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Ulrike Malmendier
Devin Shanthikumar

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ABSTRACT

Traditional economic analysis of markets with asymmetric information assumes that uninformed agents account for the incentives of informed agents to distort information. We analyze whether investors in the stock market internalize such incentives. Stock recommendations of security analysts are likely to be biased upwards, particularly if the issuing analyst is affiliated with the underwriter of the recommended stock. Using the NYSE Trades and Quotations database, we find that large (institutional) traders account for the upward bias and exert no abnormal trade reaction to buy recommendations, and significant selling pressure in response to hold recommendations. Small (individual) traders do not account for the upward shift and exert significantly positive pressure for buys and zero pressure for hold recommendations. Moreover, large traders discount positive recommendations from affiliated analysts more than from unaffiliated analysts, while small traders do not distinguish between them. The naive trading behavior of small investors induces negative abnormal portfolio returns.

Ulrike Malmendier
Graduate School of Business
518 Memorial Way
Stanford University
Stanford, CA 94305-5015
and NBER
ulrikem@stanford.edu

Devin Shanthikumar
Harvard Business School
Soldiers Filed
Boston, MA 02163
dshanthikumar@hbs.edu

I. INTRODUCTION

Traditional economic analysis of markets with asymmetric information builds on the assumption that uninformed agents account for the incentives of informed agents to distort information. In the lemons model [Akerlof, 1970], the uninformed agent understands that the informed agent does not have an incentive to reveal negative features of the product and that he would rather advertise the lemon as a "hidden gem." Consequently, the uninformed agent does not rely on such unverifiable information, and the informed agent abstains from providing it in the first place. To put it in the context of cheap talk games, if all Sender-types have the same preferences over the Receiver's action, e.g. that the Receiver buys the good the Sender is selling, then cheap talk cannot be informative [Crawford and Sobel, 1982].

This result changes if the uninformed agent is naive about the information provided. In this case, the uninformed agent would accept cheap talk at face value, and the informed agent would want to provide biased information to extract maximum profits from subsequent economic interactions.

What happens in real markets? Are agents sophisticated enough to understand the informed agents' incentives to distort information? Or do they naively trust the informed agents? In this paper, we analyze naiveté about information provision in the market for stocks and stock recommendations. Analysts of brokerage firms are more informed about the value of a stock and provide investors with information in the form of buy, hold, and sell recommendations. They have, however, incentives to distort this information upward. Positive recommendations are more likely to generate trading commissions than negative ones, given short-selling constraints. Positive recommendations also allow analysts to gain continued access to information from the management of the recommended firm.[1] The incentives to bias recommendations upward are even stronger for "affiliated" analysts, whose brokerage belongs to an investment bank underwriting security issuances of the firms covered by the analyst. Positive analyst coverage after an equity issuance is often viewed as part of an implicit agreement between underwriter and

issuer.[2] Moreover, analysts' compensation depends, either directly or indirectly, on their "support" in generating profits for the corporate finance department.[3]

If investors are rational, they account for such informational distortions of analyst recommendations. First, they should discount positive and neutral recommendations, i. e. exert less buy pressure in response to buy and strong buy recommendations than they would if these recommendations were undistorted. Second, they should discount even more recommendations from analysts who are affiliated with the underwriter of an issuer. If, however, investors are naive and do not discount enough for analysts' incentives, they might overreact to positive recommendations and not account for affiliation.

Naive behavior adversely affects investors' wealth since investors misallocate their funds. It also impacts the industrial organization of brokerage firms. If investors are naive, independent brokerage is unlikely to be a profitable business since those firms with analysts and corporate finance divisions united under one roof get (at least) as much attention from investors while having informational advantages.

We examine empirically whether investors account for analysts' incentives in their trading decision. First, using the I/B/E/S data set, we show that the vast majority of recommendations are positive or neutral; only 4.5% are negative. The distribution is even more skewed for recommendations of affiliated analysts. We also show that a trading strategy that takes recommendations literally induces losses. Moreover, these losses are significantly larger for recommendations of affiliated analysts compared to those of unaffiliated analysts, consistent with previous literature on analyst affiliation [Lin and McNichols, 1998; Michaely and Womack, 1999]. Over any investment horizon between three months and five years, the portfolio based on unaffiliated recommendations outperforms the portfolio based on affiliated recommendations.

Second, we analyze the trade reaction of investors to the issuance of analyst recommendations. We distinguish between small and large investors to allow for the possibility that individual agents are subject to biases, while firms and their associated professionals rationally account for informational distortions. This distinction follows the previous behavioral

literature on biases in markets, which points to the specialization and experience of firms as well as competitive pressure to which firms but not individuals are exposed.[4] Following previous market microstructure literature [Lee and Radhakrishna, 2000], we distinguish between small (individual) and large (institutional) investors based on the size of their trades. Using trading data from the New York Stock Exchange Trades and Quotations (TAQ) database (1993-2002), we find distinctly different trade reactions to recommendations among large and small investors. First, large investors react less positively than small investors to buy and hold recommendations. Large investors display less abnormal buy pressure in response to buy and strong buy recommendations than small investors. And, while small investors do not display any abnormal trading behavior in response to hold recommendations, large investors sell. Second, large investors distinguish between affiliated and unaffiliated analysts and exert buy pressure only after strong buy recommendations of unaffiliated analysts and not after positive recommendations of affiliated analysts. Small traders are equally enthusiastic about stocks recommended by affiliated and by unaffiliated analysts.

The results suggest that large investors act according to rational economic theory and account for the incentives of analysts, but small investors do not. What explains these differences in trade reaction? At least the second result, the failure of small investors to differentiate between recommendations from affiliated and unaffiliated analysts, is likely to be affected by higher informational costs to identify analysts' affiliation. We find, however, that informational constraints do not suffice to explain the suboptimal behavior of small investors. If investors were fully rational about analyst incentive but lacking information about analyst affiliation, their average reaction to positive recommendations should still take the upward bias among *all* analysts into account. For example, small investors should sell in response to hold recommendations (as large investors do), regardless of whether the analyst is affiliated or not. Moreover, additional results suggest that even the second result is at least partly driven by investor naiveté. If only informational constraints prevented small investors from rationally responding to analyst affiliation, a partial solution would be to focus on those analysts who are "visibly" unaffiliated. For example, analysts whose financial institutions do not *have* any

associated corporate finance department and are *never* involved in any underwriting are easily identified as "independent." We find that, in fact, recommendations of such "never-affiliated" analysts have the least upward bias. However, small investors do not display abnormal trade reaction in response to their recommendation.

We interpret our results as evidence that small investors fail to adjust for the incentive conflicts on the part of analysts and fail to discount the investment advice sufficiently. In many settings, different psychological explanations of investor naiveté are possible. Investors may take the distorted information at face value due to limited attention. Or, they may be genuinely "too trusting." Our analysis allows some distinction. Since small investors are strongly reacting to the recommendations themselves, they should also realize the extremely low portion of sell recommendations (about 5%) and be induced to consider distortions. Mere inattention is unlikely to explain our results.

The naive decision-making has negative welfare consequences, as demonstrated by the negative returns to portfolios following recommendations. Further empirical analysis indicates that competitive market forces may exacerbate rather than remedy the effect. We show that the more analysts are covering a stock, the more affiliated recommendations are distorted upwards.

The findings of this paper are likely to extend to other market settings in which an uninformed agent receives advice from an informed agent who has different interests. For example, firms provide consumers only with positive product information in advertisements. Consumers who take all advertisements at face value may over-consume or misallocate their resources to goods of better advertisers. Similarly, salesmen can judge which product is most suitable for their clients, but may also be inclined to recommend the product that maximizes their commission. Our findings suggest that individuals do not always account sufficiently for such misalignment of incentives, but follow distorted advice too closely. Competition among information providers appears to be insufficient to endogenously trigger the rise of institutions that cater to the interest of the individual consumer.

This paper relates to two main branches of literature in behavioral economics and in finance. A growing literature in behavioral economics analyzes the reaction of firms to consumer or investor biases in individual decision-making. These papers show that market interaction does not eliminate biases but may rather exacerbate their effect since firms tailor their contracts and products to take advantage of them [DellaVigna and Malmendier, 2004; Gabaix and Laibson, 2004]. The specific bias, naiveté about incentives, and the resulting firm reaction, the provision of distorted information, may be related to the experimental finding that subjects embrace the advice of other subjects, even if the advice-givers do not have superior information [Schotter, 2003]. In the finance literature, this paper builds upon previous evidence that investors incur losses if they follow analyst recommendations "literally." Barber, Lehavy, McNichols and Trueman [2001] show that only sophisticated interpretations of analyst recommendations, such as buying the most highly buy-recommended stocks and short selling the most strongly sell-recommended stocks, will lead to positive portfolio returns. Jegadeesh, Kim, Krische, and Lee [2004] identify the change in recommendations (as opposed to the level of recommendations) as informative. Their findings are consistent with the evidence in this paper that the level of analyst recommendations ought to be adjusted downwards but the ordering is informative. We also build on the evidence in Lin and McNichols [1998] and Michaely and Womack [1999] that stock recommendations by affiliated analysts are more favorable but perform more poorly over short (three-day) and long (up to two-year) horizons. Iskoz [2002] confirms these results for strong buy recommendations and provides evidence that institutional investors may be accounting for the distortions of affiliated analysts, as far as one can deduce from the quarterly changes in institutional ownership. From a theory perspective, Morgan and Stocken [2003] analyze the case that investors are perfectly rational but do not know whether the analyst is biased or not. Their paper shows that it is difficult to reconcile investor rationality with the fact that different investors react to the same recommendation in different ways. Ottaviani and Squintani [2004] analyze a cheap-talk model in which the receiver may be naive and believes that the sender is honest, leading to too much communication and biased equilibrium allocation. The behavioral-finance literature on investor reaction to firms' accounting choices, issuance decisions, and

repurchase offers provides evidence of such naiveté.[5] Investors appear to be "credulous" and not to discount enough for the incentives of firms to manipulate the signal. Finally, our paper relates to the market microstructure literature on trading reactions. We employ the modified Lee and Ready [1991] algorithm to classify trades as buyer- or seller-initiated [following Odders-White 2000] and measure trade reaction as in Lee [1992], Hvidkjaer [2001], and Shanthikumar [2003].

The remainder of the paper is organized as follows. Section 2 describes the research question and research design. Section 3 provides details on the various sources of data employed in this study. In Section 4, we present the empirical results on distortions in analyst recommendations, on the trade reaction of small and large investors, and on the associated returns. We also discuss alternative explanations for the trading behavior of small investors. Section 5 explores, in more detail, how firms respond to the biases in individual trade decisions, and points to the effects of competition among analysts as captured by coverage. Section 6 concludes.

II. Empirical Strategy

1. Analyst Incentives

Sell-side analysts issue recommendations about the specific set of stocks they are covering. Recommendations typically range from "strong sell" to "strong buy." These recommendations are published in various forms such as analyst reports, online data sources,[6] radio and TV interviews on CNBC and other channels, and news articles. In particular, online resources allow investors to get fast and easy access to current recommendations regarding a stock, as shown in the sample webpage from *finance.yahoo.com* (Figure I).[7] The example of Apache Corp. shows recommendations of both affiliated and unaffiliated analysts and provides information on averages, industry comparisons, upgrades, and downgrades. In addition, the company makes its press releases (including information about the recent stock offering and its lead underwriter) easily available online. Investors can get to this detailed information with a few clicks from the *yahoo* site.[8]

Sell-side analysts face a well-known conflict of interest when providing investment advice in the form of recommendations. On the one hand, it is their job to provide profound security analyses and reliable recommendations to customers. Customers will, in turn, invest in the recommended stocks via the associated brokerage firm. The brokerage firm earns trading commissions and additional fees for their recommendations and reports. Good recommendations enhance the reputation of an analyst and thus lead to higher compensation.

On the other hand, analysts have incentives to bias their recommendations upwards. One reason is simply that buy recommendations are more likely to generate trading business than sell recommendations. A buy recommendation can induce any investor to buy a stock; a sell recommendation, however, is mostly relevant for current owners of the stocks, given the short-selling constraints investors face. In addition, analysts are exposed to pressure from the management of the company they are covering. In order to ensure increases in shareholder value of their company, management often calls up analysts and complains about ratings that are "too low" and even tends to "freeze out" analysts who do not give positive recommendations.[9] Similarly, buy-side clients may push sell-side analysts to maintain positive recommendations on stocks they hold.[10]

Analysts have additional reasons to distort recommendations upward if their brokerage firm is part of an investment bank that is underwriting security issuances. Favorable recommendations are generally viewed as a precondition for investment banks to get future underwriting deals and as an implicit condition of existing underwriting contracts.[11] Analysts whose brokerage firm is associated with an investment bank are likely to be exposed to pressure (and monetary incentives) from corporate finance departments to support underwriting business with positive recommendations.

As a result, analysts are trading off their reputational capital with the incentive to generate portfolio transactions and, in the case of affiliation with an investment bank, the incentive to support underwriting business.

Note that sorting may enhance the upward bias of analyst recommendations. Beyond the largest cap stocks and corporate finance clients, it is typically up to the analysts to select the

stocks they cover. They are likely to choose companies whose investment prospects they judge favorably, hoping that those are of most interest to their buy-side clients. If they do not account for winner's curse, their recommendations of covered stocks will be too positive. Similarly, the corporate finance division may be affected by winner's curse. The investment bank's decision to finance a particular company implies a fundamentally positive view on that company – maybe more positive than warranted by the companies performance. While the subsequent analysis focuses on the incentive distortions, bias due to sorting has the same implications: Recommendations are likely to be biased upwards, in particular if the analyst is affiliated.

2. Investor Rationality

The effect of these distortions of analyst recommendations depends on investor rationality. If investors accounted for the incentives of analysts, they would discount positive analyst recommendations in general and those of affiliated analysts in particular. This implies that rational investors should shift the level of recommendations down and may want to sell in response to hold recommendations and may not want to buy (but just to hold) in response to buy recommendations. Only strong buy recommendations should induce abnormal buy reaction. Moreover, their buy reaction should be stronger in response to positive recommendations of unaffiliated analysts than to those of affiliated analysts. The left part of Figure II summarizes the rational trade reaction schematically. Note that, in the rough classification of Figure II, a rational investor would never buy after any affiliated recommendation.[12] Such trading behavior would, in turn, create demand for independent brokerages.

If, however, investors are naive about analyst incentives, they do not account for the general upward bias. As a result, their trade reaction to strong buy, buy and hold recommendations is too positive on average. Rather than selling in response to hold recommendations and holding in response to buy recommendations, naive agents follow recommendations literally and hold after hold recommendations and buy after buy recommendations.

The lack of downward adjustment after positive or neutral recommendations also implies overreaction to negative recommendations. Naive investors will display abnormal sell pressure only if a stock becomes a bad enough investment to be downgraded to "sell" or "strong sell." Thus, they will react more negatively to sell and strong sell recommendations than rational investors would.

Moreover, naive agents do not provide for the additional incentive distortion of affiliated analysts and display the same reaction to the recommendations of affiliated and unaffiliated analysts. Thus, the deviation from rational trading behavior, both in the form of overreaction to hold, buy, and strong buy recommendations and in the form of the delayed sell reactions, will be exacerbated in the case of affiliated analyst recommendations. The right part of Figure II summarizes the naive trade reaction.

In this paper, we consider separately the trading behavior of large (institutional) investors and small (individual) investors and analyze whether they are able to account for the misaligned incentives of analysts. The distinction between large and small investors reflects that large, institutional investors, such as pension funds, benefit from numerous professional resources that allow them to overcome the biases of individuals.[13] Institutional investors rely on professional investment managers who spend their full daily working time on these investment decisions and may specialize in certain types of investments or particular industries. For individual investors, instead, investing their funds is one of numerous, widely different, every-day decisions. In addition, repetition, more frequent feedback, and specialization make it easier for decision-makers in large institutions (than for individual investors) to learn about analysts' incentives to distort information. Market pressure reinforces the effect. Institutions that invest sub-optimally – for instance, because they are not accounting for distortions in analyst information – lose investors and will be driven out of the market. No such pressure exists for individual investors. Finally, sorting works in favor of institutional investors. Individuals working in the finance industry have a better financial education and better skills in financial decision-making than the

average individual investor, as illustrated by the anomalous trade reaction of small traders to earnings news [Lee 1992].

3. Empirical measures

Investor type. We separate small and large investors by trading size. Following the analysis of Lee and Radhakrishna [2000], we choose dollar cutoffs rather than share-based cutoffs in order to minimize noise in separating individuals from institutions. We also incorporate their suggestion to use two cutoffs, with a buffer zone between small and large trades. Specifically we choose the cutoffs based on results for three-month TORQ sample from 1990-91, in which actual information on the identity of traders was available to check the accuracy of the trade-size based classification method. The lower cutoff of $20,000 splits small and medium trades, and the higher cutoff of $50,000 splits medium and large trades.[14]

Affiliation. Our empirical measures of analyst affiliation are based on the underwriting relationship of the analyst's brokerage house with the firm the analyst is reporting on. Following previous literature,[15] we identify analysts as affiliated if their investment bank was the lead underwriter of an initial public offering (IPO) of the recommended stock in the past five years or of a secondary equity offering (SEO) in the past two years. We also include co-underwriters over the same respective periods. We further examine two possible sources of underwriting bias that have not been explored in the previous literature. The first source is future affiliation, i.e. banks underwriting an SEO in the next one or two years. There are several potential sources of incentives for future underwriters to issue higher recommendations, including attempts to gain the future business, pressure to increase the potential offer price of the future security offering and winner's curse. The number of additional firms we capture with this measure is small, though, since most future underwriters are in previous underwriting relationships. A second type of affiliation that has not been examined previously is bond underwriting, in particular lead underwriting of bonds in the past year. If positive coverage is part of an implicit agreement

between underwriter and equity issuer, then there is no obvious reason this should be different for bond issuance.

Trade Reaction. To capture the reaction of small and large investors to analyst recommendations, we employ measures of "directional trade" (trade initiation). These measures, first developed by Lee and Ready [1991], are market microstructure algorithms that aim at capturing the buy and sell pressure exerted by traders. They exploit the fact that most trades take place when one side of the transaction demands immediate execution. Accordingly, trades are classified as "buyer-initiated" if the buyer demands immediate execution and as "seller-initiated" if the seller demands immediate execution. An abnormally high balance of buyer-initiated trades indicates buy pressure; an abnormally high balance of seller-initiated trades indicates sell pressure. In general, the side of a trade demanding faster execution represents a market order, i.e. an order to be executed immediately at the current market price. For example, investors who have received positive information about a firm and who believe that the stock price will rise would not place a limit order to buy. That limit order might never be filled. Instead, they would place a market order, and demand to buy immediately – before the price goes up further.

We use the modified version of the Lee and Ready [1991] algorithm, developed in Odders-White [2000], to determine which side initiated the trade. The algorithm matches a trade to the most recent quote that precedes the trade by at least 5 seconds. If a price is nearer the bid price it is classified as seller initiated, and if it is closer to the ask price it is classified as buyer initiated. If a trade is at the midpoint of the bid-ask spread, it is classified based on a "tick test. The tick test categorizes a trade as buyer-initiated if the trade occurs at a price higher than the price of the previous trade (uptick), and as seller-initiated if the trade is on a downtick. We drop trades at the bid-ask midpoint, which are also the same price as in preceding trades.[16]

As a proxy of buy pressure, we will consider three measures. The net number of buy-initiated trades for firm i, investor type x, and date t is defined as

$$NB_{i,x,t} = buys_{i,x,t} - sells_{i,x,t} \quad (1)$$

The raw trade imbalance measure for firm i, investor type x, and date t is calculated as

(2) $$TI_{i,x,t} = \frac{buys_{i,x,t} - sells_{i,x,t}}{buys_{i,x,t} + sells_{i,x,t}}$$

Finally, we normalize this measure by subtracting off the firm-year mean, and dividing by the firm-year standard deviation, separately for each investor type, as in Shanthikumar [2003]:

(3) $$TI^{abnormal}_{i,x,t} = \frac{TI_{i,x,t} - \overline{TI}_{i,x,year(t)}}{SD(TI_{i,x,year(t)})}$$

The adjustments are made by year to account for changes in trading behavior over time. We also adjust by firm because the trading behavior for various firms may have consistent differences. These normalizations allows us to compare trading behavior over time and among firms and replaces year- and firm-fixed effects in the regression framework. Dividing by the standard deviation controls for systematic differences in the volatility of large trades and small trades or in the volatility of the stocks large and small traders invest in. It makes comparisons between small and large investors possible and rules out that a seemingly more extreme reaction is just the result of higher volatility in trade imbalances over time.

Ownership. In order to evaluate the economic meaning of our trading variables, we also compare the trading behavior of investors to changes in institutional ownership, based on the CDA/Spectrum Institutional Holdings Database. Since institutional ownership data is only available on a quarterly basis (from 13f SEC filings), we aggregate the daily trade measures over the corresponding quarterly periods. Table I displays the correlations between ownership change and the trading variables. Large-trader buy pressure is significantly correlated with an increase in institutional ownership and small-trader buy pressure with a decrease. This implies that buy pressure as measured by a positive trade imbalance, does not only capture investor enthusiasm for a stock, but captures actual increases in the aggregate ownership of the relevant class of investors as well.

III. Data

We analyze three main sources of data: data on securities trading, data on analyst recommendations, and data on underwriting.

The raw trading data is collected from the New York Stock Exchange Trades and Quotations database (TAQ). The TAQ database reports every round-lot trade and every quote from January 1, 1993 onwards on the New York Stock Exchange, American Stock Exchange and NASDAQ. We examine ordinary common shares traded on the NYSE, excluding certificates and depository receipts. We also exclude foreign companies, Americus trust components, closed-end fund shares and REITs. The final trading sample includes 2801 securities for 2723 firms, as defined by 8-digit and 6-digit CUSIPs, respectively.

We obtain analyst recommendations and information about the analyst and brokerage firm from I/B/E/S starting from October 29, 1993. I/B/E/S converts the recommendation formats of different brokerage houses into one uniform numerical format. Like other authors [Jegadeesh, Kim, Krische and Lee, 2004], we reverse the original I/B/E/S coding to the following, more intuitive scheme: 5=strong buy, 4=buy, 3=hold, 2=sell, 1=strong. A "higher" recommendation is better, and an "upgrade" translates into a positive change in the numerical value.

Note that the I/B/E/S data contains an unusually high number of recommendations during the first three months of the sample period. While the number of recommendations per year – and even per month – is fairly uniform during the period from February 1994 through 2001, the first two months and three days contain a multiple of observations. This may be due to differences in the way I/B/E/S dealt with data at the beginning of the sample period. Alternatively, it may have to do with large layoffs in the securities industry during that time. In fact, the number of firms remains relatively stable, while the number of analysts and stocks covered declines sharply, from 626 analysts and 1166 stocks in November 1993 to 435 analysts and 591 stocks in February 1994. Consulting the employment data of the Securities Industry Association (SIA), we found that employment in the industry slowed in 1994 and 1995.

However, the more detailed monthly data from U.S. Dept. of Labor Statistics (DOLS) indicates that drop off is not as sharp as the I/B/E/S data suggests. That may be because the DOLS data includes all employees in the securities industry, and equity analysts may have been laid off at a disproportionate rate. But it also leaves room for concerns about data consistency within the I/B/E/S sample. From February 1994 on, the number gradually increases from 11,596 in 1995 until in peaks at 13,944 in 1999. The number of recommendations declines in 2000 and 2001, but then skyrockets in 2002, with a total of 20,560 recommendations made that year. To exclude the "scandal effects" from 2001 and 2002 and reporting anomalies in the I/B/E/S data set, we focus on the period from February 1994 through July 2001, containing 2252 securities and 2229 firms, but run all regressions for both alternative sample periods.

In addition, we investigated how accessible recommendations are to either type of investor. We hand-collected additional brokerage company information from company publications and company websites in order to identify which type of customer a brokerage firm targets, institutions or individuals. To give two examples, we identified Adams, Harkness & Hill as serving just institutional clients from their mission statement: "Adams, Harkness & Hill is one of the largest independent research, brokerage, and investment banking firms serving the institutional market." Similarly, we identified Alliance as serving both markets from their statement: "At Alliance Capital, we're proud to provide a wide range of investment management services to a diverse group of investors worldwide, including institutional clients, high-net-worth individuals and mutual fund investors." If a firm does not specify which type of client they focus on, the lines of business and services offered often reveal whether this firm handles both types of clients or just one. In particular, research firms with only 10-15 analysts that are very specialized in a particular field, such as energy, healthcare, insurance, oil and gas, typically serve only a select group of institutional investors. Overall, we obtained the information for about 85% of the brokerage firms.[17] We found that only 5.9 % consider themselves retail brokerages (e.g. Credit Swiss Private Banking), 16.2% brokerages for institutions (e.g. DSP/Merrill Lynch or SG Cowen), but 77.9% are targeting both individuals and institutions. Moreover, we found that even

recommendations targeted towards institutions are often available to retail clients for two reasons. First, numerous institutions-oriented firms have in recent years acquired or made minority investments in retail brokerage firms in order to have a retail distribution outlet for IPO shares.[18] As a result, their research reports end up in the hands of retail customers through the retail subsidiary. Second, retail brokerage firms, such as Charles Schwab, allow clients to download reports from research firms that they have partnerships with (such as Goldman Sachs). An investor can also subscribe to a service such as *Yahoo Finance* or other websites mentioned in Section II.1 to access reports. It is thus reasonable to assume that individual investors will have access to most if not all recommendations contained in our data set.

We use the SDC New Issues database to obtain underwriting data from 1987 to 2002. We link I/B/E/S broker firms and SDC underwriters with the company names provided by the I/B/E/S recommendation broker identification file and the SDC database. We improve the match using company websites and news articles, in particular to determine subsidiary relationships and corporate name changes. Finally, we use the mapping from Kolasinski and Kothari [2004] to identify additional matches.[19]

We obtain security prices, returns, and share information from CRSP, and financial variables of the companies from COMPUSTAT. The merged data set extends from October 29, 1993 through December 31, 2002 (with underwriting data from 1987 on), and contains 173,950 recommendations with linked trading data, for 2424 securities of 2397 firms. Notice that only 12% of the firms in our NYSE sample lack recommendations, so that our final sample contains almost the entire set of domestic NYSE firms with common stock.

IV. Empirical Analysis

1. Analyst Recommendations

We first analyze the distribution of recommendations (from "strong sell" to "strong buy") among affiliated and unaffiliated analysts. We display the sample statistics for the entire sample period of October 1993 through December 2002, to characterize the full sample and to highlight

differences in behavior after the increased media attention from 2001 on. As Table II shows, analysts make very few strong sell and sell recommendations (4.58%), regardless of their affiliation. If investors were to take analyst recommendations literally, they would constantly be purchasing securities. The strikingly left-skewed distribution is consistent with analysts' incentive to issue buy recommendations rather than sell recommendations in order to maximize the resulting amount of trading business or to remain in favor with firm managers.

Table II also displays the distribution of recommendations for each type of underwriting affiliation. As in previous literature, "IPO lead underwriting" affiliation indicates that the analyst's investment bank was the lead underwriter of an IPO in the past 5 years. If the investment bank underwrote an SEO in the past 2 years, the analyst is "SEO lead underwriting" affiliated. "Co-underwriting" affiliation is defined for the same periods. In addition, we consider future equity underwriting for the next two years and bond underwriting for the past year.[20] Including all affiliation categories, there are a total of 11,017 affiliated recommendations, about 9.1% of the total recommendation sample, which contains 121,130 recommendations.

The summary statistics show that analysts with any type of affiliation issue more positive recommendations than unaffiliated analysts. The average recommendation level in all of the affiliated groups lies around 4.00 or higher, that is, their average recommendation is at least a "buy." Unaffiliated analysts, on the other hand, have average recommendations of 3.76. The difference to the average level of affiliated recommendations is statistically significant. (In an OLS regression of recommendation level on a constant and an indicator for analyst affiliation, the coefficient on affiliation is 0.2515, with a standard error of 0.0103.) Likewise, the mode is "buy" for affiliated analysts while it is "hold" for unaffiliated analysts. The distortion is largest for future underwriting affiliation, with buy and strong buy recommendations amounting to more than 85%. Note that these differences do not arise from quicker updating of affiliated analysts. As shown in Malmendier and Shanthikumar (2004), affiliated analysts update their recommendation on a given stock more slowly than unaffiliated analysts, every 357 days instead of 308 days for unaffiliated analysts for the sample analyzed in this paper. Moreover, the difference is entirely driven by positive recommendations. While affiliated analysts are faster to

update negative and hold recommendations, they preserve their positive recommendations about 70 days longer than unaffiliated analysts.

We find similar differences for negative recommendations. Unaffiliated analysts make very few sell and strong sell recommendations, but affiliated analysts make even fewer. Combining all of the possible affiliations, for the entire sample of over 2500 stocks for over ten years, affiliated analysts issued fewer than 250 sell and strong sell recommendations. The extremely low number becomes even more remarkable when we examine the timing of these recommendations. The few sell and strong sell recommendations made by affiliated analysts are almost exclusively from 2002. For example, for our whole sample, analysts with IPO and SEO lead and co-underwriter affiliation issue a total of 154 sell and strong sell recommendations. Out of the 154 negative recommendations, 69 are from 2002. Twenty-two of those recommendations were made by analysts from Morgan Stanley, as the firm worked on improving their analysts' reputation and on moderating the effect of the SEC investigation of their analysts' conflicts of interest. For the entire sample period affiliated recommendations are significantly higher than unaffiliated recommendations, but if we limit the sample to 1993-2001, the difference is even stronger.

We also consider independent brokerage firms separately, where we define firms as "independent" or "never affiliated" if they do not underwrite any securities during our SDC sample period of 1987 through 2002. Analysts of independent firms make the most strong-sell and sell recommendations, and their average recommendation is significantly lower than the average recommendation of unaffiliated brokerage firms in general (the difference is -0.0805, with a standard error of 0.0118), or any other group of affiliated brokerage firms specifically (the difference to all affiliated analysts is 0.3102, with a standard error of 0.0157).

Finally, we address the possibility that positive recommendations made by affiliated analysts are caused by differences in the firms being covered. Companies that have recently issued securities may be truly of higher quality, as evidenced by their ability to access the capital markets. We thus examine the sample statistics and average recommendations restricting our sample to recommendations of firms that have recently issued stocks or bonds. Panel B of

Table II shows that the statistics are virtually identical and that the higher recommendations of affiliated analysts are thus not due to characteristics of firms that have issued new securities.

Further evidence that the differences do not arise from differences in the firms being covered is presented in Appendix Table 1. A detailed look at the NAIC industries covered by each group shows that there are barely any differences. In fact, the portion of recommendations falling into any of the NAIC industry groups differs by less than one percentage point for all but three groups.

To summarize the insights from the analysis of the recommendations data, we find evidence that analyst recommendations display two types of distortions. First, more than 95% of all recommendations are positive or neutral. Second, analysts with underwriting affiliations tend to issue even more positive recommendations.

2. Returns

Before we turn to the core of our empirical analysis, we briefly show that investors make losses if they follow analyst recommendations "literally." Previous literature indicates that investors cannot naively follow analyst recommendations in order to earn positive portfolio returns [Barber et al., 2001; Jegadeesh et al., 2004]. Moreover, stocks recommended by affiliated analysts perform significantly worse than those recommended by unaffiliated analysts [Michaely and Womack 1999; Lin and McNichols 1998; Iskoz 2002]. These results have been shown for various measures of abnormal returns, such as the market-model abnormal buy-hold returns and Fama-French portfolio returns.

We briefly replicate those results with our data in order to demonstrate the potential welfare affects of the two types of distortion laid out above. We show that it is not profitable to take analyst recommendations at face value and to buy in response to buy and strong buy recommendations, to hold after hold recommendations, and to sell after sell and strong sell recommendations, in particular in the case of affiliated recommendations.

Describing our primary portfolio method, we construct two different portfolios. In one, the recommendations of all affiliated analysts are followed, that is, stock is purchased for a buy or strong-buy recommendation, and sold for a sell or strong-sell recommendation of any affiliated analyst. In the second portfolio, the same is done for the recommendations of unaffiliated analysts. We then examine both the buy-and-hold returns and the cumulative abnormal returns of these portfolios over many different time horizons. The investment strategy of a naive (small) investor is likely to correspond to some convex combination of the two portfolios.

We calculate both the raw returns and the abnormal returns using the market model. For the abnormal returns, we form event-time portfolios based on recommendations and estimate the relation of event-time portfolio and market portfolio over the one-year period ending two months before the event as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{4}$$

where $R_{i,t}$ is the return of portfolio i on day t, and $R_{m,t}$ is the return of the market portfolio on day t. We then use the estimated values of all α_i and β_i to calculate the abnormal return during and after the event period. The abnormal return is the difference between the realized portfolio return and the predicted return based on the estimated parameters and the realized market returns.

$$AR_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{mt}\right) \tag{5}$$

We evaluate buy-and-hold returns over a number of horizons. Table III displays the returns over three months following the analyst recommendation date, six months, the first, second and third year (in addition to the pre-even returns from day –10 to –2 and the even returns over the three-day window from –1 to +1). Since the analyst issuing a recommendation is likely to be evaluated during the same year, the performance over the next six months to one year is probably most relevant. On the other hand, small investors may not re-evaluate their positions for some years. Thus, longer horizons are also of interest from the perspective of the investors.

Panel A of Table III presents the abnormal returns for the portfolio strategy described above separately for recommendations of affiliated and unaffiliated analysts. We find that both portfolios significantly underperform relative to the market over any post-event horizon

considered. Using the value-weighted market index, the underperformance amounts to 17.8% for the stocks recommended by affiliated analysts and to 4.5% for stocks recommended by unaffiliated analysts over one year. The results are similar for equal weighting (21.4% and 7.5% underperformance for year one). We also find that the portfolio following recommendations of affiliated analysts underperforms relative to those recommended by unaffiliated analysts. Over the one-year horizon, the abnormal returns of affiliated recommendations are more than 13% lower. Note that these numbers are virtually identical to those in Michaely and Womack [1999].

We also distinguish between upgrades and downgrades since a given recommendation level may have different informational content, depending on the direction of change from the previous level. As the middle part of Panel A shows, we find the same pattern of underperformance of portfolios following affiliated and unaffiliated analyst recommendations as well as underperformance of the affiliated relative to the unaffiliated recommendations. The partition also reveals that the underperformance of the portfolio following affiliated recommendations is significantly stronger for upgrades. For example, over the one-year horizon, a portfolio buying and selling in stocks upgraded by an affiliated analyst actually performs worse by more than 8.5 percentage points relative to a portfolio buying and selling stocks downgraded by an affiliated analyst. This pattern is less strong for unaffiliated analysts and other intervals.

Finally, we address the concern that the underperformance of affiliated recommendations relative to unaffiliated recommendations may be driven by long-run underperformance of IPOs and SEOs. In the bottom part of Panel A, we recalculate returns for the subsample of firms that have issued stock in an IPO during the last five years or an SEO during the last two years at the time of a recommendation. Rather than comparing returns to a market index, we display a benchmark portfolio that invests in all stocks at issuance. For horizons up to one year, the picture remains the same: Both portfolios generate lower raw returns than the benchmark, for example 11.5% for affiliated recommendations, 13.8% for unaffiliated recommendations, and 15.8% for the IPO/SEO benchmark sample over the one-year horizon. The difference is statistically significant (at the 1% level) for the affiliated portfolio. (The difference to the unaffiliated portfolio is significant over shorter horizons, e.g. six months). The results suggest that an

investor who wants to trade securities of recent equity issuers would do better simply buying indiscriminately than following analyst recommendations and in particular affiliated analyst recommendations, despite the additional information we might expect an affiliated analyst to have.

The abnormal returns are virtually the same if we consider portfolio strategies that account for short-selling constraints and are constructed by buying in case of buy and strong buy recommendations and holding the stock for the various periods considered above.

In addition to the event-study methodology, we estimate daily abnormal portfolio returns using a Fama-French three-factor model (Panel B of Table III). We calculate the time-series of daily excess returns of zero-investment portfolios with a buy-and-hold horizon of one year. The buy portfolio consists of all stocks with at least one buy- or strong-buy recommendation in the last year, the sell portfolio consists of all stocks with at least one sell- or strong-sell recommendation in the last year. Portfolio returns are value-weighted by market capitalization. (The results with equal weighting are virtually identical.) If the sell-portfolio is empty we substitute with the risk-free rate.

The portfolio of all stocks that are recommended only by affiliated analysts earns negative abnormal returns of 0.24% per day. The abnormal returns of the portfolio investing in all stocks that are recommended only by unaffiliated analysts are negative and insignificant. If we restrict the analysis only to buy recommendations (to account for short-sell constraints), we find a negative alpha both for the portfolio of affiliated recommendations and the portfolio of unaffiliated recommendations. While the affiliated portfolio has a lower alpha, the difference is not significant. If we consider more sophisticated portfolio strategies (such as buying only stocks with strong-buy recommendations and selling stocks with hold, sell, or strong-sell recommendations), the alpha of the unaffiliated portfolio becomes zero and that of the affiliated portfolio small and insignificantly negative. Thus, portfolios naively following analyst recommendations seem to earn negative returns beyond the three Fama-French factors, in particular for affiliated analysts.

Thus, a "naïve" portfolio strategy that takes analyst recommendations literally leads to significant underperformance, in particular if it follows affiliated analysts. It is worth stressing that the negative abnormal returns to both affiliated and unaffiliated recommendations are due to the simple portfolio formation. As Barber, Lehavy, McNichols and Trueman [2001] have shown, more sophisticated strategies allow to "profit from the prophets," in particular short selling the least-recommended stocks. In our sample, for example buying only strong buy recommendations and selling buy, hold, sell, and strong sell recommendations leads to considerably less underperformance. The abnormal returns are -3.92% (value-weighted index) and -2.44% (equal-weighted index) for the portfolio following affiliated analyst recommendations and -2.51% (value-weighted) and -0.70% (equal-weighted) following unaffiliated recommendations. As we will see below, however, it is in particular the literal interpretation of analyst recommendations, which is of interest in the context of trade reactions.

3. Trade Reaction

The incentives faced by analysts seem to have an effect on their recommendations. Overall, analysts almost never recommend selling a stock. Underwriting-affiliated analysts issue even more positive recommendations than unaffiliated analysts, and consistently issue more buy and strong buy recommendations than unaffiliated analysts. The primary question of this section is whether investors account for these distortions in their trading decisions.

We apply the different measures of trade reaction, developed in Section II.4, to identify the buy or sell reaction triggered by recommendations. Table IV presents summary statistics for our trading measures. Panel A shows that small investors execute about nine more buy-initiated trades and sell-initiated trades per day than large investors. The average differences between buy- and sell-initiated trades, however, are very similar, 3.18 for small trades and 3.43 for large trades. The median is 0 for both small and large trades.

To test the trade reactions to recommendations, we employ the methodology of event studies. Trading days 0 and 1 around the event are our primary event period, where day 0 is the

first trading day at or after recommendation issuance. The summary statistics for trading behavior during these event days, presented in Panel B, show that the difference between buys and sells is considerably higher, both for small and large trades on the days of recommendations (19.26 for small trades and 18.92 for large trades over the two event days), indicating systematic buy-pressure induced by the recommendations. The trade imbalance for large traders is slightly negative on these days, indicating that they initiate a larger portion of their buy orders than of their sell orders on high-volume days.

Our core results are presented in Table V. We regress the normalized trade imbalance on dummies for all recommendation levels and their interactions with a dummy variable for affiliation. This regression framework allows us to investigate the investor reaction to both types of analyst distortions, analysts' general tendency to issue mostly positive recommendations and the additional distortion of underwriting-affiliated analysts relative to their unaffiliated peers. The first three columns show the trade reaction of large investors, of small investors, and the difference between the two investor classes for all recommendations of unaffiliated analysts in the upper part and the differential reaction to recommendations of affiliated analysts in the lower part of Table V. For unaffiliated analysts, we find that large investors' imbalance is significantly positive for strong buy recommendations, zero (insignificantly positive) for buy recommendations and significantly negative for hold, sell, and strong sell recommendations. Small investors, instead, display significantly positive reaction to both buy and strong buy recommendations from unaffiliated analysts and zero trade reaction to unaffiliated hold recommendations. They display negative abnormal trading behavior only in response to sell and strong sell recommendations.

The implications of these baseline results are two-fold. First, the pattern of significant abnormal trade imbalances suggests that recommendations have a significant impact on the trading behavior of both large and small investors. Second, the results imply that large traders account for the general upward bias by shifting recommendations down by one level while small traders take the recommendations literally.

The bottom part of Table V shows the differential reaction of large and small investors to the recommendations of affiliated analysts. Large investors significantly reduce their positive or neutral trade imbalance after strong buy or buy recommendations if the analyst is affiliated. The differential reaction to hold, sell, and strong sell recommendations is insignificant, implying that, as with unaffiliated recommendations, they react negatively. Small investors, on the other hand, do not display any significant difference in trading behavior for strong buy, buy, hold or sell recommendations. They react more negatively to affiliated strong sell recommendations.

These results indicate that large traders apply an additional downward adjustment to positive recommendations if the analyst is affiliated. Small investors, instead, fail to adjust for affiliation and take both affiliated and unaffiliated recommendations literally. For affiliated sell and strong sell recommendations, we also observe the predicted difference in trade imbalance of large and small investors. For example, large investors do not display significant additional sell pressure after a sell recommendation if it is affiliated (the negative coefficient of -0.195 is insignificant), but small traders do. Taking affiliated and unaffiliated recommendations together, the strong negative reaction of small investors to sell and strong sell recommendations is consistent with their preceding neutral reaction to hold recommendations, as outlined in Section II.2. Large investors, instead, have already reacted negatively to preceding hold recommendations. In fact, the mean number of hold recommendations in the month preceding a recommendation is 0.5989 for the full sample, but 0.8722 for sell recommendations and 1.0126 for strong sell recommendations. The results suggest that large investors incorporate the negative news earlier, when the hold recommendation is issued, while small investors do so only at issuance of a sell or strong sell recommendation. It is also consistent with small-investor naiveté that the difference in trading behavior is stronger for affiliated sell and strong sell recommendations since most of the large-traders' negative reaction happens "even earlier" for affiliated than unaffiliated recommendations while small investors do not distinguish between affiliated and unaffiliated analysts. Note, though, that a simple theory of naiveté does not predict that the coefficient of small investors' trade reaction is more negative for affiliated strong sells than for unaffiliated strong sells (-0.838 versus -0.105). Interpreting this specific result, however,

is difficult due to the small sample size. There are only 27 affiliated strong sell recommendations, suggesting that they arise only under unusual circumstances.[21]

Using the normalized trade imbalance as our dependent variable also allows us to compare the magnitude of trade reactions across investor groups. The coefficients for large and small investors' trade reaction indicate that small traders react much more strongly to positive recommendations than large traders do. While the negative trade imbalances following unaffiliated sell and strong sell recommendations are similar in magnitude for both types of investors, the positive reaction to unaffiliated strong buy recommendations is about two times larger for small than for large investors. The trade reaction to buy recommendations is about ten times as large. Small investors thus appear to condition their trading decisions on recommendations to a larger extent than large investors. The weaker reaction of large investors to positive recommendations may either be due to the higher baseline information of large traders (i.e. their trades are more spread out), or it may result from additional discounting for the upward recommendation bias.

Both the failure to adjust for the general upwards bias in recommendations and the failure to adjust for additional upwards distortion due to affiliation is consistent with small-investor naiveté. The behavior of large investors, on the other hand, appears to reflect fully rational behavior.

Reaction to Upgrades and Downgrades. The discussion so far focused on the level of a recommendation. As the discussion of small investors' over- and under-reaction revealed, another important consideration is the previous level of recommendation. To identify the role of upgrades and downgrades, we re-do the previous analysis on the subsample of upgrades and the subsample of downgrades in Columns 4 to 9 of Table V. Notice that the category of affiliated sell recommendations within upgrades disappears due to lack of data – there are only two observations in this category.

For recommendations of unaffiliated analysts, we find that the negative trade reaction of large investors to sell recommendations is significant both for upgrades and for downgrades. Regardless of whether the previous recommendation level was higher or lower, large investors recognize the negative news conveyed in a sell recommendation. The negative reaction to hold recommendations, on the other hand, is mostly driven by downgrades. The coefficient on hold recommendation for downgrades (-0.15) is almost ten times the coefficient on the hold dummy for upgrades (-0.016), and only the downgrades coefficient is statistically significant. This means that an upgrade from sell or strong sell to hold is not enough good news to reverse the previous sell reaction; a downgrade from buy or strong buy, however, is interpreted as bad news about the stock. Also the coefficient on the buy recommendations dummy differs between the upgrades and the downgrades sample. It is significantly positive for upgrades and significantly negative for downgrades. In other words, large investors evaluate a buy recommendation relative to the previous level of recommendation.

Small investors, on the other hand, distinguish much less between upgrades and downgrades. They buy after buy recommendations, hold after hold recommendations, and sell after sell recommendations, regardless of the direction of change.[22] Small traders react more positively to a hold, buy or strong buy recommendation than large traders, whether that recommendation is an upgrade or downgrade. The difference is highly significant for all categories other than the upgrade-hold recommendation. However, the trade reaction is more positive for upgrades than for downgrades.

The estimates of the differential reaction to upgrades and downgrades of affiliated analysts are much less precisely estimated on the subsamples and are mostly insignificant. Both the size of the coefficients and the (relatively smaller) standard errors reveal, however, that reactions to recommendation upgrades are driving the "affiliation neglect" of small traders. Large traders react more negatively when an affiliated analyst issues an upgrade hold, buy or strong buy, while small traders react more positively. The difference between the small and large investors' trade corrections for affiliation is significant for each of the three upgrade recommendation categories.

Relationship Between Trading and Returns. Our results on trade reaction and the earlier results on portfolio returns suggest that small traders lose money relative to large traders. In Table VI, we provide more direct evidence of the loss induced by trading behavior that does not account for the distortions of analysts. We calculate the buy-and-hold returns over a three-month horizon, a six-month horizon, and a one-year horizon after each recommendation. We then regress these post-event returns on the net value of buy- minus sell-initiated trades of small and large investors for each recommendation (on event days 0 and 1) and on a constant.

For small investors, we find a significantly negative relation between net trades and returns over any horizon. Accounting for the positive constant, the net effect is still negative at any positive amount of net trades. For large traders, instead, the coefficient on trade imbalance is minimal, at about 0.4% to 0.5% of the coefficient for small trades (while the coefficient on the constant remains about the same). It is insignificant over the one-year horizon. In fact, for any *net* trade value up to about $7m for the one-year horizon and for up to $8.2m for the three-month horizon, large investors earn positive returns on their trades. (The average net trade size is $5m for large traders.)

In addition to the raw return results displayed, we repeated the test using the various return and trade measures previously employed in this paper. We consistently find that there is a negative relationship between future returns and event-time net trading, whether measured in dollars or number of trades. We also calculate the return earned per dollar traded for both small and large trades, for the three-month, six-month and 1-year horizons. The returns to large trades are significantly higher than the returns to small trades, using both raw returns and various abnormal return measures. The difference is 4-5% per year for raw returns and market-adjusted returns, and is over 10% for market model abnormal returns.

4. Robustness

Panel A of Table VII re-estimates the standard errors, allowing for heteroskedasticity, with arbitrary within-year correlation and arbitrary within-brokerage firm correlation. Our results are robust to these alternative assumptions. For large investors, we find both the rational downward

adjustment in response to unaffiliated recommendations (e.g. significant abnormal sell reaction to hold recommendations) and the additional discounting of positive affiliated recommendations. Only the downward adjustment to affiliated buy recommendations is not significant in this variation. As for the small investors, we find again significant abnormal trade reaction in the direction suggested by a literal (unadjusted) interpretation of recommendations and no significant difference between their reaction to affiliated and unaffiliated recommendations (as before with the exception of strong sells). Similarly, including year- or brokerage fixed effects in the regressions does not affect our results.

We also check the robustness of our results to variations in the cutoff values for distinguishing "small" from "large" trades. Panel B of Table VII shows the trade reaction for four subgroups of trades below $50,000, namely trades of at most $5,000, trades between $5,000 and $10,000, trades between $10,000 and $20,000, and trades between $20,000 and $50,000. (The cutoff value mainly employed in the paper aggregates the first three groups.) Both sets of results, the "literal" reaction to any recommendations and failure to account for additional distortion of affiliated recommendations replicate in almost all cells. In fact, the puzzling differential trade reaction to affiliated strong sell recommendations loses significance for two groups (below $5,000 and $10,000-$20,000). On the other hand also the negative abnormal trade reaction to negative unaffiliated recommendations disappears or loses significance for two subgroups (below $5,000 and $20,000-$50,000). Overall, both results show remarkable robustness within each of these small subgroups.

In addition, the results are similar if we employ the raw number of buy-initiated trades minus the number of sell-initiated trades or the trade imbalance without normalization over the event period. Also, longer horizons (up to 20 trading days after the recommendation) lead to similar results, indicating that small traders continue reacting to recommendations over some time period.

As a final robustness check, we split "affiliation" into its component parts, including the additional definitions of possible affiliation, such as future underwriting and bond underwriting.

We also include whether the firm has recently issued a security and whether the underwriter is independent. We limit the sample to firms that have at least *some* institutional ownership at the quarter-end before the recommendation, using several different cutoffs. We repeat the regression for each year in the sample, and for various other sub-samples. With all of these variations, the two general results remain. First, small traders react more positively in general to hold, buy and strong buy recommendations than large traders. Second, small traders fail to correct for underwriter affiliation to the extent that large traders correct for it.

5. Alternative Explanations

Limited Information. Compared to institutional investors, individuals are likely to face higher informational costs to identify analysts as affiliated. Their limited access to information about analyst affiliation may generate (and certainly contributes to) the failure of small investors to differentiate between recommendations of affiliated and unaffiliated analysts. For example, small traders may decide to follow analyst recommendations regardless of affiliation, since the probability of randomly hitting an unaffiliated recommendation is high enough to compensate for the added risk of hitting an affiliated recommendation.

Informational constraints, however, cannot explain our first result. If investors were just lacking information about analyst affiliation, but fully rational about analyst incentives, their average reaction to positive recommendations should still take the upward bias among all analysts into account. Given that small investors follow recommendations (as evidenced by their abnormal trade reaction) and given that 95% of these recommendations are positive or neutral, small investors should be aware of the general upward distortion and discount appropriately. We find, however, that small investors fail to do so and react more positively to recommendations than large investors. In particular, while large investors sell in response to hold recommendations, small investors do not. And while large investors do not display any abnormal trade reaction after buy recommendations, small investors exhibit abnormal buy pressure.

Additional empirical results suggest that even the indiscriminate trade reaction after affiliated and unaffiliated analyst recommendations is at least partly due to naiveté. Investors for

whom it is costly to find out about analysts' affiliation but who are aware of the incentive effects can benefit from focusing on analysts who are "visibly" unaffiliated, because their financial institution is never involved in any underwriting and may not even have any associated corporate finance department. Such information is easier to collect and often advertised by unaffiliated brokerage firms. More generally, it is less costly for investors to get a broad impression of which brokers underwrite heavily and which rarely underwrite than to identify every single underwriter relationship. We thus analyze the differential trade reaction of small investors to firms in our sample that never underwrite during our sample period (starting in 1987). Of the 382 brokerage firms that issue recommendations for the firms in our sample, 105 (27%) do not have a single match to an SDC underwriter firm who was either the lead or co-underwriter on an equity issue for a US firm from 1987 on. These brokers issue about 5% of the recommendations in our sample. As shown earlier, the recommendations of these analysts are less upward-biased than any other subsample of affiliated or unaffiliated analysts (Table II). As a result, the recommendations of never affiliated analysts are significantly less (if at all) underperforming. For example, in the market model with value-weighted index, the portfolio strategy of buying any buy- or strong-buy-recommended stock and holding it for one year leads to abnormal returns -0.20% (from trading day 2 to 255) rather than -18.21% for the buy and strong-buy recommendations of affiliated analysts and -3.70% for those of all unaffiliated analysts. The net performance from trading day -1 to day +255 is positive (0.34% from trading day -1 to +1).

Nevertheless, as shown in the first column of Table VIII, small investors react significantly less to buy and strong buy recommendations of never-affiliated analysts than to the average (affiliated or non-affiliated) recommendation, with t-statistics of -1.7 for the interaction with the buy dummy and -1.8 for the interaction with the strong buy dummy. The differential reaction to a hold, sell, and strong sell recommendation issued by a never-affiliated analyst is insignificant. We also account for the possibility that these firms are simply not "on the radar screen" of small investors because they are too small. Specifically, we gather data on annual sales and number of employees from D&B's Million Dollar Database. We match this data to our underwriting brokers, and use it to control for brokerage firm size. The matched data set is

considerably smaller, only about 5% of the data set used in the baseline regressions (in Table V). Despite the considerably reduced sample size, we find that our findings are robust to limiting the sample to the largest 50% of firms for which we have sales data or employee count data. As shown in the second and third columns of Table VIII, the results remain significant for strong buy recommendations, and the coefficients become even more negative for both buy and strong buy.

Overall, these results suggest that informational constraints do not only fail to explain small investors' general inability to adjust their interpretation of recommendations but also fail to fully explain the lack of adjustment for affiliation.

Analyst Quality. One difficulty in analyzing data on analyst recommendations is the lack of an objective quality measure for recommendations. Our results that naive portfolio strategies, which mirror the trade reaction of small investors, induce losses, leave room for two interpretations. Either the lower returns result from small investors' inability to account for analysts' incentives to distort information. Or investors happen to follow over-proportionally the recommendations of lower-quality analysts. In order to distinguish investor naiveté from analyst quality, we repeat the regression analysis of trade reaction on two subsamples. First, we restrict the analysis to analysts who are classified both as affiliated and as unaffiliated at different points during the sample period ("Ever-Affiliated Analysts"). Second, we restrict the analysis to analysts who were listed in *Institutional Investor Magazine*'s most recent October list of top analysts ("All Star Team").[23] In both cases we reduce the heterogeneity in recommendations due to analyst characteristics.

The results are shown in Table IX. As in the baseline regressions in Table V, we find that large traders display negative trade reaction to hold, sell, and strong sell recommendations, no significant reaction to buy recommendations, and positive reaction to strong buy recommendations of unaffiliated analysts. Moreover, large traders adjust their trade reactions to strong buy recommendations downwards if the analyst is affiliated. For all other recommendation levels, the differential reaction is insignificant. We also replicate the result that small traders take analyst recommendations "literally" and sell after sell and strong sell

recommendations, hold after hold recommendations, and buy after buy and strong buy recommendations of unaffiliated analysts. (For the smaller sample of All Star Analysts the sell reaction loses significance.) As in the baseline regressions, small traders also display additional sell pressure for the (very small number of) strong sell recommendations issued by affiliated analysts, and they display no differential reaction to the sell, hold, and buy recommendations of affiliated analysts. The differential reaction to strong buy recommendations of affiliated analysts is negative; however the net trade reaction of small investors to affiliated strong buy recommendations is still strongly positive (differently from the zero reaction of large investors).

In summary, our two main results replicate both on the Ever-Affiliated subsample and on the All-Star subsample. These additional findings make it unlikely that analyst heterogeneity (beyond affiliation) and adverse sorting of small investors generate our results.

Brokerage Firm Heterogeneity. Similar concerns about recommendation quality may apply on the firm level. While the above analysis rules out that small investors follow worse analysts, they may still only be aware of a subset of widely published recommendations. Small investors too positive reaction to recommendations in general and to affiliated recommendations in particular may be capturing their stronger reaction to recommendations of certain (large) brokerage firms. To account for heterogeneity of brokerage firms, we turn again to the subsample of firms with matched sales or employee data and included these characteristics in the regression. We allow the same degree of non-linearity and interact sales/employees with all levels of recommendations. As pointed out above, the matched data set is considerably smaller. We thus first replicated our baseline results on the subsample (first three columns of Table X). The results are weaker for the subsample, but the coefficients maintain the same signs and almost the same magnitudes as for the full sample. We include controls of every level of recommendation interacted with the size proxy. As shown in columns 4 to 9, the additional controls do not diminish the results any further. In fact, including the controls improves the results for the subsample.

Relationship Between Trading Size and Affiliation. An additional concern is that our empirical findings may be due to systematic changes in trading size in response to affiliation. In particular, it is conceivable that investors trade smaller amounts in response to affiliated buy recommendations than in response to unaffiliated buy recommendations. The resulting (re-)classification of large investors as small may generate the weaker trade reaction of large traders to affiliated recommendations. An immediate weakness of this alternative explanation is that variations in trade size cannot explain our first result, i.e. that small investors do not discount analyst recommendations on average. Moreover, two additional results address this concern directly.

First, systematic shifts in trade size, which are large enough to move investors normally trading above $50,000 into the class of investors trading below $20,000, should be reflected in the remaining class of large trades. For example, a uniform shift would reduce the average size of the remaining large trades above $50,000 by at least $30,000. We find, however, that the average size of trades above $50,000 changes by less than 3.5% between unaffiliated to affiliated recommendations. The average large trade is $217,244 in response to unaffiliated recommendations and $209,836 in response to affiliated recommendations. It seems unlikely that for a significant portion of investors with trades of more than $50,000 in response to unaffiliated recommendations trade for less than $20,000 in response to affiliated recommendations, and so any inaccuracies in our cutoffs are more likely to introduce noise than bias.

Second, in order to explain the more negative reaction of large traders in response to affiliated recommendations, it does not suffice for all traders to reduce their trade size to generate changes in trade imbalance. Rather, the relative portion of buy-initiators has to go down among traders classified as large. In other words, an abnormally high portion of those large investors who are particularly keen to buy the recommended stock has to reduce their trade size enough to drop out of the large-investor category and potentially join the small-investor category. This is not the case. Buy-initiated large trades change on average by 3.9% and sell-initiated large trades by 2.5%, i.e. both changes are small and similar.

Front Running. Large traders may learn either of the recommendation itself, or the information that sparks the new recommendation, earlier than small traders. As a result, their main trade reaction may take place earlier and they may display either no or a contrarian trade reaction at the time of the recommendation.

The informational advantage of larger traders is likely to explain why large traders display less of an abnormal trade reaction to recommendations in general, for instance as measured by the normalized trade imbalance in Table V. The coefficients are typically much smaller for large investors' trade reaction for the trade reaction of small investors. Our results, however, do not only indicate that large investors react "relatively less" but also that they adjust their reaction downwards as schematized in Figure 2. Rather than display a weaker but directionally unaffected trade reaction or a contrarian trade reaction, large investors "hold" in response to buy recommendations and "sell" in response to hold recommendations but follow strong buy, sell, and strong sell recommendations literally.

Moreover, it is hard to detect any front running by large investors in the data. Table XI presents the trading volume in the month preceding a recommendation until one day after the recommendation. We find that both small and large trades peak on the day of the recommendation and not before. This result holds regardless of whether trading volume is measured in transaction dollars or number of trades. In addition, the increase in trading volume from 20 trading days before the recommendation until the day of the recommendation is relatively stronger for large investors (29% in number of trades, 51% in dollar volume) than for small investors (11% and 16%). In addition, we re-analyzed the relation between recommendation and trade imbalance for the week *preceding* the recommendation (days -5 to -1) as in Table V.[24] None of the coefficients would imply any anticipatory trades among large traders. Quite to the opposite, large traders exhibit a significant buy-imbalance for "downgrade buys," i.e. stocks that are currently strong buys but will be downgraded to buy within the next five trading days, while they exhibit a significant sell-imbalance once the downgrade occurs. Similarly, large traders exert insignificant negative pressure before the upgrade to a strong buy,

but significant buying pressure upon the issuance of the recommendation. These results remain unchanged when we include a larger event window.

V. Market Response

Consumer biases affect not only consumption decisions, but also market organization. Profit-maximizing firms have incentives to tailor their product design and information provision to take advantage of consumers' systematic deviations from optimal decision-making. In the case of stock market recommendations, it is profitable for investment banks to entertain a brokerage branch issuing distorted investment advice and, in particular, to unify brokerage and corporate finance under one roof since investors systematically neglect analyst distortions.

How stable is the interaction between biased consumers and rational firms? Specifically, can we identify circumstances under which firms would cease issuing distorted recommendations? Or, could individual investors learn to account for the distortions? These questions are of particular relevance from a policy perspective. Our return results imply that consumer naiveté and firm response affect negatively the welfare of consumers. If the policy-maker is concerned about small investors, the question is how to optimally remedy this effect.

Our data allows us to shed light on two aspects of these questions. First, we can exploit variation in coverage of stocks and ask whether increased coverage reduces the distortion of recommendations. The more analysts are covering the same stock, the more each of them is competing for the attention of investors. Do analysts compete for clients by providing more accurate recommendations? Given that, almost always, the affiliated brokerages are covering the stock, increased competition implies an increased number of non-affiliated analysts. Since unaffiliated analysts tend to bias their recommendations less, one may expect that competition will also moderate the distortion in affiliated recommendations. The empirical variation in coverage reflects, of course, heterogeneity of the covered stocks, both in the cross-section and over time, such as market capitalization, recent and long-term performance, volatility, ownership structure (broad or narrow). We do not have a clean natural experiment that varies coverage for

exogenous reasons. However, if stocks that attract more analyst coverage also received less distorted recommendations, there would be potential for increased competition to alleviate the adverse welfare effects of naiveté for small investors. Such a result would leave room for the hypothesis that less intrusive policy measures such as removing barriers to entry and competitive disadvantages for unaffiliated analysts (as, for example, intended with Regulation FD) may be sufficient.

To analyze the effect of increased coverage on the distortion of recommendation levels we calculate for each recommendation the difference between the recommendation and the consensus (average recommendation level) over the last month as well as the number of analysts who have made a recommendation on the same stock in the past month. The summary statistics are in Panel A of Table XII. We then relate the "deviation" from the consensus to affiliation and to the number of analysts covering the stock. Columns 1 and 3 of Panel B show that, as expected, affiliated recommendations tend to lie above the average recommendation, recommendations of independent analysts below. Increased coverage, however, does not mitigate the effect. The number of analysts enters insignificantly. Moreover, the opposite appears to be the case for affiliated analysts. As shown in Column (2), the interaction of the affiliation dummy and the number of analysts is positive and significant. Column (4) shows that SEO lead-underwriter affiliation appears to contribute most to the upward bias, though the effect is not precisely estimated. While the mechanism behind the correlation of higher coverage and more upward bias of affiliated analysts cannot be deduced from this regression, the results are a first indication that competition may not remedy informational distortion among analysts.

The reaction of small investors to these recommendations is consistent with competition failing to influence affiliated analysts towards more accurate recommendations. In untabulated regressions, we compare the trade reactions for the quartile of recommendations with the highest number of other analysts with reactions to the quartile with the lowest number. We find that the small traders react slightly more positively to affiliated buy and strong buy recommendations, relative to unaffiliated positive recommendations, when the competition is highest.

A second aspect of the dynamic market interaction between rational firms and biased consumers, on which the data allows to shed some light, is the ability of small investors to learn. While the data is insufficient to examine individual learning over time, we analyze the trade reaction of the class of small investors as a whole. As mentioned before, our baseline results replicate for every single year between 1994 and 2001 and do not display a clear trend. In addition, we analyzed whether the neglect of independent analysts changed during the period of analyst scandals. In August 2001, media coverage of analysts' conflicts of interest skyrocketed as the first lawsuit by an investor claiming to have lost money due to biased recommendations was settled. In May 2002, extensive changes in the regulation of investment banking organization and analyst affiliation disclosure were initialized, and May was the period of the initial settlement in the case against Merrill Lynch filed by the state of New York. We take these two dates as cutoff points and rerun the regressions of abnormal trade imbalances. Columns 4 and 5 of Table VIII show the overall reaction of small analysts becomes considerably weaker (in terms of the size of the coefficients) and more negative. Moreover, in the sample starting in 5/2002, small investors start to react negatively to hold recommendations, i.e. appear to discount neutral and positive recommendations on average. The reaction to recommendations of never-affiliated analysts, on the other hand, becomes stronger, both in terms of economic and in terms of statistical significance. Differently from the 2/1994-7/2001 sample, the reaction to buy recommendations of independent analysts is now positive and (for the period starting in 5/2002) statistically significant at the 1% level. Trade reaction to sell and strong-sell recommendations is now negative, though insignificant. The other coefficients remain insignificant. (We fail to explain the negative, though insignificant coefficient on "Strong Buy.") This change in behavior suggests that small investors started understanding the implications of incentive conflicts after they were confronted with stark evidence on the resulting distortions. Information about these incentive conflicts was available before August of 2001, and the skewed distribution of recommendations made it even more apparent; but the mere knowledge of an incentive conflict appears to be insufficient to motivate small investors to adjust. Anecdotes such as Merrill's

Henry Blodget privately referring to stocks as "crap" that he had publicly touted may have induced small investors to become less credulous and to avoid affiliated analysts.

VI. Conclusion

Analysts face incentives to positively bias the information they provide to investors. These incentives are reflected in the very low number of sell and strong sell recommendations issued by all analysts, in particular by affiliated analysts. They also result in negative returns to portfolios that follow analyst recommendations literally.

The traditional economic assumption that uninformed agents account for the incentives of informed agents does not seem to hold for small investors in the market for information about stocks. While large investors interpret hold recommendations as sell signals and buy recommendations as hold signals, small investors take recommendations literally. Small investors also fail to account for the additional distortion due to underwriter affiliation. While large investors discount positive recommendations of affiliated analysts even further than those of unaffiliated analysts, small investor do not display differential trading reactions. Finally, fiercer competition does not seem to solve the problem. Affiliated analysts issue even higher recommendations when they face more competition of other analysts covering a stock.

The lack of downward adjustment to positive and neutral recommendations in general indicates that small traders lack the sophistication to account for analyst recommendations. Naiveté may also explain small investors' indifference between affiliated and unaffiliated analysts. However, the higher informational costs for small traders to identify underwriting affiliation are another important explanation for the latter mistake. It is striking, though, that small traders do not remedy the informational asymmetry by focusing on analysts from non-underwriting firms.

The behavior of small investors gives rise to another fundamental question: Why do small investors follow analyst recommendations at all? Why do they display any abnormal trade reaction to recommendations – in fact stronger trade reaction than large investors? An obvious

alternative would be to invest in a broad index-based portfolio such as the S&P500. Is it due to limited attention? Or to the entertainment value of following investment analysts? Or, do investors fear the regret if a recommendation turns out to be enormously profitable? The analysis in this paper does not offer an answer to these questions. However, whatever the answer, such behavior is certainly consistent with the credulity, i.e. naiveté of small investors of which we provide evidence.

Our findings also have implications for the policy debate about the appropriate regulations to be imposed on brokerage houses. Our results suggest that abstractly informing agents of potential conflicts of interest may not be enough to remedy their behavior. Small traders started to moderate their reaction to recommendations in general and to rely more on independent (non-underwriting brokerages) only after analyst scandals got enormous media attention.

Thus, public and direct "warning" about the recommendations of certain types of analysts may warrant more success. Legislative and other public pressure seems to have pushed the media into that direction. For example, CNBC now discloses an analyst's conflicts of interests, whenever an analyst speaks on air. The network shows a graphic indicating whether the analyst 1) owns the stock; 2) the analyst's family owns the stock; 3) the analyst's firm owns more than 1% of the shares outstanding; 4) the firm does investment banking business with the company; or 5) other possible conflicts. On the other hand, independent analysts still claim that the media tends to pay far more attention to affiliated than to non-affiliated analysts.[25] In other words, media bias may have exacerbated the distortions in the first place.

As another result of the increased pressure on brokerage firms not to provide distorted recommendations, some brokerage firms have started abolishing the use of recommendation ratings.[26] However, firms with more retail business appear unwilling to take that step.

Overall, there is little indication that market forces and self-regulation are sufficient to induce more sophisticated decision-making among small analysts. In order to prevent small investors from naive investment decisions rather intrusive regulatory interference appears to be

required. We would like to stress, though, that concerns for market efficiency may lead to very different conclusions. We have shown that large investors act exactly according to rational theory and account fully for both types of distortions. Moreover, their trade imbalances are, according to the classification employed in this paper, about 20 times as large as those of small investors. Most of the (abnormal) volume considered is thus likely to be generated by rational response to analyst recommendations. Regulation, such as prohibiting affiliated analysts from issuing recommendations, would not improve the decision-making of institutional investors and may in fact reduce informational efficiency.

GRADUATE SCHOOL OF BUSINESS, STANFORD UNIVERSITY
HARVARD BUSINESS SCHOOL, HARVARD UNIVERSITY

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[4] DellaVigna and Malmendier [2004]; Fisman [2003].

[5] For an overview see Daniel, Hirshleifer, and Teoh [2002], esp. pp. 177 ff.

[6] Examples are *briefing.com*, *FirstCall* of Thomson Financial, and *finance.yahoo.com*.

[7] The increasing convenience of online information suggests that analyst recommendations may have become more easily accessible over time. Surprisingly, trade reactions to recommendations (Table VII) do not display any time pattern and are replicable year-by-year. (Results available upon request.)

[8] Note that the press releases mention the lead underwriter, but do not name the co-underwriters.

[9] For details on management communication with analysts see Francis, Hanna and Philbrick [1997].

[10] Boni and Womack [2002] cite several press reports and the testimony of the (then) acting SEC chairman Laura Unger to the House Subcommittee on July 31, 2001.

[11] See Bradley, Jordan, and Ritter [2003].

[12] Interestingly, independent analysts had no buy or strong-buy recommendations on any stock at all during 2002 [*Economists*, October 23, 2002, "Unconflicted – Wall Streets Independent Analysts"].

[13] Cf. Glaeser [2003].

[14] The results are robust to variations in cutoff; see Panel B of Table IX.

[15] Lin and McNichols [1998]; Michaely and Womack [1999].

[16] The original Lee-Ready algorithm employs a "zero-tick" in the case that a trade is at the bid-ask midpoint and the same price as the previous trade. Because of its low accuracy (about 60% according to Odders-White, 2000) the "zero-tick" is left out in the modified Lee-Ready algorithm.

[17] A significant number of the firms have either been acquired or dissolved, mostly within the last one to five years.

[18] For example, Morgan Stanley acquired Dean Witter for this purpose. Salomon Brothers acquired Smith Barney for this purpose.

[19] We are very grateful to Adam Kolasinski and S.P. Kothari for providing us with their mapping, which uses corporate websites, news articles from LexisNexis, Hoover's Online, and the Directory of Corporate Affiliations to refine the matches.

[20] Our subsequent analysis focuses on the traditional measures of affiliation (IPO- and SEO-lead/co-underwriting), both in order to conform with previous literature and in order to minimize the impact of informational asymmetries between large and small investors, e.g. about future underwriting.

[21] Note that, as in all empirical work on trade reactions, the coefficient of determination is rather low, typically around 1%, revealing large cross-sectional heterogeneity. Since the focus of the analysis, however, is not to forecast trade volume but rather to contrast small and large investors' interpretation of stock recommendations, the goodness of fit has very limited role.

[22] Note that the negative sell-coefficient in the upgrades sample is larger than in the downgrades sample but insignificant. The estimation is again affected by the extremely small sample size of the identifying subsample.

[23] We thank Steven Drucker for providing us with the lists of "All Star" analysts for the years 1995 through 2001. We obtained the names for the remainder of our sample period using the October issues of *Institutional Investor Magazine*.

[24] Table available upon request.

[25] See *New York Times*, Money and Business Section, on August 17, 2003, "Wall Street's Harsh New Reality," describing the (past) celebrity status and TV appearances of investment analyst with inside information.

[26] *Wall Street Journal* on March 1, 2004, commenting on the decision of SG Cohen (and HSBC in the UK) to abandon buy/sell ratings.

TABLE I. Correlations of Institutional Ownership and Trades

Correlations of the change in the percentage of shares outstanding owned by institutions (as of their 13f SEC filings) and measures of trade reaction. Correlations are calculated using all sample firm-quarters from 12/1993 to 12/2002 with both recommendations data and trading data. P-values in parentheses.

	Small Investors Values	Large Investors Values
Sum of daily abnormal trade imbalances over last quarter	-0.073 (0.000)	0.070 (0.000)
Quarterly trade imbalance, number of trades	-0.082 (0.000)	0.088 (0.000)
Quarterly trade imbalance, number of shares	-0.089 (0.000)	0.122 (0.000)
Quarterly trade imbalance, dollar value	-0.085 (0.000)	0.119 (0.000)

TABLE II. Sample of Recommendations

Panel A: Entire Sample	Sample size	Percentage within category					Numerical translation [1]	
		Strong Sell	Sell	Hold	Buy	Strong Buy	Mean	Standard Deviation
All	121,130	1.72	2.86	36.84	32.90	25.67	3.78	0.92
Unaffiliated	110,113	1.82	2.95	37.75	32.27	25.22	3.76	0.92
Affiliated	8,466	0.73	1.61	25.68	39.56	32.42	4.01	0.84
IPO lead-underwriting (past 5 years)	1,104	0.63	1.45	23.82	38.41	35.69	4.07	0.84
SEO lead-underwriting (past 2 years)	1,198	0.42	1.50	21.87	39.90	36.31	4.10	0.82
Co-underwriting equity[2]	4,143	0.99	1.62	26.43	38.79	32.17	4.00	0.86
Future SEO (next 2 years)	665	0.00	0.30	14.29	45.56	39.85	4.25	0.70
Bond lead underwriting (past year)	2,083	0.62	1.87	27.99	39.85	29.67	3.96	0.84
Never Affiliated[3]	6,418	3.91	4.25	36.63	28.01	27.19	3.70	1.04

Panel B: Subsample of firms with an IPO in the past 5 years, an SEO in the past 2 years or a bond issue in the past year	Sample size	Percentage within category					Numerical translation [1]	
		Strong Sell	Sell	Hold	Buy	Strong Buy	Mean	Standard Deviation
All	54,952	1.55	2.47	34.99	33.73	27.24	3.83	0.91
Unaffiliated	45,523	1.71	2.59	36.70	32.58	26.42	3.79	0.92
Affiliated[4]	8,237	0.75	1.65	25.88	39.43	32.28	4.01	0.85

Sample period is 10/29/1993 to 12/31/2002.

[1] The numerical translation scheme is 1=strong sell, 2=sell, 3=hold, 4=buy, 5=strong buy.

[2] We exclude co-underwriters who are also lead underwriters of SEO or IPO issuances to eliminate the large number of double-counts in this particular category.

[3] A brokerage firm is "Never Affiliated" if it does not have any (lead or co-underwriter) equity or bond underwriting affiliation during the entire sample period.

[4] "Affiliated" summarizes the same categories as in Panel A (IPO in the past 5 years, SEO in the past 2 years, IPO/SEO co-underwriting over the same horizons, future underwriting in the next 2 years, and bond underwriting in the next year).

TABLE III. Portfolio Returns

Panel A. The portfolios are constructed by buying in case of buy and strong buy recommendations and (short-)selling in case of sell and strong-sell recommendations. The returns are buy-and-hold returns for the various periods specified in trading days. (Results for cumulative abnormal returns are similar.) MM indicates market model, E equal-weighted market index, V value-weighted market index, Raw stands for raw returns. The IPO/SEO sample restricts the analysis to firms with an IPO during the last five years and/or an SEO during the last 2 years. The Benchmark Portfolio is constructed by buying a stock at issuance (IPO or SEO). The sample period is 2/1994 through 7/2001.

		Affiliated Analysts			Unaffiliated Analysts			Diff. Unaff. minus Aff.		
	Period	Return	SE	t-stat.	Return	SE	t-stat.	Return	SE	t-stat.
MM, V	(-10,-2)	-1.07%	0.17%	-6.38	-0.02%	0.04%	-0.48	1.05%	0.17%	6.08
	(-1,+1)	0.12%	0.10%	1.25	0.70%	0.03%	27.57	0.58%	0.10%	5.82
	(+2,+64)	-3.51%	0.44%	-7.89	-0.75%	0.12%	-6.39	2.76%	0.46%	6.00
	(+2,+128)	-7.89%	0.63%	-12.50	-2.07%	0.17%	-12.51	5.82%	0.65%	8.92
	(+2,+255)	-17.83%	0.89%	-19.97	-4.48%	0.23%	-19.09	13.35%	0.92%	14.46
	(+256,+510)	-19.22%	0.89%	-21.48	-3.61%	0.23%	-15.37	15.61%	0.93%	16.87
	(+511,+765)	-12.02%	0.89%	-13.44	-2.10%	0.23%	-8.95	9.92%	0.92%	10.73
MM, E	(-10,-2)	-1.09%	0.16%	-6.65	-0.09%	0.04%	-2.10	1.00%	0.17%	5.90
	(-1,+1)	0.22%	0.10%	2.27	0.70%	0.03%	27.68	0.48%	0.10%	4.79
	(+2,+64)	-3.71%	0.44%	-8.52	-0.91%	0.12%	-7.78	2.80%	0.45%	6.21
	(+2,+128)	-8.75%	0.62%	-14.17	-2.95%	0.17%	-17.82	5.80%	0.64%	9.07
	(+2,+255)	-21.36%	0.87%	-24.45	-7.50%	0.23%	-32.01	13.86%	0.90%	15.32
	(+256,+510)	-20.95%	0.88%	-23.93	-6.86%	0.23%	-29.20	14.09%	0.91%	15.55
	(+511,+765)	-15.31%	0.88%	-17.49	-6.07%	0.23%	-25.86	9.24%	0.91%	10.20
Upgrade	(-10,-2)	-1.21%	0.19%	-6.21	0.02%	0.06%	0.36	1.23%	0.20%	6.07
MM, V	(-1,+1)	1.06%	0.11%	9.42	1.23%	0.03%	44.78	0.17%	0.12%	1.47
	(+2,+64)	-3.89%	0.52%	-7.53	-0.34%	0.12%	-2.74	3.55%	0.53%	6.68
	(+2,+128)	-8.86%	0.73%	-12.06	-1.54%	0.18%	-8.65	7.32%	0.76%	9.68
	(+2,+255)	-19.51%	1.04%	-18.79	-3.64%	0.25%	-14.45	15.87%	1.07%	14.85
	(+256,+510)	-20.51%	1.04%	-19.71	-2.91%	0.25%	-11.52	17.60%	1.07%	16.44
	(+511,+765)	-12.50%	1.04%	-12.01	-0.88%	0.25%	-3.47	11.62%	1.07%	10.85
Downgrade	(-10,-2)	-0.34%	0.39%	-0.87	-0.10%	0.10%	-1.05	0.24%	0.40%	0.60
MM, V	(-1,+1)	-3.71%	0.22%	-16.51	-1.15%	0.06%	-20.65	2.56%	0.23%	11.06
	(+2,+64)	-1.90%	1.03%	-1.85	-1.70%	0.25%	-6.67	0.20%	1.06%	0.19
	(+2,+128)	-5.00%	1.46%	-3.42	-2.81%	0.36%	-7.74	2.19%	1.51%	1.45
	(+2,+255)	-10.98%	2.07%	-5.32	-5.65%	0.51%	-11.02	5.33%	2.13%	2.50
	(+256,+510)	-10.34%	2.07%	-5.00	-3.78%	0.51%	-7.37	6.56%	2.13%	3.08
	(+511,+765)	-1.01%	2.07%	-0.49	-0.67%	0.51%	-1.31	0.34%	2.13%	0.16

Raw Returns for IPO/SEO Portfolio

	Affiliated Analysts			Unaffiliated Analysts			Benchmark		
Period	Return	SE	t-stat	Return	SE	t-stat	Return	SE	t-stat
(-10,-2)	-0.21%	0.17%	-1.22	0.59%	0.05%	11.725	0.94%	0.33%	2.813
(-1,+1)	0.45%	0.10%	4.438	0.93%	0.03%	31.762	-0.55%	0.19%	-2.848
(+2,+64)	3.63%	0.46%	7.808	3.61%	0.13%	26.96	5.25%	0.88%	5.955
(+2,+128)	6.75%	0.66%	10.216	7.15%	0.19%	37.659	9.53%	1.25%	7.614
(+2,+255)	11.47%	0.93%	12.278	13.76%	0.27%	51.237	15.80%	1.77%	8.922
(+256,+510)	5.23%	0.94%	5.59	11.25%	0.27%	41.812	4.71%	1.77%	2.657
(+511,+765)	9.94%	0.94%	10.621	12.13%	0.27%	45.067	8.80%	1.77%	4.96

TABLE III. (*continued*)

Panel B. Time-series regression of daily excess returns (in percent) of zero-investment portfolios with a buy-and-hold horizon of one year on Fama-French factors:

$$R_b - R_s = a_i + b_i(R_M - R_f) + s_i SMB + h_i HML + e_i$$

R_b is the daily return of the buy portfolio, consisting of all stocks with at least one buy- or strong-buy recommendation in the last year. R_s is the daily return of the sell portfolio, consisting of all stocks with at least one sell- or strong-sell recommendation in the last year. If the sell-portfolio is empty we substitute with the R_f, the one-month Treasury bill rate observed at the beginning of the month (from CRSP). Portfolio returns are value-weighted by market capitalization. (The results with equal weighting are virtually identical.) R_M is the value-weighted return on all NYSE, AMEX, and NASDAQ stocks (from CRSP). *SMB* (Small Minus Big) is the average daily return on the three Fama-French small portfolios (Small Value, Small Neutral, Small Growth) minus the average daily return on the three Fama-French big portfolios (Big Value, Big Neutral, Big Growth). *HML* (High Minus Low) is the average return on the two Fama-French value portfolios (Small Value, Big Value) minus the average return on the two Fama-French growth portfolios (Small Growth, Big Growth). All factors and the risk-free rate are downloaded from Ken website. The column entitled Affiliated considers all stocks that are recommended only by affiliated analysts; the column Unaffiliated all stocks that are recommended only by unaffiliated analysts. The sample period is 2/1994 through 7/2001. Standard errors are in parentheses.

	Affiliated	Unaffiliated
a	-0.240	-0.010
	(0.086)	(0.007)
b	0.624	0.050
	(0.150)	(0.013)
s	0.286	0.017
	(0.169)	(0.014)
h	0.268	0.064
	(0.225)	(0.019)
R^2	0.0181	0.0092
Sample size	1892	1892

TABLE IV. Measures of Trade Reaction: Summary Statistics

Panel A. Summary Statistics Daily Trading for Sample Firms (2/1990 - 7/2001)

	Mean	Median	Std. Dev.	Min	Max
Total number of small trades	66.10	32	102.17	0	3,953
Total number of large trades	45.55	7	128.46	0	3,627
Number of small buy-initiated trades	29.97	13	50.98	0	1,702
Number of large buy-initiated trades	21.49	3	62.14	0	1,911
Number of small sell-initiated trades	26.79	13	42.76	0	2,453
Number of large sell-initiated trades	18.06	3	51.09	0	1,563
Total number of small buy/sell-initiated trades	56.76	26	91.06	0	3,506
Total number of large buy/sell-initiated trades	39.55	6	112.42	0	3,339
Δ(buy-sell) initiated small trades	3.18	0	23.71	-1,440	965
Δ(buy-sell) initiated large trades	3.43	0	17.44	-660	791
Dollar value total small trades	562,641	244,263	932,865	0	27,500,000
Dollar value total large trades	12,200,000	1,082,491	47,200,000	0	6,640,000,000
Dollar value small buy-initiated trades	255,760	99,175	461,493	0	12,300,000
Dollar value large buy-initiated trades	5,579,860	417,750	22,700,000	0	4,860,000,000
Dollar value small sell-initiated trades	228,392	98,550	387,906	0	16,000,000
Dollar value large sell-initiated trades	4,666,593	382,524	18,300,000	0	3,120,000,000
Dollar value total small buy/sell-initiated trades	484,153	204,600	828,517	0	22,700,000
Dollar value total large buy/sell-initiated trades	10,200,000	918,875	40,000,000	0	5,510,000,000
Dollar value of (buy-sell) small trades	27,368	2,338	201,131	-10,600,000	8,854,894
Dollar value of (buy-sell) large trades	913,267	0	9,824,109	-1,430,000,000	4,860,000,000
N	*2,996,265*				

Panel B. Summary Statistics Trade Imbalance - Sum over Event Days 0 and 1

	Mean	Median	Std. Dev.	Min	Max
Δ(buy-sell) initiated small trades	19.26	5	78.52	-2,545	1560
Δ(buy-sell) initiated large trades	18.92	3	55.78	-543	1059
Dollar value of (buy-sell) small trades	161,318	40,428	670,243	-17,100,000	11,800,000
Dollar value of (buy-sell) large trades	4,775,637	369,841	33,900,000	-1,400,000,000	1,520,000,000
Normalized imbalance of small trades	0.1087	0.1265	1.6348	-15.8431	7.1467
Normalized imbalance of large trades	-0.0063	0.0141	1.4083	-9.4254	7.1931
N	*86,962*				

TABLE V. Trade Reaction: Regression Results

OLS regressions of normalized trade imbalance over event days 0 and 1 on dummies for recommendation level (Strong Sell, Sell, Hold, Buy, Strong Buy) and affiliation. In the three columns titled Upgrades, the sample is limited to recommendations which are upgrades; in the Downgrades columns, the sample is limited to downgrades. Sample period is 2/1994 through 7/2001. Standard errors in parentheses.

	All Recommendations			Upgrades			Downgrades		
	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L
Strong Sell	-0.103	-0.105	-0.002				-0.118	-0.168	-0.051
	(0.039)	(0.045)	(0.059)				(0.044)	(0.054)	(0.070)
Sell	-0.118	-0.139	-0.021	-0.377	-0.144	0.234	-0.134	-0.132	0.002
	(0.033)	(0.038)	(0.051)	(0.173)	(0.201)	(0.266)	(0.040)	(0.049)	(0.063)
Hold	-0.091	0.007	0.098	-0.016	0.047	0.063	-0.150	0.013	0.163
	(0.008)	(0.009)	(0.013)	(0.035)	(0.041)	(0.054)	(0.011)	(0.014)	(0.018)
Buy	0.011	0.134	0.123	0.086	0.190	0.105	-0.078	0.053	0.131
	(0.008)	(0.010)	(0.013)	(0.015)	(0.018)	(0.024)	(0.017)	(0.021)	(0.027)
Strong Buy	0.112	0.243	0.131	0.144	0.264	0.120			
	(0.010)	(0.011)	(0.015)	(0.013)	(0.015)	(0.020)			
(Strong Sell)*Affiliation	-0.195	-0.838	-0.642				-0.285	-0.735	-0.450
	(0.273)	(0.317)	(0.419)				(0.292)	(0.357)	(0.462)
(Sell)*Affiliation	0.094	-0.087	-0.180				0.199	0.085	-0.114
	(0.247)	(0.287)	(0.378)				(0.260)	(0.318)	(0.411)
(Hold)*Affiliation	-0.001	0.005	0.006	-0.385	0.526	0.911	0.023	-0.026	-0.049
	(0.045)	(0.052)	(0.069)	(0.276)	(0.321)	(0.423)	(0.054)	(0.066)	(0.085)
(Buy)*Affiliation	-0.068	0.013	0.081	-0.116	0.214	0.331	0.046	0.083	0.037
	(0.034)	(0.040)	(0.052)	(0.089)	(0.103)	(0.136)	(0.064)	(0.078)	(0.101)
(Strong Buy)*Affiliation	-0.129	-0.023	0.106	-0.053	0.088	0.141			
	(0.036)	(0.042)	(0.056)	(0.059)	(0.069)	(0.091)			
Sample size	86,962	86,962		21,613	21,613		24,520	24,520	
R^2	0.0034	0.0085		0.0068	0.0200		0.0088	0.0012	

TABLE VI. Relationship between event-time trading and post-event returns

Regressions of buy-hold returns in percent (over the period of trading days indicated in parentheses in the first column) on the dollar value of net buy- minus sell-initiated trades (in $m). The sample is limited to all firms with at least one year of returns following the recommendation. The recommendation sample period is 2/1994 through 7/2001. Standard errors in parentheses.

	Small Trades (in millions of dollars)	Constant	R^2	Large Trades (in millions of dollars)	Constant	R^2
(2, 64)	-0.879	0.034	0.0008	-0.004	0.033	0.0000
	(0.106)	(0.001)		(0.002)	(0.001)	
(2, 128)	-1.870	0.071	0.0017	-0.010	0.073	0.0001
	(0.154)	(0.001)		(0.003)	(0.001)	
(2, 255)	-3.540	0.146	0.0025	-0.002	0.014	0.0003
	(0.241)	(0.002)		(0.005)	(0.002)	

Sample size: 85,577

TABLE VII. Robustness.

Panel A. Clustering

OLS regressions of normalized trade imbalance. Trade reaction is summed over event days 0 and 1. The recommendation levels (Strong Sell, Sell, Hold, Buy, Strong Buy) and Affiliation are dummy variables. Cluster by Year and Cluster by Brokerage Firm indicate that the standard errors are robust to heteroskedasticity and arbitrary within-year or, respectively, to arbitrary within-firm correlation. Sample period is 2/1994 through 7/2001. Standard errors in parentheses.

Panel B. Alternative Trade Size Groups

OLS regressions of normalized trade imbalance. Trade reaction is summed over event days 0 and 1. The recommendation levels (Strong Sell, Sell, Hold, Buy, Strong Buy) and Affiliation are dummy variables. Sample period is 2/1994 through 7/2001. Standard errors in parentheses.

	Cluster by Year			Cluster by Brokerage Firm			Trade Size - Dollar Value (thousands)			
	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L	≤ 5	5-10	10-20	20-50
Strong Sell	-0.103	-0.105	-0.002	-0.103	-0.105	-0.002	0.014	-0.125	-0.112	-0.018
	(0.044)	(0.032)	(0.042)	(0.031)	(0.056)	(0.049)	(0.042)	(0.043)	(0.042)	(0.040)
Sell	-0.118	-0.139	-0.021	-0.118	-0.139	-0.021	-0.001	-0.094	-0.145	-0.012
	(0.031)	(0.050)	(0.044)	(0.030)	(0.057)	(0.057)	(0.036)	(0.036)	(0.036)	(0.035)
Hold	-0.091	0.007	0.098	-0.091	0.007	0.098	0.065	0.005	-0.009	0.008
	(0.013)	(0.021)	(0.017)	(0.009)	(0.018)	(0.019)	(0.009)	(0.009)	(0.009)	(0.009)
Buy	0.011	0.134	0.123	0.011	0.134	0.123	0.129	0.107	0.070	0.057
	(0.015)	(0.019)	(0.014)	(0.011)	(0.010)	(0.011)	(0.009)	(0.009)	(0.009)	(0.009)
Strong Buy	0.112	0.243	0.131	0.112	0.243	0.131	0.182	0.198	0.145	0.101
	(0.018)	(0.030)	(0.016)	(0.012)	(0.023)	(0.019)	(0.010)	(0.010)	(0.010)	(0.010)
(Strong Sell)*Affiliation	-0.195	-0.838	-0.642	-0.195	-0.838	-0.642	-0.695	-0.465	-0.755	-0.199
	(0.216)	(0.320)	(0.463)	(0.226)	(0.266)	(0.333)	(0.296)	(0.300)	(0.294)	(0.285)
(Sell)*Affiliation	0.094	-0.087	-0.180	0.094	-0.087	-0.180	-0.105	-0.248	0.033	-0.360
	(0.136)	(0.184)	(0.282)	(0.233)	(0.275)	(0.339)	(0.268)	(0.271)	(0.266)	(0.258)
(Hold)*Affiliation	-0.001	0.005	0.006	-0.001	0.005	0.006	0.088	-0.089	0.003	0.057
	(0.038)	(0.050)	(0.066)	(0.040)	(0.077)	(0.076)	(0.049)	(0.049)	(0.048)	(0.047)
(Buy)*Affiliation	-0.068	0.013	0.081	-0.068	0.013	0.081	0.013	0.008	0.008	-0.080
	(0.061)	(0.054)	(0.088)	(0.040)	(0.029)	(0.042)	(0.037)	(0.037)	(0.037)	(0.036)
(Strong Buy)*Affiliation	-0.129	-0.023	0.106	-0.129	-0.023	0.106	0.058	-0.041	-0.029	-0.080
	(0.031)	(0.032)	(0.049)	(0.036)	(0.048)	(0.047)	(0.040)	(0.040)	(0.039)	(0.038)
Sample size: 86,962.										
R^2	0.0034	0.0085		0.0034	0.0085		0.0073	0.0062	0.0035	0.0017

TABLE VIII. Independent Analysts

Regressions of Normalized Trade Imbalance, Sum Over Event Days 0 and 1

Difference in Number of Buy and Sell Initiated Trades, Normalized					
		Small Trades			
		Feb-94 - Jul-01		Aug-01 -	May-02 -
		Sales[1]	Employees[2]	Dec-02	Dec-02
Strong Sell	-0.122	1.066	1.018	0.125	0.197
	(0.048)	(0.575)	(0.618)	(0.068)	(0.073)
Sell	-0.157	-0.204	-0.204	-0.049	-0.130
	(0.041)	(0.138)	(0.139)	(0.038)	(0.042)
Hold	0.005	0.084	0.122	0.000	-0.074
	(0.010)	(0.046)	(0.050)	(0.015)	(0.018)
Buy	0.139	0.196	0.243	0.107	-0.030
	(0.010)	(0.048)	(0.052)	(0.017)	(0.023)
Strong Buy	0.246	0.253	0.286	0.148	-0.041
	(0.011)	(0.048)	(0.050)	(0.020)	(0.026)
(Strong Sell)*NeverAffiliated	-0.002	-1.035	-0.987	-0.074	-0.226
	(0.132)	(0.613)	(0.653)	(0.199)	(0.244)
(Sell)*NeverAffiliated	0.125	1.780	1.780	-0.139	-0.102
	(0.113)	(1.632)	(1.640)	(0.263)	(0.288)
(Hold)*NeverAffiliated	0.032	0.102	0.057	0.010	-0.022
	(0.039)	(0.099)	(0.102)	(0.069)	(0.084)
(Buy)*NeverAffiliated	-0.075	-0.394	-0.383	0.143	0.260
	(0.044)	(0.386)	(0.425)	(0.085)	(0.109)
(Strong Buy)*NeverAffiliated	-0.087	-0.168	-0.198	-0.106	-0.029
	(0.048)	(0.102)	(0.104)	(0.069)	(0.086)
Brokers limited to top 50% sales		X			
Brokers limited to top 50% employee count			X		
Sample Size	86,962	4,426	3,959	25,557	14,904
R^2	0.0085	0.0134	0.0175	0.0043	0.0030

Standard errors in parentheses.

[1] Sales represents the dollar value of annual sales for the brokerage firm issuing the recommendation, and is used as a broker size control.

[2] Employees represents the total number of employees for the brokerage firm issuing the recommendation and is used as a broker size control.

TABLE IX. Analyst Quality

OLS regressions of normalized trade imbalance. Trade reaction is summed over event days 0 and 1. The recommendation levels (Strong Sell, Sell, Hold, Buy, Strong Buy) and Affiliation are dummy variables. The Ever-Affiliated Analysts sample includes only recommendations made by analysts who issue at least one affiliated and one unaffiliated recommendation are included. The All-Star Analysts sample is limited to recommendations made by analysts who were listed in Institutional Investor Magazine's most recent October list of top analysts. Sample period is 2/1994 through 7/2001. Standard errors in parentheses.

	Ever-Affiliated Analysts			All-Star Analysts		
	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L
Strong Sell	-0.149	-0.197	-0.048	-0.153	-0.152	0.001
	(0.069)	(0.080)	(0.105)	(0.092)	(0.110)	(0.144)
Sell	-0.256	-0.241	0.015	-0.260	-0.153	0.107
	(0.057)	(0.067)	(0.088)	(0.124)	(0.148)	(0.194)
Hold	-0.113	-0.012	0.101	-0.120	-0.010	0.110
	(0.012)	(0.014)	(0.019)	(0.022)	(0.027)	(0.035)
Buy	-0.004	0.145	0.149	0.001	0.145	0.144
	(0.012)	(0.015)	(0.019)	(0.022)	(0.026)	(0.034)
Strong Buy	0.155	0.299	0.145	0.157	0.353	0.197
	(0.015)	(0.017)	(0.022)	(0.028)	(0.033)	(0.043)
(Strong Sell)*Affiliation	-0.149	-0.746	-0.597	-0.517	-1.592	-1.074
	(0.276)	(0.322)	(0.424)	(0.621)	(0.742)	(0.967)
(Sell)*Affiliation	0.276	-0.059	-0.335	0.713	0.510	-0.203
	(0.253)	(0.294)	(0.388)	(0.627)	(0.748)	(0.976)
(Hold)*Affiliation	0.022	0.025	0.003	0.041	0.116	0.075
	(0.046)	(0.053)	(0.070)	(0.081)	(0.097)	(0.127)
(Buy)*Affiliation	-0.056	0.005	0.061	-0.056	-0.051	0.005
	(0.035)	(0.041)	(0.054)	(0.059)	(0.070)	(0.092)
(Strong Buy)*Affiliation	-0.171	-0.083	0.088	-0.150	-0.156	-0.006
	(0.038)	(0.044)	(0.058)	(0.070)	(0.084)	(0.109)
Sample size	39,632	39,632		11,882	11,882	
R^2	0.0058	0.0121		0.006	0.0135	

TABLE X. Brokerage Heterogeneity

OLS regressions of normalized trade imbalance. Trade reaction is summed over event days 0 and 1. Recommendation level (Strong Sell, Sell, Hold, Buy, Strong Buy) and Affiliation are dummy variables. Regressions are based on sub-sample of firms for which Sales and Employee data are available from D&B's Million Dollar Database. Sample period is 2/1994 through 7/2001. Standard errors in parentheses.

	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L	Large Trade	Small Trade	Difference S-L
Strong Sell and Sell	-0.170	-0.048	0.122	-0.205	-0.070	0.135	-0.274	0.131	0.405
	(0.079)	(0.091)	(0.121)	(0.090)	(0.104)	(0.137)	(0.188)	(0.211)	(0.282)
Hold	-0.092	0.009	0.101	-0.094	-0.012	0.081	-0.060	-0.055	0.006
	(0.027)	(0.031)	(0.041)	(0.031)	(0.035)	(0.047)	(0.048)	(0.054)	(0.073)
Strong Buy and Buy	0.051	0.192	0.141	0.057	0.181	0.124	0.034	0.186	0.151
	(0.020)	(0.023)	(0.030)	(0.021)	(0.024)	(0.032)	(0.029)	(0.032)	(0.043)
(Strong Sell, Sell)*Affiliation	0.127	-0.012	-0.138	0.145	0.000	-0.145	0.012	-0.690	-0.702
	(0.382)	(0.441)	(0.584)	(0.383)	(0.442)	(0.585)	(0.833)	(0.938)	(1.254)
(Hold)*Affiliation	0.047	0.166	0.119	0.048	0.171	0.123	0.169	0.327	0.158
	(0.116)	(0.133)	(0.176)	(0.116)	(0.133)	(0.177)	(0.201)	(0.226)	(0.302)
(Strong Buy, Buy)*Affiliation	-0.091	0.049	0.140	-0.094	0.053	0.147	-0.060	0.090	0.149
	(0.062)	(0.071)	(0.094)	(0.062)	(0.071)	(0.094)	(0.109)	(0.123)	(0.164)
(Recommendation level)*Sales				X	X	X			
(Recommendation level)*Employees							X	X	X
Sample Size	8,767	8,767		8,767	8,767		4,626	4,626	
R^2	0.0027	0.0095		0.0029	0.0099		0.0015	0.0117	

TABLE XI. Trading Behavior Preceding Recommendations

Average trading volume (in number of trades or dollar value of trading) per stock-day during specified event-time period. Sample period is 2/1994 through 7/2001.

		[-20,-16]	[-15,-11]	[-10,-6]	-5	-4	-3	-2	-1	0	1
Number of Trades											
Small Trade											
	Mean	99.14	99.67	100.99	102.01	102.42	103.31	105.24	109.57	114.62	110.78
	Median	52	52	53	54	54	54	55	59	62	59
	StdDev	137.10	137.88	140.32	140.20	140.72	142.08	144.56	145.04	147.92	151.11
Large Trade											
	Mean	88.85	89.10	90.16	91.63	92.58	93.71	96.85	107.57	114.18	100.79
	Median	27	27	27	27	28	28	29	33	36	32
	StdDev	176.72	177.94	180.46	182.73	183.54	183.78	187.79	204.15	214.41	192.65
Dollar Volume (thousands of dollars)											
Small Trade											
	Mean	887	891	903	912	916	924	942	984	1,029	984
	Median	447	448	453	461	464	468	476	511	543	506
	StdDev	1,250	1,257	1,277	1,277	1,280	1,294	1,312	1,314	1,339	1,347
Large Trade											
	Mean	24,100	24,100	24,500	25,000	25,600	26,200	27,300	32,600	36,400	29,000
	Median	5,171	5,170	5,209	5,328	5,418	5,476	5,745	6,600	7,193	6,373
	StdDev	63,000	62,800	67,700	65,100	70,500	74,200	70,200	89,400	118,000	74,700

TABLE XII. The Effect of Coverage on Recommendation Bias

Panel A. Summary Statistics

Recommendation Consensus is the average of all analyst recommendations on a specific stock over the last month. Analysts (#) is the number of analysts who have issued a recommendation for the specific stock during the last month.

	Mean	Median	25%	75%	St.Dev.
Recommendation Consensus	3.84	3.87	3.50	4.17	0.51
Difference Recommendation to "Consensus"	-0.06	0.00	-0.75	0.67	0.95
Analysts (#)	1.5	1.00	0.00	2.00	1.85

Panel B. Regression Analysis

OLS regression of the difference between a recommendation and the average recommendation in the past month (consensus) on dummies for affiliation and a dummy for "never affiliated" analyst, the number of analysts and its interaction with the dummies. The sample period is 1993-2000 (since Regulation FD became effective on Oct. 23, 2000). Standard errors are in parentheses.

	(1)	(2)	(3)	(4)
Affiliation	0.131	0.066		
	(0.016)	(0.027)		
IPO Affiliation			0.098	0.020
			(0.417)	(0.070)
SEO Affiliation			0.234	0.131
			(0.038)	(0.063)
Co-underwriter Affiliation			0.104	0.053
			(0.019)	(0.033)
Never Affiliated	-0.157	-0.138	-0.157	-0.139
	(0.015)	(0.025)	(0.015)	(0.025)
Analysts (#)	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Analysts (#)*Affiliation		0.035		
		(0.012)		
(Analysts #)*IPO Affiliation				0.046
				(0.032)
(Analysts #)*SEO Affiliation				0.055
				(0.055)
(Analysts #)*Co-underwriter Affiliation				0.027
				(0.014)
(Analysts #)*(Never Affiliated)		-0.013		-0.009
		(0.009)		(0.010)
Constant	-0.013	-0.013	-0.013	-0.012
	(0.006)	(0.005)	(0.005)	(0.006)

Sample size: 122,730.

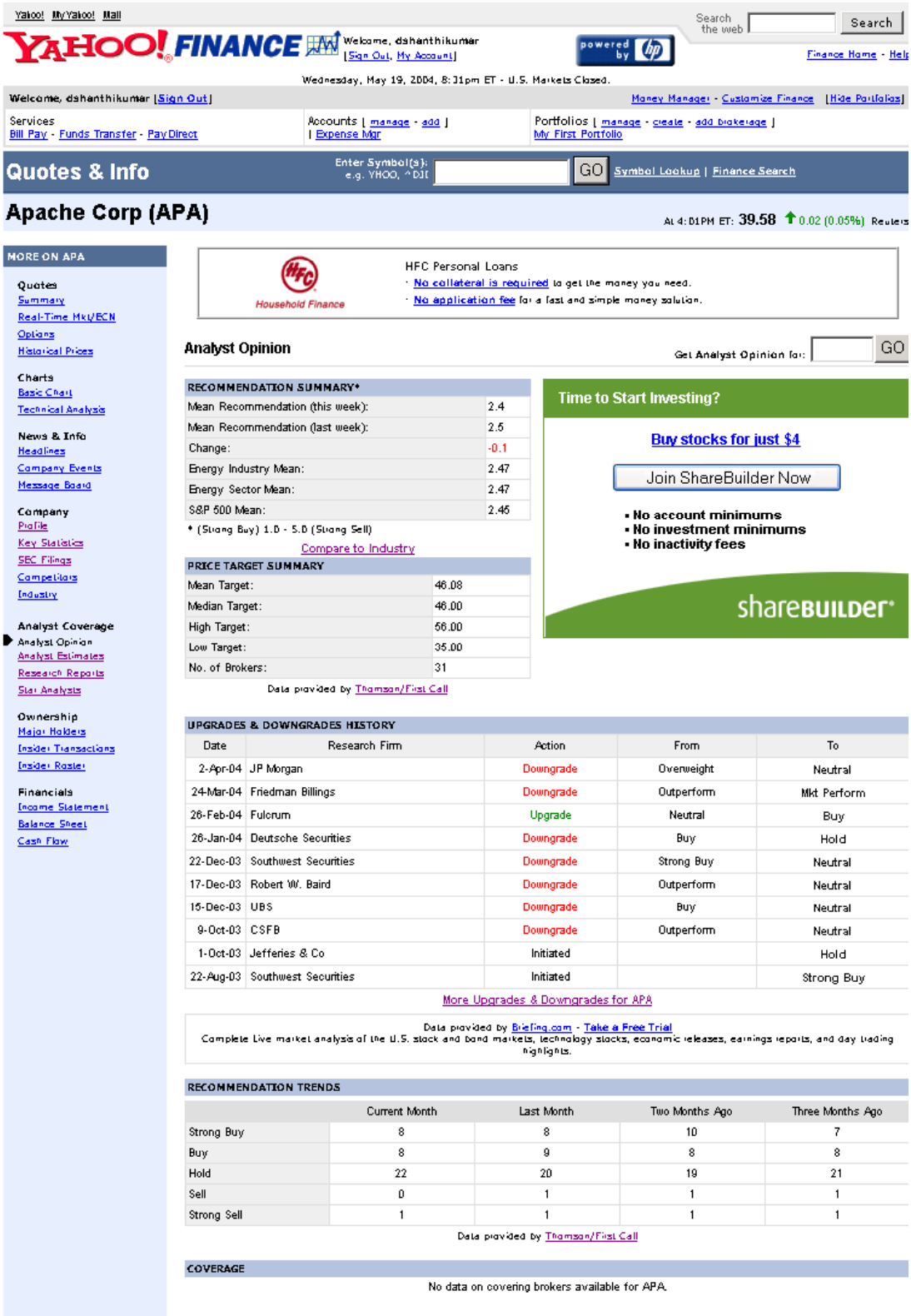
Appendix Table 1. Industry Summary Statistics

North American Industry Codes of recommended firms, split up by affiliation. Sample period 10/29/1993-12/31/2002.

	Subsample of Recommendations							%-point diff. "any affiliation minus no affiliation"
Industry (NAIC)	All	IPO affiliation	SEO affiliation	Co-affiliation	Any equity affiliation	No affiliation	Never affiliated	
All	233,698	2,016	2,334	7,524	11,874	222,170	12,442	
Agriculture	514	0	14	10	24	490	26	
	0.22%	0.00%	0.60%	0.13%	0.20%	0.22%	0.21%	-0.02%
Mining	15,233	124	192	436	752	14,509	830	
	6.52%	6.15%	8.23%	5.79%	6.33%	6.53%	6.67%	-0.20%
Utilities	12,446	28	202	484	714	11,734	532	
	5.33%	1.39%	8.65%	6.43%	6.01%	5.28%	4.28%	0.73%
Construction	2,910	8	30	86	124	2,786	96	
	1.25%	0.40%	1.29%	1.14%	1.04%	1.25%	0.77%	-0.21%
Manufacturing	93,768	710	832	2,614	4,156	89,710	5,336	
	40.12%	35.22%	35.65%	34.74%	35.00%	40.38%	42.89%	-5.38%
Wholesale Trade	8,350	96	108	324	528	7,834	476	
	3.57%	4.76%	4.63%	4.31%	4.45%	3.53%	3.83%	0.92%
Retail Trade	19,572	206	168	584	958	18,664	836	
	8.37%	10.22%	7.20%	7.76%	8.07%	8.40%	6.72%	-0.33%
Transportation and Warehousing	5,980	46	72	222	340	5,660	210	
	2.56%	2.28%	3.08%	2.95%	2.86%	2.55%	1.69%	0.32%
Information	15,660	160	140	540	840	14,846	966	
	6.70%	7.94%	6.00%	7.18%	7.07%	6.68%	7.76%	0.39%
Finance and Insurance	36,010	344	306	1,250	1,900	34,154	2,014	
	15.41%	17.06%	13.11%	16.61%	16.00%	15.37%	16.19%	0.63%
Real Estate and Rental Leasing	2,128	88	58	208	354	1,796	108	
	0.91%	4.37%	2.49%	2.76%	2.98%	0.81%	0.87%	2.17%
Professional, Scientific,	5,361	48	56	158	262	5,107	306	
Technical Services	2.29%	2.38%	2.40%	2.10%	2.21%	2.30%	2.46%	-0.09%
Mgmt of Companies and Enterprises	0	0	0	0	0	0	0	
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Administrative and Support and	3,380	56	34	140	230	3,156	200	
Waste Mgmt and Remediation Services	1.45%	2.78%	1.46%	1.86%	1.94%	1.42%	1.61%	0.52%
Educational Services	510	6	10	18	34	476	76	
	0.22%	0.30%	0.43%	0.24%	0.29%	0.21%	0.61%	0.07%
Health Care and Social Assistance	4,232	10	46	214	270	3,962	184	
	1.81%	0.50%	1.97%	2.84%	2.27%	1.78%	1.48%	0.49%
Arts, Entertainment, Recreation	886	22	14	70	106	780	14	
	0.38%	1.09%	0.60%	0.93%	0.89%	0.35%	0.11%	0.54%
Accommodation and Food services	5,914	24	30	86	140	5,786	196	
	2.53%	1.19%	1.29%	1.14%	1.18%	2.60%	1.58%	-1.43%
Other Services	386	22	22	36	80	324	22	
	0.17%	1.09%	0.94%	0.48%	0.67%	0.15%	0.18%	0.53%
Public Administration	0	0	0	0	0	0	0	
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

FIGURE I. Sample Webpage of Analyst Recommendations (*finance.yahoo.com*)

On January 16, 2003, Apache Corp (APA), an oil and gas exploration and production company traded on the NYSE, issued a secondary equity offering (SEO), underwritten by several investment banks. Morgan Stanley acted as the lead underwriter, while Petrie Parkman & Co, AG Edwards & Sons, Robert W Baird & Co, RBC Dain Rauscher Corp, Citigroup/Salomon Smith Barney, and Raymond James & Associates all acted as co-underwriters of the $553.7 million common stock offering.



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YAHOO! FINANCE

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Finance Home - Help

Wednesday, May 19, 2004, 8:11pm ET - U.S. Markets Closed.

Welcome, dshanthikumar [Sign Out] | Money Manager - Customize Finance - [Hide Portfolios]

Services: Bill Pay - Funds Transfer - Pay Direct

Accounts [manage - add] | Expense Mgr

Portfolios [manage - create - add brokerage] My First Portfolio

Quotes & Info | Enter Symbol(s): e.g. YHOO, ^DJI | GO | Symbol Lookup | Finance Search

Apache Corp (APA)

At 4:01PM ET: 39.58 0.02 (0.05%) Reuters

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HFC Household Finance

HFC Personal Loans
· No collateral is required to get the money you need.
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Analyst Opinion

Get Analyst Opinion for: GO

RECOMMENDATION SUMMARY*

Mean Recommendation (this week):	2.4
Mean Recommendation (last week):	2.5
Change:	-0.1
Energy Industry Mean:	2.47
Energy Sector Mean:	2.47
S&P 500 Mean:	2.46

* (Strong Buy) 1.0 - 5.0 (Strong Sell)

Compare to Industry

PRICE TARGET SUMMARY

Mean Target:	46.08
Median Target:	46.00
High Target:	56.00
Low Target:	35.00
No. of Brokers:	31

Data provided by Thomson/First Call

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UPGRADES & DOWNGRADES HISTORY

Date	Research Firm	Action	From	To
2-Apr-04	JP Morgan	Downgrade	Overweight	Neutral
24-Mar-04	Friedman Billings	Downgrade	Outperform	Mkt Perform
26-Feb-04	Fulcrum	Upgrade	Neutral	Buy
26-Jan-04	Deutsche Securities	Downgrade	Buy	Hold
22-Dec-03	Southwest Securities	Downgrade	Strong Buy	Neutral
17-Dec-03	Robert W. Baird	Downgrade	Outperform	Neutral
15-Dec-03	UBS	Downgrade	Buy	Neutral
9-Oct-03	CSFB	Downgrade	Outperform	Neutral
1-Oct-03	Jefferies & Co	Initiated		Hold
22-Aug-03	Southwest Securities	Initiated		Strong Buy

More Upgrades & Downgrades for APA

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RECOMMENDATION TRENDS

	Current Month	Last Month	Two Months Ago	Three Months Ago
Strong Buy	8	8	10	7
Buy	8	9	8	8
Hold	22	20	19	21
Sell	0	1	1	1
Strong Sell	1	1	1	1

Data provided by Thomson/First Call

COVERAGE

No data on covering brokers available for APA.

FIGURE II. Rational and naive trade reactions to analyst recommendations.

The recommendation levels are indicated as (--) for "strong sell", (-) for "sell", (0) for hold, (+) for "buy", and (++) for strong buy.

	Rational Investors		Naïve Investors	
	Rec.	Trade Reaction	Rec.	Trade Reaction
Unaffiliated Analysts	(– –) (–) (0) (+) (+ +)	Sell* Sell* Sell Hold Buy	(– –) (–) (0) (+) (+ +)	Sell* Sell Hold Buy Buy
Affiliated Analysts	(– –) (–) (0) (+) (+ +)	Sell* Sell* Sell* Sell Hold	(– –) (–) (0) (+) (+ +)	Sell* Sell Hold Buy Buy

* Alternatively, investors may display no abnormal trade reaction since previous negative (sell or hold) recommendations induced them to sell earlier. Short-sell constraints may strengthen this effect.