

[24] A recent Business Week article noted that in response to the opportunities created by the settlement, "S&P is hiring extra analysts to cover more companies and bulking up the five-page stock reports it aims at retail investors. It brags it now covers 1,160 U.S. stocks -- more than Merrill Lynch & Co. or Morgan Stanley." See "(Still) Pity the Poor Little Guy," Business Week, May 19, 2003.

favored analysts, may reduce this bias. However, it will probably not affect subconscious analyst identification with management that naturally occurs over time.

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Table 1
Selection process for earnings forecast (Panel A) and price forecast (Panel B) samples.

	Number of forecasts
Panel A: Earnings forecast sample	
Full sample of earnings forecasts on *I/B/E/S* from January 1998 to December 2000	579,820
Less:	
Forecasts with negative/missing horizons	45,038
Forecasts with missing analyst firm data	109
Multiple forecasts by analyst in forecast period	148,468
Forecasts for firms covered by only one analyst	33,056
Forecast coding errors/outliers	3,612
Final sample	349,537
Panel B: Target Prices	
Full sample of price forecasts on *First Call* from January 1999 to September 2001	153,195
Less:	
Forecasts with missing actual stock prices	22,014
Forecasts with missing analyst firm data	558
Multiple forecasts by analyst in forecast period	41,590
Forecasts for firms covered by only one analyst	29,781
Final sample	59,252

Table 2

Frequency of analyst firms, analysts, companies covered, and forecasts by horizon for different classes of analyst firms. Panel A shows summary data for the earnings forecast sample, and panel B shows data for the target price forecast sample. The earnings forecasts are made in the period January 1998 to December 2000 reported on *I/B/E/S*, whereas target price forecasts are made between January 1999 and September 2001 reported on *First Call*.

				Number of forecasts		
	Number of analyst firms	Number of analysts	Number of companies	Short-term (0-90 days)	Medium-term (91-180 days)	Long-term (181+ days)
Panel A: Earnings forecast sample						
Underwriter banks	100	3,536	4,940	96,611	83,904	100,989
Non- underwriter banks						
Syndicate firms	97	934	3,299	17,536	15,124	18,402
Brokerage firms	51	271	1,663	5,210	4,712	5,314
Pure research firms	11	43	326	589	512	634
Total non- underwriter banks	159	1,225	3,692	23,335	20,348	24,350
Total	259	4,505	5,006	119,946	104,252	125,339
Panel B: Target price forecast sample						
Underwriter banks	79	2,839	3,042			50,537
Non- underwriter banks						
Syndicate firms	67	611	1,723			7,828
Brokerage firms	20	90	405			841
Pure research firms	4	10	30			46
Total non- underwriter banks	91	710	1,817			8,715
Total	170	3,457	3,069			59,252

Table 3
Frequency of coverage across analyst firm types for the earnings and price forecast samples. The earnings forecasts are made in the period January 1998 to December 2000 reported on *I/B/E/S*, whereas target price forecasts are made between January 1999 and September 2001 reported on *First Call*.

	Earnings sample		Target price sample	
	No. of forecasts	% of forecasts	No. of forecasts	% of forecasts
Coverage by one firm type:				
Underwriter	24,230	7%	10,409	18%
Syndicate	169	0%	49	0%
Brokerage	20	0%	2	0%
Research	8	0%		0%
	24,427	7%	10,460	18%
Coverage by two firm types:				
Underwriter /Research	1,354	0%	25	0%
Syndicate/Research	118	0%	4	0%
Brokerage/Research	6	0%	0	0%
Underwriter /Brokerage	18,954	5%	1,430	2%
Syndicate/Brokerage	124	0%	8	0%
Underwriter /Syndicate	86,796	25%	31,115	53%
	107,352	31%	32,582	55%
Coverage by three firm types:				
Underwriter /Research/Brokerage	899	0%	0	0%
Syndicate/Research/Brokerage	16	0%	4	0%
Underwriter /Syndicate/Brokerage	196,606	56%	15,238	26%
Underwriter /Syndicate/Research	7,059	2%	706	1%
	204,580	59%	15,948	27%
Coverage by all firm types:				
Underwriter /Syndicate/Brokerage/ Research	13,178	4%	262	0%
	13,178	4%	262	0%
Total	349,537	100%	59,252	100%

Table 4

Descriptive statistics on earnings and price forecasts. The earnings forecast sample is from the period January 1998 to December 2000 reported on *I/B/E/S*. The price forecast sample comprises price forecasts made in the period January 1999 to September 2001 reported on *First Call*. Earnings forecast errors and absolute forecast errors are deflated by the absolute value of the earnings forecast, whereas price forecast errors and absolute forecast errors are deflated by the forecasted stock price. The estimated price growth rate is the difference in the target price and the pre-forecast price, deflated by the pre-forecast price.

	Forecast horizon (days)	Forecast error	Absolute forecast error	Estimated Price growth
Panel A: Earnings forecast sample				
Short-term forecasts				
Mean	54.6	0.055	0.415	
First quartile	33.0	-0.124	0.031	
Median	56.0	-0.021	0.097	
Third quartile	79.0	0.057	0.286	
Standard Deviation	26.0	1.839	1.792	
Percent positive		33.2%		
Medium-term forecasts				
Mean	138.8	0.192	0.583	
First quartile	115.0	-0.124	0.047	
Median	140.0	0.000	0.148	
Third quartile	164.0	0.191	0.429	
Standard Deviation	27.7	2.478	2.416	
Percent positive		43.5%		
Long-term forecasts				
Mean	289.5	0.304	0.757	
First quartile	237.0	-0.115	0.066	
Median	282.0	0.024	0.214	
Third quartile	349.0	0.368	0.605	
Standard Deviation	67.1	6.585	6.548	
Percent positive		52.5%		
Panel B: Target price forecast sample				
Mean	12.0	0.201	0.423	0.381
First quartile	12.0	-0.020	0.156	0.141
Median	12.0	0.243	0.338	0.255
Third quartile	12.0	0.533	0.605	0.447
Standard Deviation	0.555	0.642	0.523	0.682
Percent positive		73.4%		

Table 5

Mean relative earnings and price forecast optimism by analyst firm type and forecast horizon. The sample comprises earnings forecasts made in the period January 1998 to December 2000 reported on *I/B/E/S*. Relative forecast optimism is the difference between the analyst's forecast error and the average forecast error for all analysts making forecasts for the same company, quarter, and forecast horizon, deflated by the mean absolute forecast error for the company, quarter, and horizon.

Panel A: Earnings forecast sample

	Forecast horizon		
	Short-term (0-90 days)	Medium-term (91-180 days)	Long-term (181+ days)
Underwriter banks	-0.007 [b]	-0.007 [a]	-0.002
Non-underwriter banks			
Syndicate firms	0.010	0.018	0.006
Brokerage firms	0.087[c]	0.051[d]	0.009
Pure research firms	0.000	0.064	0.007
Total non- underwriter banks	0.027	0.027	0.007

Panel B: Price forecast sample

	Relative forecast optimism
Underwriter banks	-0.011[b]
Non- underwriter banks	
Syndicate firms	0.061
Brokerage firms	0.102[e]
Pure research firms	-0.038
Total non- underwriter banks	0.064

[a] Significantly different from the mean for syndicate, brokerage, and research firms at the 5% level or lower

b Significantly different from the mean for syndicate and brokerage firms at the 5% level or lower

[c] Significantly different from the mean for underwriter, syndicate and research firms at the 5% level or lower.

[d] Significantly different from the mean for underwriter and syndicate firms at the 5% level or lower.

[e] Significantly different from the mean for underwriter firms at the 5% level or lower.

Table 6

Summary statistics for control variables by analyst-firm class for earnings forecast sample (Panel A) and price forecast sample (Panel B). The earnings forecast sample comprises *I/B/E/S* forecasts that are made in the period January 1998 to December 2000. Price forecasts, from *First Call*, are made in the period January 1999 to September 2001. Controls variables are defined as follows: Analyst company experience is the number of quarters that have elapsed between the analyst's first forecast for a company reported on *I/B/E/S* or *First Call* and the current forecast observation. Forecast horizon is the number of days between the forecast and the actual earnings announcement.

	Underwriter firms	Syndicate firms	Brokerage firms	Research firms
Panel A: Earnings forecast sample				
Analyst company experience				
Mean	11.3	9.3	9.4	7.6
Standard deviation	12.8	11.0	14.2	15.1
Forecast horizon				
Mean	163.9	164.8	162.0	161.9
Standard deviation	109.7	109.7	107.7	104.1
Panel B: Target price forecast sample				
Company experience				
Mean	7.5	6.0	17.5	13.2
Standard deviation	9.0	7.4	17.0	13.1

Table 7

Relation between relative earnings forecast optimism, forecast horizon, analyst company experience, and analyst firm type estimated using robust cluster analysis. The sample comprises earnings forecasts made in the period January 1998 to December 2000 reported on *I/B/E/S*. The dependent variable, relative forecast optimism, is calculated as the difference between the analyst's forecast error and the average forecast error for all analysts forecasting for the same company, quarter, and forecast horizon, deflated by the mean absolute forecast error for the company, quarter, and horizon. Independent variables include analyst company experience (the number of quarters that an analyst has covered a firm), forecast horizon (the number of days between the forecast and the earnings announcement), and dummy variables for analyst firm type (non-underwriter, non-bulge underwriter, syndicate, brokerage, brokerage: institutional, brokerage: mixed institutional and retail, and research).

Independent variables	Model 1	Model 2	Model 3	Model 4
Panel A: Short-term forecasts (N=119,946)				
Constant	-0.232	-0.232	-0.257	-0.232
	(-26.4)[a]	(-26.5)[a]	(-23.2)[a]	(-26.5)[a]
Analyst company experience	-0.003	-0.003	-0.002	-0.003
	(-1.1)	(-1.1)	(-0.6)	(-1.1)
Forecast horizon	0.004	0.004	0.004	0.004
	(34.3)[a]	(34.4)[a]	(34.5)[a]	(34.5)[a]
Non- underwriter banks	0.036			
	(3.6)[a]			
Non-bulge underwriter banks			0.032	
			(3.4)[a]	
Syndicate firm		0.018	0.041	0.018
		(1.7)[c]	(3.3)[a]	(1.7)[c]
Brokerage firm		0.099	0.122	
		(4.8)[a]	(5.6)[a]	
Brokerage firm: Institutional				0.093
				(4.0)[a]
Brokerage firm: Retail and Institutional				0.115
				(2.5)[b]
Research firm		0.010	0.033	0.010
		(0.3)	(1.1)	(0.3)
R^2	0.014	0.015	0.015	0.015

Table 7 continued

Independent variables	Model 1	Model 2	Model 3	Model 4
Panel B: Medium term forecasts (N=104,252)				
Constant	-0.300	-0.300	-0.308	-0.300
	(-20.9)[a]	(-20.9)[a]	(-19.6)[a]	(-20.9)[a]
Analyst company experience	0.003	0.003	0.004	0.003
	(1.2)	(1.3)	(1.4)	(1.3)
Forecast horizon	0.002	0.002	0.002	0.002
	(21.1)[a]	(21.1)[a]	(21.0)[a]	(21.1)[a]
Non-underwriter banks	0.029			
	(3.3)[a]			
Non-bulge underwriter banks			0.012	
			(1.5)	
Syndicate firm		0.021	0.030	0.021
		(2.2)[b]	(2.7)[a]	(2.2)[b]
Brokerage firm		0.051	0.061	
		(2.6)[a]	(2.9)[a]	
Brokerage firm: Institutional				0.039
				(1.8)[c]
Brokerage firm: Retail and Institutional				0.091
				(2.2)[b]
Research firm		0.067	0.076	0.067
		(2.0)[c]	(2.2)[a]	(2.2)[c]
R^2	0.006	0.006	0.006	0.006

Table 7 continued

Independent variables	Model 1	Model 2	Model 3	Model 4
Panel C: Long-term forecasts (N=125,339)				
Constant	-0.190	-0.191	-0.198	-0.190
	(-18.1)[a]	(-18.1)[a]	(-15.9)[a]	(-18.0)[a]
Analyst company experience	0.005	0.005	0.006	0.005
	(2.3)[b]	(2.3)[b]	(2.4)[b]	(2.3)[b]
Forecast horizon	0.001	0.001	0.001	0.001
	(18.2)[a]	(18.2)[a]	(18.2)[a]	(18.2)[a]
Non-underwriter banks	0.010			
	(1.3)			
Non-bulge underwriter banks			0.009	
			(1.2)	
Syndicate firm		0.009	0.016	0.009
		(1.0)	(1.5)	(1.0)
Brokerage firm		0.015	0.022	
		(0.9)	(1.2)	
Brokerage firm: Institutional				0.009
				(0.4)
Brokerage firm: Retail and Institutional				0.034
				(1.1)
Research firm		0.019	0.027	0.019
		(0.7)	(0.9)	(0.7)
R^2	0.004	0.004	0.004	0.004

[a] Significant at the 1% level using a two-tailed test;
[b] Significant at the 5% level using a two-tailed test;
[c] Significant at the 10% level using a two-tailed test

Table 8

Relation between relative price forecast optimism, analyst company experience, and analyst firm type estimated using robust cluster analysis. The sample comprises price forecasts made in the period January 1998 to September 2001 reported on *First Call*. Relative forecast optimism is the difference between the analyst's forecast error and the average forecast error for all analysts forecasting for the same company, quarter, and forecast horizon, deflated by the mean absolute forecast error for the company, quarter and horizon. Independent variables include analyst company experience (the number of quarters that an analyst has covered a firm), and dummy variables for analyst firm type (non-underwriter, non-bulge underwriter, syndicate, brokerage, brokerage: institutional, brokerage: mixed institutional and retail, and research).

Independent variables	Model 1	Model 2	Model 3	Model 4
(N=59,252)				
Constant	-0.027	-0.027	-0.022	-0.027
	(-4.7)[a]	(-4.7)[a]	(-2.6)[a]	(-4.7)[a]
Analyst company experience	0.012	0.012	0.012	0.012
	(4.5)[a]	(4.6)[a]	(4.5)[a]	(4.5)[a]
Non-underwriter banks	0.077			
	(6.1)[a]			
Non-bulge underwriter banks			-0.007	
			(-0.7)	
Syndicate firm		0.075	0.070	0.075
		(5.9)[a]	(4.9)[a]	(5.9)[a]
Brokerage firm		0.104	0.099	
		(2.4)[b]	(2.2)[b]	
Brokerage firm: Institutional				0.135
				(2.3)[b]
Brokerage firm: Retail and Institutional				0.049
				(1.2)
Research firm		-0.035	-0.039	-0.034
		(-0.6)	(-0.7)	(-0.6)
R^2	0.003	0.003	0.003	0.003

[a] Significant at the 1% level using a two-tailed test;
[b] Significant at the 5% level using a two-tailed test;
[c] Significant at the 10% level using a two-tailed test