When Informed Agents Disagree

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Abstract

I analyze the price informativeness of three informed parties' actions from 1994-2005. Consistent with their disparate environments, I find that insiders are more informative at longer (12-month) versus shorter (6-month) horizons, while analysts and transient institutions are only informative at shorter horizons. When inter-party disagreement exists, a party's informativeness is not only a function of its own strength, but also the collective weakness of its counterparts. While insider signals are generally most informative, they become uninformative when prior synchronicity is low, consistent with prior impounding of firm-specific information attenuating their advantage. Finally, post Reg-FD, institutions are uninformative, indicating that their ability to inform future prices is reliant upon exclusive insider relationships.

I. Introduction

A common stock-screening strategy, often referred to as "following the smart money", consists of following the actions of professionals, particularly the trading behavior of insiders and transient institutions, and the recommendations of analysts (Damodaran, 2003)[1]. Prior research documents that the actions of these informed agents predict future returns[2]. Research focused on these information intermediaries has also documented the economic incentives and behavioral biases of each group[3]. My study bridges these two areas of the literature to address the following questions: (1) How do the distinct environments of these groups affect the horizons over which their actions are most informative? (2) Given that all three parties are sophisticated and generally informative of future stock returns, what happens when there is a lack of consensus? Which signals remain informative of future stock returns, and over what horizons? (3) How do different information environments affect the hierarchy of informativeness?

Past research shows that the different pressures faced by various informed agents (e.g. incentives to generate trading commissions, incentives to avoid fund outflows, fear of litigation risk) lead to predictable differences in preferences for particular firm characteristics. The three groups of informed agents in my sample, based on 48 quarters of data from 1994 through 2005, exhibit preferences and investment philosophies consistent with past research. Analysts and institutions act as momentum chasers, while insiders act as contrarians. Because the momentum phenomenon occurs over a three to twelve month period (Jeegadeesh and Titman, 1993), and analysts and institutions appear unable to take advantage of a firm's momentum when it is in its early stages, I predict that the signals of analysts and institutions will be strongest in predicting stock returns over shorter time horizons (three to six months). Conversely, because insiders face

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[1] Some recent media mentions include: Business Week (2007) and MSN Money (2007)
http://www.businessweek.com/investor/content/jun2007/pi20070607_123598.htm
http://moneycentral.msn.com/content/P119359.asp

[2] Examples of literature focusing on the informativeness of informed signals on future stock returns include Rozeff and Zaman (1998), Piotroski and Roulstone (2004), Ke and Petroni (2004), Collins, Gong and Hribar (2003), Yan and Zhang (2007), Gompers and Metrick (2001).

[3] Examples of literature focusing on the various incentives faced by analysts, institutions and insiders include Michaely and Womack (1999), Lin and McNichols (1998), Huddart, Ke and Shi (2007), Lakonishok et al (1991), and Shleifer and Vishny (1997).

litigation risks for trading in advance of material news disclosures and are unable to profit from round-trip trades within a six month period due to regulatory constraints, I predict that the strength of the insider signal will grow with the passing of time, and be at its peak at the 12 month time frame (versus three to six months). Results are consistent with predictions for all three groups.

To answer the second question, I compare the informativeness of each party's signal under varying circumstances of disagreement and create a hierarchy based on each signal's ability to deviate from the consensus of the other two parties and remain price informative. While insiders possess firm-specific private knowledge, insider signals may not always dominate. For example, insider sells tend to be less informative, as insiders often sell for rebalancing and liquidity reasons. In addition, because insiders must time their trades to minimize the probability of litigation risk, their trades are likely to be less informative at shorter horizons, and must be weighed against the signals from the two countervailing forces (e.g. analysts and institutions) at their optimal horizons for informativeness.

When inter-party disagreement is high, my results indicate that insiders, when buying, are the only group able to deviate from a consensus signal and remain incrementally informative at all three horizons, with the magnitude of informativeness being largest at the 12-month horizon. When deviating from the selling forces of their counterparts, buy signals of analysts (institutions) only remain informative at six (three) month horizons. No group is predictive at any horizon when issuing sell signals against a buy consensus of the other two, although insider sell deviations are marginally predictive at the 12-month horizon. Overall, results suggest the following hierarchy of signal informativeness among the three groups: insiders' actions are, on average, most informative of future prices, followed by the actions of analysts and finally, institutions.

To address the third question, I analyze how the overall hierarchy of informativeness is affected by two different informational environments. First, I use firm-level synchronicity, defined as the R-squared of firm-level returns regressed on market and industry-level returns, calculated in a rolling regression over the preceding 60 months, as a proxy for the firm's information

environment. My results from synchronicity analyses indicate that the dominance of insiders over analysts depends on the firm's existing information environment. I find that when synchronicity is low, i.e. when prices are relatively more efficient with regards to firm-specific information, thus reducing the comparative advantage of insiders, the hierarchy of informativeness reverses, with analysts dominating and the insiders' normally dominant signal becoming completely insignificant in predicting future returns, even at the 12-month horizon.

Finally, motivated by the ambiguity surrounding the source of institutions' informational advantage, I examine the effect of the passage of Regulation Fair Disclosure (Reg-FD) on the relative signal informativeness of institutions and analysts. Given that Reg-FD has been shown to block private information flows from insiders to other parties prior to official disclosure dates, my findings that institutions lose all of their predictive ability in the post Reg-FD period is consistent with their inability to create their own information advantage and their dependence on private communications with insiders to remain price informative. Conversely, consistent with analysts' industry-derived informational advantages, I find the strength of their signals to be relatively unscathed in the post-FD regime.

Overall, this paper complements a burgeoning stream of literature on price discovery and information intermediaries. I contribute to existing research by examining how varying preferences for firm characteristics, stemming from different sets of incentives and constraints, affect the time horizon over which the actions of informed parties are most optimally informative. My results appear consistent with insiders being the earliest to capitalize on a firm's positive momentum in stock prices, followed by analysts, and finally institutions, resulting in the insiders' signal informativeness continuing to grow with the passing of time, while the signals of analysts and institutions are optimally informative at shorter horizons. I create a hierarchy of signal informativeness under various conditions, thereby indirectly benefitting both prospective individual investors and money managers. My documentation of divergence amongst informed parties has implications for market efficiency because it implies that, ironically, arbitrageurs may

create their own limits-to-arbitrage by trading in non-concerted directions, thereby prolonging, rather than correcting, market mispricings.

The remainder of my paper is divided into six sections. Section II gives a brief overview of the prior literature focusing on each party's environment. Section III makes relative predictions about (a) the horizon of signal informativeness of each party, and (b) expected signal informativeness when disagreement is high. Section IV discusses data and signal construction. Section V presents results relating to earlier predictions. Section VI presents analyses related to the effects of synchronicity and Reg-FD on the overall hierarchy of informativeness of the three groups. Section VII concludes and suggests future avenues related to this line of research.

II. Prior Literature on Institutional Background and Incentives of Informed Agents

II.A. Financial Analysts

Currently, over 4,000 sell-side financial analysts are employed by investment banks, brokerage firms, and research boutiques. Analysts assist the price discovery process by assimilating information from management guidance, conference calls, macro-economic and industry-level analyses, and the analysis of financial statements. Since analysts are generally assigned to cover specific sectors or industries, they ultimately develop a deeper knowledge of industry and macro-economic forces, relative to their counterparts. Analysts then disclose their opinions of a specific firm via reports that include price targets, earnings forecasts, and buy/sell recommendations. The information in these reports is then consumed by both individuals and institutional investors when making investment decisions. While analyst forecasts and buy/sell recommendations have been shown to be value-relevant (Brown et al, 1987) and informative in predicting future earnings and stock prices, their actions have also been shown to be biased in certain circumstances due to a combination of incentives and heuristics. The biases in analyst actions have been documented in prior research, and in certain circumstances are likely to hinder their ability in predicting future returns.

For example, analysts have been shown to rely on heuristics, rather than the magnitude of market mispricing when issuing stock recommendations. Specifically, Jeegadeesh et al. (2004) show that the value-relevance from analysts' recommendations is primarily driven by their tilt towards stocks with strong future growth prospects, prior earnings and returns. Bradshaw (2004) shows that long-term growth (LTG) and price to earnings-growth (PEG) multiples projections are far stronger determinants of an analyst's recommendation signal than the difference between a Residual Income Model (RIM)-derived intrinsic value and price, despite the fact that the LTG based method is least predictive of future abnormal returns.

Sell-side analysts also face numerous conflicts of interest that can affect the accuracy of their decisions. Michaely and Womack (1999) and Lin and McNichols (1998) show that analysts covering firms from which they also earn revenues via investment banking tend to be overoptimistic in their buy/sell recommendations relative to non-affiliated analysts for firms which are undergoing equity offerings, a finding experimentally supported by Hunton and McEwen (1997). By nature, firms in the underwriting process are characterized by high levels of expected future growth, and also add to the analysts' tilt towards growth firms. Further, prior papers document that, in addition to accuracy, the objective function of analysts includes increasing revenues for their respective brokerages through commissions from increased levels of trade. Irvine (2000) and O'Brien and Bhushan (1990) both show that increased levels of analyst coverage result in higher levels of trading volume. Malmendier and Shantikumar (2007) document that stock recommendations are strongly followed by small traders, and that analysts are overly optimistic in their attempts to generate increased trade while earning favor with management.

By and large, the literature on analysts' behavior documents (1) their predilection towards heuristic-based valuations, particularly measures related to future growth, (2) the fact that a primary source of analyst generated revenues stems from increased trading commissions, and (3) a conflict of interest with investment-banking related equity offerings (coupled with the fact that the majority of firms undergoing an equity offering are growth firms).

II. B. Corporate Insiders

Corporate insider trading occurs when officers, directors, and employees who own more than ten percent of their company's shares, buy or sell stock in their own firm. Due to their internal relationship with the firm, these individuals are privy to value-relevant information relative to outsiders, and are thereby advantaged in estimating the firm's intrinsic value (Piotroski and Roulstone, 2005). In addition, insiders possess the unique ability to use earnings management to optimally time disclosures around their transactions to avoid precipitous drops in stock prices.

Without constraints, policy-makers have realized that the firm-specific informational advantages of insiders (e.g. advance knowledge of material events such as mergers and acquisitions, joint ventures, and earnings announcements) would allow them to expropriate wealth from other parties[4]. Thus, regulators have prohibited trade on material non-public information (SEC Rule 10b5-1). In addition, litigators have levied harsh penalties on insiders convicted of exploiting the insider information to their financial benefit. Thus, insiders making trading decisions are faced with the trade-off between taking advantage of private information and the possibility of litigation, reputation, and employment costs.

Laws designed to constrain insiders from taking advantage of exclusive information appear to be at least partially successful. Huddart, Ke, and Shi (2007), find that insiders trade to avoid risks associated with regulatory actions, shareholder class-action suits, and adverse publicity, often leaving profitable insider trades on the table. If insiders do attempt to act on their firm-specific knowledge, they must do so well in advance to avoid scrutiny from litigators. Ke, Huddart, and Petroni (2003) show that insiders sell shares between 3 and 9 quarters prior to a break in a long-term earnings growth streak to avoid scrutiny from the SEC. By selling so far in advance of bad news, insiders forgo the additional momentum profits garnered by earnings growth prior to the break of the streak.

[4] While there have been heated debates on whether the legalization of insider trading would lead to enhanced market efficiency and social welfare, I have omitted such discussions within this paper as they are beyond the scope of my research.

However, insiders' superior knowledge of future cash flows and earnings relative to non-insiders allows them to profit when markets have overreacted to stale information, without worries of violating insider trading rules. This argument is consistent with prior research documenting the profitability of the contrarian investment style of insiders (Rozeff and Zaman, 1998; Lakonishok and Lee, 2001).

Overall, while prior literature documents that insiders possess specific private and value-relevant knowledge about their own firm, insiders are forced to weigh the benefits of taking advantage of their inside information against the costs of increased scrutiny from third parties such as regulators and litigators. Prior research has shown that insiders appear to handle this trade-off in part through the timing of their actions by either (1) trading far in advance of significant news events, or (2) trading as contrarians following a market overreaction.

II.C. Transient Institutions

Institutional investors include investment companies, mutual funds, brokerages, insurance companies, pension funds, investment banks and endowment funds. In general, these firms earn their living by managing large sums of capital for investors and taking a percentage of the total assets under management, or a percentage of returns over a given benchmark. Unlike analysts and insiders, institutions do not possess an explicit informational advantage that they can leverage to inform future prices. Thus, in order to maximize their fund's performance, they combine the informational advantages of both insiders and analysts with their own analyses. They do this by augmenting their internal research with external reports from sell-side analysts, while also attempting to earn favor from upper-level management that could result in exclusive access to firm-specific information.

Overall, prior literature documents that the actions of institutional investors have predictive power for future returns, consistent with these agents being informed traders. Gompers and Metrick (2001) show that the quarterly level of aggregate institutional ownership is associated with future stock returns. While they attribute this in large part to demand shocks resulting from changes in ownership composition, Yan and Zhang (2007) show that the predictive power of total

institutional ownership is driven entirely by changes in short-term institutional ownership. Their study is consistent with institutions driving returns due to them being informed investors, and not because of the demand shock as posited by Gompers and Metrick.

Recent papers focusing on the behavior of institutional investors use Bushee's (1998, 2001) classification techniques, which characterize institutions based upon their level of portfolio diversification, turnover, and trading sensitivity relative to current earnings. Each institution is classified as either a "transient", "dedicated", or "quasi-indexing" institution. Transient institutions are characterized as typically holding stakes in numerous firms, trading frequently, and often basing their trades on current earnings or components of such earnings. Of the three institutional classes, they are most likely to search for private information, as dedicated and quasi-indexing institutions have different primary objectives, and hence have little incentive to search for private information. Because this paper examines the informativeness of institutions' trading decisions, it focuses solely on transient institutions, henceforth referred to as "institutions."

Prior literature regarding the actions of transient investors showns them to be harbingers of both future earnings and abnormal stock returns. Ke and Petroni (2004) show that these institutions appear able to predict when a firm will have a break in a string of quarterly earnings increases, and trade at least one quarter prior to this event to avoid the upcoming negative stock returns associated with the disclosure of the bad news. Collins, Gong, and Hribar (2003) find that transient institutional investors exploit the mispricing of accruals to earn abnormal returns. Similarly, Ke and Ramalingegowda (2005) document that transient institutions trade to exploit post earnings announcement drift, and document arbitrage trades that yield buy and hold annualized abnormal returns of 22%.

Despite being generally informed, institutions face constraints that can create preferences for specific firm characteristics, prohibiting them from fully utilizing their information matrix and from optimizing their investment decisions to maximize profits. For example, the clients of institutional investors often have little or no knowledge about capital markets. The lack of market

knowledge of clients providing institutional investors with capital can result in agency issues that can hurt institutions when they most aggressively attempt to exploit market mispricings. For example, if an investment manager were to purchase undervalued firms in an attempt to exploit market mispricing, his clients may only see their funds being allotted to poorly-performing firms with undervalued multiples primarily derived from deflated stock prices. Since stock price reversals often take up to three years (Debondt and Thaler, 1985), it becomes highly likely that the price will continue to drift negatively before reversing its direction.

While the optimal strategy for institutions in an agency-free world would be to trade even more aggressively to exploit the mispricing, the reality is often that investors refuse to provide additional capital to the arbitrageurs, and even remove capital in fear that they may lose their investment. This separation of "brains and capital," as referred to by Shleifer and Vishny (1997), can prohibit arbitrageurs from exploiting long-term mispricings (e.g. value stocks) that may worsen in the short-run, as negative returns can lead to investment outflows when capital is most needed to exploit such mispricings. In attempts to avoid these fund outflows, mutual funds (O'Neal, 2007) and pension funds (Lakonishok, et al 1991) have been documented to engage in "window dressing," where firms sell large positions in poorly-performing stocks and buy large positions in stocks with strong past returns prior to the quarterly and yearly disclosure of portfolio holdings, in an attempt to keep individual investors from removing capital from the fund.

In addition to the "window dressing" problem, institutional investors are often constrained by the fiduciary responsibilities they have to prudently invest their customers' capital. Farber (2005) shows fraud to be linked to decreases in institutional ownership which are not reversed despite improvements in corporate governance. He attributes the lack of increase in institutional ownership to the fact that most institutions limit their investments to firms which are deemed to be financially sound. Such fiduciary restrictions also limit institutions from pursuing value strategies, often composed of purchasing poor past performers, where markets may have overreacted to bad news.

Finally, the sheer volume of shares transacted by institutions on a per trade basis also creates a preference for firms with higher levels of liquidity, to reduce transaction costs and adverse price impacts caused by information asymmetries with the market-maker (Glosten and Milgrom, 1985). In order to be able to quickly transact such block trades while minimizing price concessions, institutions prefer liquid stocks with higher turnover levels, while avoiding low-priced firms where transaction costs can be relatively high (Falkenstein, 1996).

In sum, institutional investors face a unique environment that includes "window-dressing" issues, fiduciary responsibilities to their investors, and microstructure concerns. As a consequence, transient institutions prefer shorter-term momentum-based strategies, being net buyers of firms with extreme positive prior returns, and net sellers of firms with extreme negative returns. They are also net buyers of glamour stocks with higher market-to-book ratios, and net sellers of value stocks with lower market to book ratios. They are most likely to prefer heavily traded firms both when buying and selling, in order to avoid microstructure-based price concessions.

III. Relative Signal Informativeness at Different Horizons: Predictions

Section II presents prior literature on the differing environments of the three groups of informed agents, discussing how these differences could constrain investment decisions and create affinities toward particular firm characteristics. In this section, I use the preceding discussion to predict (1) the horizon at which each party's actions are most likely to be informative of future prices, and (2) the circumstances under which each party is likely to remain informative when deviating from a consensus of the other two.

As discussed earlier, past literature documents the preferences of analysts and institutions for firm characteristics such as momentum and market-to-book, and the contrarian preferences of insiders relative to these two groups. A few other points are worth noting. First, insiders do not suffer from the performance based arbitrage problem faced by institutions. While both groups attempt to arbitrage mispricing in order to create profit, insider trades are financed with personal

capital, often as part of their compensation package, while institutions typically exploit mispricing by using the capital of less sophisticated investors. Thus, unlike institutions, insiders are not constrained from pursuing value strategies. Second, while institutions are free to exploit short-term anomalies such as post-earnings announcement drift (Bernard and Thomas, 1990), and post-revision drift (Gleason and Lee, 2003), Rule 16(b)-6 in SEC act of 1934 prohibits insiders from profiting on any round trip trades where the holding period is less than six months. Given that momentum profits are primarily documented over short-to-intermediate time horizons, this "short-swing rule" adds another constraint to insiders wishing to execute such momentum strategies.

The above arguments, coupled with insiders' possession of superior knowledge regarding the future cash flows and earnings of their firms (Piotroski and Roulstone, 2005), suggest that insiders who trade optimally to maximize profitability while minimizing litigation risk should trade as "late-stage" contrarians, implying that they should not only trade following market overreactions, but that they should also take advantage of their superior knowledge of when a market correction is expected to occur. Since price momentum follows a market correction, and the timing of the insiders' trades should enable them to take full advantage of such momentum, I expect the insider signal to become more informative over longer horizons.

As previously discussed, both analysts and institutions prefer firms with similar characteristics. Owing to trade generating incentives, investment-banking conflicts of interest, and general biases in their valuation methods, analysts appear partial towards stocks with high-levels of future growth and strong prior price momentum. Institutions, albeit for different reasons such as performance-based arbitrage issues and "window-dressing", also share preferences for momentum and growth. Given that the momentum phenomenon has been documented to occur over a 3 to 12 month horizon (Jegadeesh and Titman, 1993), and that analysts and institutions apparently act after a firm has already exhibited signs of positive momentum, I expect the actions of analysts and institutions to be more informative over shorter horizons, leading to the following relative predictions:

- Insiders' actions are most price informative over longer (12-month) horizons, while analysts' and institutions' actions are most price informative over shorter (6-month) horizons.

Earlier discussions suggest that informed parties will not always act in tandem. How is the informativeness of each group affected when there is a lack of unanimity? To the best of my knowledge, this question remains unresolved. In a world free of insider trading constraints, insiders' private information advantages shown in past literature (Piotroski and Roulstone, 2005) would result in insider trading signals dominating those of their two counterparts, rendering the above empirical question trivial. However, due to litigation risk concerns and insider-trading restrictions such as the "short-swing rule" as previously discussed, whether insiders are consistently able to reveal their private information through their actions is unclear. Furthermore, insiders may exhibit overconfidence (Malmendier and Tate, 2005), overoptimism (Heaton, 2002), or subjective biases resulting in an overweighting of their own private information and an underweighting of non-firm specific information (Daniel, Hirshleifer, and Subrahmanyam, 1998). These factors potentially attenuate the informativeness of the insider signal. Finally, the trading horizon at which each signal is strongest must be considered. While the insider signal is expected to be relatively stronger at longer horizons, the signals of analysts and institutions should be relatively stronger at shorter-horizons. If the returns to insiders' actions are measured at their non-preferred horizon, insiders' signals may not predict future returns when opposing the two counterforces.

I base my predictions about the informativeness of each party's signal under conditions of inter-party disagreement on the following four premises.

i. Due to exclusive access to firm-specific information, insiders have a general informational advantage over analysts and institutions.

ii. Owing to insiders' contrarian behavior, the informativeness of their signal is expected to grow over time, being therefore stronger at longer (12-month) versus shorter (three- and six- month) windows.

iii. Insiders' BUY signals are more predictive of returns than their SELL signals as insiders may sell for non-informative reasons related to liquidity, rebalancing, and taxes (Lakonishok and Lee (2001)).

iv. Analysts and institutions are momentum-style traders. Therefore, the strength of their signals is likely to attenuate over time, and is likely to be strongest at the three- and six-month time horizons.

The basis for whether or not each party's action is likely to be informative hinges upon two primary forces: (1) the strength of the deviating signal over a particular time horizon, and (2) the relative weakness of the countervailing forces. Overall, I predict that:

- The most probable scenario where a deviating party remains informative is when insiders are buying against the consensus of the other two parties, and returns are being predicted over longer horizons.
- Neither analysts nor institutions are likely to be informative at longer horizons, when they deviate from a consensus of the other two parties.
- Analysts or institutions who deviate from the other two parties better predict future returns at shorter (three or six month) horizons when they issue buy signals.
- Deviating insider buy signals are still likely to be informative at shorter horizons.

The first prediction arises from the expectation that the predictive power of insider actions is at its strongest for buy signals at longer horizons, while the deviating signals from analysts and institutions are at their weakest at these horizons. The second prediction is based on the argument that, whatever the signal, neither analysts nor institutions are likely to prevail

against insiders at the latter's advantaged horizons. The third prediction stems not only from the fact that analysts and institutions exhibit stronger signals at shorter time horizons, but also from the fact that the normally dominant insider signal is mitigated when issuing a sell signal. The final prediction is derived primarily from the general dominance of the insider signal, and hence, is made with less confidence, because insiders are competing against the countervailing actions of analysts and institutions at the latter's advantaged horizons.

IV. Data Sources, Signal Construction and Sample Characteristics

IV. A. Data Sources

To examine the behavior of each entity, I use quarterly data, spanning 1994-2005, from the CDA/Spectrum database (Form 13F disclosures of institutional holdings), the filings of insider trades (SEC Forms 3, 4, 5), and the Institutional Brokers Estimate System (IBES) database. The 13F form reports all institutions with more than $100 million of total holdings[5], or with common-stock positions within a specific firm of more than 10,000 shares or $200,000. Forms 3, 4 and 5 are obtained from the Securities and Exchange Commission (SEC) Ownership Reporting System data file. This database contains transactions by all insiders who are subject to disclosure as mandated by the SEC Act of 1934, Section 16(a), which mandates the reporting of all trades by any person who is either directly or indirectly the owner of more than 10 percent of any specific equity security by the tenth day of the calendar month after the trading month. The IBES stock recommendations database dates back to 1994, and includes the stock recommendations of financial analysts, as self-reported by over thousands of brokerages from the largest global houses to smaller regional and local shops.

In order to examine returns under varying levels of disagreement, there must exist a disclosure for each signal, as well as corresponding Compustat quarterly data and Center for Research in Security Prices (CRSP) monthly files for each firm in order to control risk over the 12

[5] Other types of security holdings that contribute to the "total holdings" disclosure threshold include convertible bonds, stock options, and preferred stock.

month horizons. Analyses are restricted to U.S. firms listed on the NYSE, AMEX, or NASDAQ stock exchanges. After filtering for missing observations, removing observations where firms do not report in consecutive periods, and deleting stocks with share prices of less than $3 to avoid undue noise in estimating returns (Conrad and Kaul, 1993), my data set consists of 53,966 firm-quarter observations.

IV. B. Signal Construction

The analysts' signal, ANA henceforth, is constructed on a quarterly basis in a manner similar to Jegadeesh, Kim, Krische, and Lee (2004), who find the consensus change in quarterly recommendations to be more informative than the consensus level of the recommendation. I reverse code the variable from each recommendation by subtracting the level of the recommendation from 5, such that a strong buy is now coded as 4, a buy is coded as 3, a hold as 2, a sell as 1, and a strong sell is coded as 0. The quarterly consensus change is taken as the difference between the mean recommendations of the current and prior quarters. If a firm does not have analyst coverage for consecutive quarters, it is removed from the sample. Each signal is then converted into a non-parametric percentile rank in order to account for the right skewness of these signals as documented by Piotroski and Roulstone (2004). In the event that two firms have the same magnitude of consensus change in recommendation, the firm's signal is considered to be stronger if its current level of consensus has a higher rank.

Because Yan and Zhang (2007) document that long-term buy-and-hold style institutional trading is not related to future stock returns, I use Bushee's (1998, 2001) institutional investor classifications[6] to parse out institutional trades by "dedicated" and "quasi-indexing" institutions[7].

[6] Bushee's classification techniques use factor analysis to characterize institutions based upon portfolio diversification, portfolio turnover, and trading sensitivity relative to current earnings, labeling them as either "transient", "dedicated", or "quasi-indexing" institutions. Dedicated institutions tend to prefer longer-term holdings and these institutions often tilt their holdings toward "prudent" stocks (Del Guercio 1996). These institutions are characterized by "relationship investing," which reduces their incentives to search for private information. Quasi-indexing firms have a primary objective of diversification, and are thus less likely to base their trades on information.

[7] In untabulated analyses, I partition the trades from dedicated and quasi-indexing institutions separately to determine whether their net trades are predictive of future returns, and find the informativeness of each group to be insignificantly different from zero at 3, 6, and 12-month time horizons.

Transient investors are characterized as typically holding stakes in numerous firms (higher diversification) and trading frequency (higher turnover), often basing their trades on current earnings or components of such earnings (higher earnings trading sensitivity). The transient institutional signal, TI, is calculated as the difference in shares held by transient institutions from the preceding to the current quarter, divided by the number of shares outstanding in the preceding quarter, as reported in Form 13F. Similar to ANA, the TI signal is also converted into percentile ranks over the entire sample period.

The corporate insider signal, CI, is computed as in Lakonishok and Lee (2001), as the difference between the number of purchases and the number of sales, divided by the total number of purchases and sales, for each reporting period where there is at least one insider trade. For consistency, each signal is converted into a nonparametric variable by ranking the variable into percentiles over the entire sample period. For firms with signals of -1 or +1, the signal is considered to be stronger when the dollar amount traded is larger relative to the total market value of equity for the firm at the end of the quarter.

IV. C. Sample Characteristics

Table 1 shows annual univariate statistics taken from the final sample of firms. On average, insiders appear to be net sellers of stock. This is consistent with past research, and may be because the data reported only reflects shares transacted on the open market, which are unlikely to reflect shares gifted to insiders as part of their compensation plans. Consistent with prior literature, analysts show optimism in their consensus, as firms on average are rated as buy firms. The change in consensus recommendation, or the level of upgrade or downgrade between quarters, is nearly zero, with the exception of the year 2002, where the average change in consensus decreases by 0.10. It is also interesting to note that the mean consensus recommendation decreases from 2.99 in 2001, to 2.68 in 2005. This decrease coincides with the passing of the Sarbanes-Oxley Act (SOX) (passed in July of 2002), which could be consistent with SOX leading to improved financial reporting quality, and a subsequent decrease in the consensus recommendation. On average, transient institutions are net buyers, reflecting the overall growth

in institutional money management over time. In the far right column, inter-party disagreement is calculated as the variance across percentile-ranked signals. Disagreement appears to decrease from the years 2002-2005, perhaps consistent with Sarbanes-Oxley Act resulting in improved disclosure that could decrease disagreement amongst the three parties. It is interesting to note that this proxy for inter-party disagreement is negatively correlated (ρ = -0.29, p-value < 0.0001) with the standard deviation of analysts' consensus recommendations, a common proxy for information uncertainty. This is consistent with inter-party disagreement stemming from the differing environments of the three parties, rather than merely general ambiguity about a firm's future. Pearson correlations (untabulated) between the informed parties' signals show that insider signals are negatively correlated with both analysts (ρ = -0.0430, p-value < 0.0001) and institutions (ρ = -0.1057, p-value < 0.0001), while analysts' recommendation changes and institutions' net shares traded have a positive correlation (ρ = 0.0898, p-value < 0.0001). These correlations are consistent with past literature as discussed in Section II.

Next, I examine whether each informed party's signal exhibits the preferences for particular firm characteristics suggested by past research and the discussion in Section II. Figure 1 plots momentum in the form of prior 12 month returns, against each party's signal strength, as reported by deciles. Consistent with prior literature, analysts' and transient institutions' signals are correlated with positive prior returns, and insiders appear to exhibit contrarian philosophies[8]. At the extreme deciles for BUY signals, institutions have the strongest preferences for positive momentum, followed by analysts, and then insiders. Conversely, at the extreme deciles for SELL signals the opposite is observed. Finally, note the diametrically opposed preferences of insiders and institutions for high momentum stocks. The extreme quintiles for institutional buying behavior and insider selling behavior appears strikingly similar. Institutions buy firms with returns of 3.50% compounded monthly over the year, while insiders sell firms with monthly returns of 3.46%.

[8] 3-Month and 6-Month BHAR's show similar patterns.

Figure 2 plots the market-to-book ratio, a proxy for glamour (high M/B) and value (low M/B) against the signal strength deciles. Overall, insiders exhibit the strongest buying preferences for firms with the lowest levels of market to book, while analysts and institutions exhibit a higher affinity for buying glamour firms. At the univariate level, the relative difference between institutions and analysts is largest at the extreme buying decile. Finally, the extreme insider selling decile and institutional buying decile are again similar, with insiders selling glamour firms with an average market-to-book ratio of 3.51 and institutions buying glamour firms with an average market-to-book ratio of 3.33.

Figure 3 plots signal strength deciles against the preceding six-month total trading volume scaled by total shares outstanding. Consistent with the discussion in Section II, the buying and selling behavior of institutions suggests strong preferences for liquidity. Their U-shaped plot indicates that the largest levels of net buying/selling occur when past trading volume has been high. Analysts also show U-shaped preferences in their stock recommendation behavior with regards to trading volume. Finally, insiders tend to sell most strongly when volume is high, and buy most strongly when volume is low, perhaps consistent with high-volume firms being correlated with investor overreaction and firm overvaluation (Miller, 1977).

Overall, this analysis is consistent with expectations derived from past literature. Insiders appear to be contrarians who favor low volume, neglected value stocks with poor past returns. Conversely, the behavior of analysts and institutions appears to favor firms with high momentum and high expected growth.

To supplement these univariate analyses, I examine the relative preferences of each informed party for the above firm characteristics within a multivariate framework. Due to the non-linear U-shaped distribution for volume, I divide each signal into two partitions by the median signal value, and designate each half as either a favorable or unfavorable signal for each party depending upon whether that group's signal is above or below the median value. For variables in the unfavorable partitions, I multiply the rank signal by -1, such that the coefficients on the independent variables now proxy for increases in net selling/downgrading behavior. I then

run each of the six dependent variables (Analyst Favorable, Analyst Unfavorable, Institution Favorable, Institution Unfavorable, Insider Favorable, Insider Unfavorable) on the predicted variables, while using size as a general control.

Table 2 summarizes these results by showing the coefficients of the key variables in each of the six regressions. The differences between coefficients for momentum, book-to-market, and volume across each group are significant at the 0.01 level[9]. Results of multivariate regressions are consistent with the earlier results. One interesting phenomenon that emerges from this analysis, however, is that transient institutions appear to act as "ultra-momentum" style investors. Of the three entities, they most strongly prefer buying high volume, high momentum, and glamour stocks. Insiders have buying preferences diametrically opposed to those of institutions. Analogously, the analysis of the "negative" signals shows that institutions are most likely to be net sellers of stocks with the worst past returns, the lowest M/B (ultra-value firms), and the highest levels of volume. Again, insiders' selling preferences are in direct contrast to those of institutions. Of the three groups, the firms that they sell most strongly have the highest levels of M/B (ultra-glamour firms) and highest levels of past returns. Finally, the actions of analysts appear less extreme than those of institutions, falling between the actions of institutions and insiders.

Why is it that institutions appear to have similar, but more extreme, preferences for momentum and glamour, relative to analysts? One possibility lies in their reliance on sell-side analysts' in making their trading decisions. Cheng, Liu, and Qian (2006) note that only 5% of institutions rely exclusively on "buy-side" reports. Rather, the majority use a combination of reports from buy-side (exclusive private information) and sell-side analysts (information available for public consumption), and weight each report depending on its strength and accuracy. In order to do so, institutions must wait for the production, disclosure and assimilation of sell-side reports prior to making their trades. If the weight of the sell-side analyst report is sufficiently large in the institutions' trading decision, then the observed actions of the institutions appear to

[9] Test Statistic is calculated according to Clogg, Petkova and Haritou (1995).

mimic analysts' actions, after controlling for such delays[10]. Given that the preferred characteristics of analysts and institutions are largely similar, the lag from institutions prior to their trades causes them to appear as "ultra-momentum" investors relative to analysts.

V. Relative Signal Informativeness at Different Horizons: Results

Table 3 reports mean size-adjusted[11,12] buy and hold abnormal returns over three, six, and twelve month time horizons within each decile of signal strength for analysts, institutions, and insiders. Hedge portfolio returns are calculated as the difference between the BUY (highest quintile ranking) and SELL (lowest quintile ranking) portfolios. A summary of these univariate results is as follows: (1) hedge portfolio returns created from insiders' signals are superior to those of analysts and institutions at all time horizons. (2) Consistent with prior research, the returns for insiders are driven largely by the BUY portfolio. (3) Confirming predictions in Section III, the magnitudes of the insiders' hedge returns continue to grow with time, earning 3.60% over the first six-months and 4.76% over the second six-months of the 12-month window, while institutions and analysts have the highest magnitude of hedge portfolio returns at the 6 month horizon, with returns becoming insignificantly different from zero at the longest, 12-month, horizon. Overall, the evidence of insider superiority increasing over time is consistent with them being contrarians that buy late-stage losers and are able to extract the full benefits of the momentum cycle over the longest time periods. Evidence of hedge returns for analysts and institutions only being significant at 3 and 6 months is also consistent with their preferences for momentum stocks, and their delayed buying behavior relative to insiders.

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[10] Note that because buy-side analysts' reports are private, an asymmetry in information disclosure exists, and sell-side analysts would be unable to use such information in their stock recommendations in a similar fashion.

[11] Size Adjusted Buy and Hold Abnormal Returns (BHAR) are created by calculating each firm's monthly abnormal return by subtracting the average return for firms in the same NYSE size decile, then compounding the corresponding abnormal returns over the specified horizon period. If a firm delists, CRSP delisting returns are used, which are calculated by comparing the value after delisting against the price on the security's last trading period.

[12] Similar inferences are obtained when reporting returns with market-adjusted and raw returns.

Table 4 compares the predictive power of each party's signal when all three signals are used in tandem. For ease of interpretation, I divide the percentile rank of each signal by 99, such that the independent variable for signal strength now ranges between 0 and 1. The coefficient for each party's signal now represents the signal's ability to predict future returns in percentage terms. Following prior literature (Fama and French, 1992), size, book to market, and prior 12 month returns are used as controls for expected returns.

Inferences from the multivariate analyses, after controlling for risk, yield similar conclusions to those in Table 3. The relative magnitudes of each signal's coefficient confirms the superiority of the insider signal, with the insider advantage being most evident at the twelve month horizon, and institutions being the least predictive at all three time horizons. Consistent with the prior univariate analysis and the momentum-like preferences of analysts and institutions, Table 4 shows that the coefficients on institutions' and analysts' signals are largest at the six month horizon. The monotonic increase in the insider signal coefficient over time is consistent with their "late-stage" contrarian behavior.

Table 5 presents results regarding the relative informativeness of each party's signal under conditions of high inter-party disagreement. For each party, ranked signals in the extreme quintiles proxy for strong BUY and SELL signals, which are then used to create high disagreement portfolios. I calculate the relative informativeness of each party's signal when moving away from a full consensus by examining the differences in means of size-adjusted BHAR's for each disagreement portfolio versus a control group where a full consensus exists. For example, I measure the incremental informativeness of an insider BUY signal as the hedge portfolio where insiders are issuing BUY signals, and analysts and institutions are issuing SELL signals, less the consensus control portfolio where all three groups are issuing SELL signals.

Table 5 shows that the insider/buy/12-month deviations yield the most positive and significant BHAR's (8.12%). Similarly, analyst/buy deviations are informative at the shorter 3 and 6 month horizons, and the institutions/buy deviation is informative at the 3 month horizon. The institution/buy/6-month deviation is, however, uninformative (t = 0.42). This may be due to the

fact that transient institutions purchase late-stage winners, leaving them closest to an impending reversal, thus making them uninformative even at mid-stage horizons. Insider/buy at the 3 and 6 month horizons are shown to be informative when deviating from the consensus, yielding BHAR's of 5.57% and 4.40%, respectively, confirming the dominance of the insider buy signal over the combined sell signals from analysts/institutions even at the momentum traders' preferred horizons.

Overall, insider buys at 3/6/12 months, analyst buys at 3/6 months, and institutional buys at 3 months leveraged the power of their signals to add incremental information to prices under heavy disagreement. In a more stringent test, I further examine the extent of each party's contribution by comparing returns associated with each party's deviating buy (sell) signal to a full consensus buy (sell) signal (results untabulated). Given that the full consensus signals produce the most extreme returns, an insignificant difference between a party's deviating signal and these control groups indicates the deviating signal is so powerful that it is indistinguishable from a full consensus in the same direction. Results show that only insider buys at 3/12 months, and insider sells at 12 months are insignificantly different (t = -0.80, -0.26, and 0.55, respectively) from their respective control groups. These results remain consistent with insider superiority, particularly over longer horizons.

The overarching theme from this analysis of inter-party disagreement is that the ability to deviate and remain predictive of future returns relies on two factors: (1) the strength of the deviating signal over the particular time horizon, and (2) the relative weakness of the countervailing forces. Clearly, the insider buy signal is dominant under all time horizons. Other parties are only informative when insiders' countervailing actions are mitigated because they are selling, or because returns are being predicted over shorter time horizons.

VI. Factors Influencing the Hierarchy of Informativeness

Overall, results in the preceding section confirm the superiority of the insider signal, followed by analysts, and then institutions. The following subsections examine the impact of two

factors on the relative hierarchy of signal informativeness for these three groups: (1) firm-level synchronicity, and (2) the passing of Regulation Fair Disclosure.

VI.A. Effects of Firm-Level Synchronicity on Insider Signal Dominance

If insiders' dominant signal comes from superior access to firm-specific knowledge, then the implicit assumption underlying the hierarchy seen in Section V is that firm-specific information, on average, is more responsible for driving stock prices than industry or other macro-level information. In this section, I compare the relative hierarchy between analysts and insiders across environments that differ in the extent that stock prices reflect industry and macro-level versus firm-specific information. I argue that, in instances where more firm-specific information is already impounded in prices, additional actions of insiders are less likely to be relevant, and hence, worse predictors of future returns.

I calculate the relative amount of industry and macro-level versus firm-specific information already impounded in prices at any given point by measuring firm-level "synchronicity" over the preceding 60 months, following the methodology used by Piotroski and Roulstone (2004)[13]. I partition the data into two subsamples, based on the highest (lowest) synchronicity quintile, and run the in-tandem regression presented in Table 4 across the two partitions.

When synchronicity is low, the firm's information environment appears to have impounded into prices relatively small amounts of market and industry information, but relatively large amounts of firm-specific information. Given that Piotroski and Roulstone show analysts to assist the impounding of industry and macro-level information into prices, I predict that:

[13] Piotroski and Roulstone calculate synchronicity as SYNCH = log $(R^2 / 1 - R^2)$ from the following equation:
$FirmRET_t = a + b1*MaRET_t + b2*MaRET_{t-1} + c1*IndRET_t + c2* IndRET_{t-1} + e_t$
FirmRET is the monthly raw return of the firm, while MaRET is the value-weighted market adjusted return from the CRSP monthly stock file. IndRET is the industry return, and is calculated as the value weighted monthly average for all the firms within a given 2-digit SIC code. Piotroski and Roulstone show that analysts (insiders) tend to impound more macro-level (firm-specific) information into prices. Other synchronicity determinants include the overall level of firm diversification, the level of intra-industry competition, and the volatility of the firm's earnings stream.

- When synchronicity is LOW, the comparative advantage of insiders is eroded, and analysts have the strongest predictive power.

Conversely, when synchronicity is high, the firm's returns are largely explained with industry and market returns, implying that the firm's environment is more reflective of systematic information than firm-specific information. Given that insiders are most advantaged with regards to firm specific information, I predict that:

- When synchronicity is HIGH, insiders have the strongest signal, and analysts have a relatively non-informative signal, particularly at the insiders' most informative 12-month horizon.

Table 6 confirms the differing informational advantages of insiders and analysts in each subsample, and illustrates how the existing information environments can change the magnitudes and relative strengths of each entity's predictive power. When synchronicity is high, insiders have the most predictive power on 12 month ahead BHAR's, while the analysts' signal is insignificantly different from zero. Conversely, when synchronicity is low, the ranking of signal strength between insiders and analysts reverses. The analysts' signal is now predictive, while the insider variable becomes insignificant. Results at the 3 month time horizons show the same directional changes in coefficients, with the analysts' signal becoming significantly more powerful in the low synchronicity subsample. Finally, while no particular predictions were made for transient institutions, note that the behavior of their signals weakly mimics that of insiders. Given these findings, transient institutions appear relatively advantaged in terms of firm-specific information, compared to industry-specific information, possibly due to exclusive access to private information from upper-level management[14].

[14] This evidence is also consistent with the spirit of Piotroski and Roulstone's (2004) results. They document that while the overall trades of institutional investors, including but not limited to transient investors, impound firm-specific information, they are weak impounders of this information relative to insiders' trades.

VI.B. Effects of Regulation Fair Disclosure on Relative Informativeness of Analysts' and Institutions' Signals

Reg-FD was adopted by the SEC on October 23, 2000 in order to eliminate the release of selective disclosure by management, so as to reduce information asymmetries between smaller individual investors and professionals. The ruling obligates all publicly traded companies to disclose material information to all investors simultaneously, thereby preventing managers from leaking information to analysts and institutions before a public disclosure. Prior research by Francis, Nanda and Wang (2006) and Ke, Petroni, and Yu (2007) has studied the effects of Reg-FD on analysts and transient institutional investors. Both studies conclude that the passing of Reg-FD reduces private information flows from insiders to analysts and institutions. While both groups are expected to lose predictive power after Reg-FD, whether analysts' or institutions' signals are influenced differentially by Reg-FD remains an unanswered empirical question.

My predictions related to Reg-FD effects on the analyst-institutions hierarchy derive from results of the synchronicity analyses presented in Table 6, and prior research by Piotroski and Roulstone (2004). Since analysts' expertise does not stem from firm-specific information, and the behavior of transient institutions weakly mimics that of insiders, if the passing of Reg-FD results in the halting of firm-specific information flows from insiders to their informed counterparts, analysts should still be able to rely on their industry and macro-economic expertise to add value as information intermediaries. In contrast, transient institutions will have lost their primary source of competitive advantage, leading to a larger loss of predictive power for their signal, relative to the signal of analysts. Therefore, I hypothesize that:

- The attenuation of the institutions' signal is larger than the attenuation of the analysts' signal in the post Reg-FD regime.

I test these predictions by first running a Chow test to determine whether there is a structural change in the regression parameters around the passing of Reg-FD, and then by examining the sub-periods pre- and post- Reg-FD. The results of the Chow test ($F = 41.00$, p-value < 0.0001) show that there indeed exists a structural break around the passing of Reg-FD. Results

of the regression analyses in Table 7 are consistent with a large and very significant loss of predictive power for institutions at all three time horizons ($p < 0.01$ at all horizons). In fact, institutions' signals are significant and positive at all three time horizons pre-FD, earning BHAR's of 4.66%, 3.67%, and 1.93% after controlling for size, M/B, momentum, and other party's signals, but insignificant from zero in the post-FD regime. For analysts' signals, however, the degree of attenuation across the two regimes is insignificantly different from zero at all windows. Overall, these results are consistent with transient institutions deriving informativeness primarily from management's private disclosures, while analysts' informational advantages arise from other sources, possibly their industry expertise.

VII. Conclusion and Future Research Suggestions

In this paper, I contribute to the existing literature on information intermediaries. I focus on sell-side analysts, corporate insiders, and transient institutional investors, and analyze (1) the horizons over which each group impounds information into prices, (2) the circumstances under which each group remains incrementally price informative when the level of inter-party disagreement is high, and (3) the effects of firm-level synchronicity and Reg-FD on each party's relative signal strength. Indirectly, my results are also likely to interest individual investors and money managers who trade by following "smart money" strategies, by offering insight into the interpretation of divergent signals from informed agents.

Overall, I find that the signals of analysts and institutions are predictive of future prices only over shorter horizons, becoming uninformative over a 12-month horizon. Conversely, the insider signal strengthens with the passing of time, and is strongest at 12 months. Both of these results are consistent with each group's environment influencing their investment philosophies, i.e. insiders being forced to act as contrarians due to litigation risk and trading constraints, and analysts and institutions acting as momentum investors due to incentives to generate trade and "window-dress," respectively.

Regarding disagreement among informed agents, my tests indicate that the insider buy signal is dominant, and that under all time horizons, insider' buys are able to deviate from the consensus and still remain informative of prices. Furthermore, when analysts and institutions deviate from the consensus to issue sell signals, neither group is informative at any time horizon, as they are unable to overcome the dominant insider buy signal. Analysts' and institutions' signals are incrementally informative only when buying at their preferred shorter-term horizons, and fighting against the insider sell signal at its weakest horizon. In sum, the ability of each party to disagree with other members of the triad, and remain predictive of future returns is positively correlated with (1) the relative strength of their signal over the given time horizon and (2) the relative weakness of the two countervailing forces.

When firm-level synchronicity is low, implying that prices are more reflective of firm-specific information, the normally dominant insider signal becomes insignificant, even at the insider's preferred 12-month horizon, resulting in a reversal of the insider-analyst informativeness hierarchy. Finally, I show that the institutions' signal is completely attenuated in the post-FD regime, consistent with institutions being unable to create their own informational advantage, being reliant on private communications with upper-level management to earn abnormal returns.

The documentation of inter-party disagreement itself should interest researchers fascinated by the price discovery process. Such tri-modal disagreement could have implications for market efficiency by implicitly suggesting that arbitrageurs may create their own limits-to-arbitrage by trading in non-concerted directions, thereby prolonging, rather than correcting market mispricings. If this is indeed the case, then it would be interesting to study how the divergence of opinion could impede the speed of arbitrage following public information releases. If news is released, and arbitrageurs issue conflicting signals, price may be slower in converging to value, thereby making market anomaly strategies (e.g. momentum, post-earnings announcement drift, accrual fixation) more profitable and more easily executable.

Another avenue for future research involves investigating how differences in each party's relative aversion for idiosyncratic risk may result in inter-party disagreement. Assuming that a

firm's risk profile increases over time (e.g. due to restatement or acquisition of a higher-risk firm), how would each party react? Analysts may choose to downgrade a stock because their recommendations are primarily written for individuals who are impacted by idiosyncratic risk (Goetzmann and Kumar, 2007), (Malmendier and Shanthikumar, 2007). Insiders are also likely to be undiversified individuals, and may choose to sell shares for diversification purposes. Conversely, transient institutions are more likely to be well diversified, and may choose to increase their holdings since their return/risk profile would not be adversely affected.

References

Barber, B. Lyon, J. and Tsai C. (1999). Improved Methods for Tests of Long-Run Abnormal Stock Returns. *The Journal of Finance*, 54 (1):165–201.

Bernard, V. and Thomas, J. 1990. Evidence that stock prices do not fully reflect the implications of current earnings for future earnings." *Journal of Accounting and Economics*, 13(4): 305-340.

Bradshaw, M.T. 2004. How do analysts use their earnings forecasts in generating stock recommendations? *The Accounting Review* 79 (1): 25-50

Brown, L., Hagerman, R., Griffin, P., and Zmijewski, M. 1987. Security Analysts Superiority Relative to Univariate Time-Series Models in Forecasting Quarterly Earnings. *Journal of Accounting and Economics*, 9(1): 61-87.

Bushee, B. 1998. The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review*. 73: 305-333.

Bushee, B.J. 2001. Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research*, 18 (2): 207-246.

Cheng, Y., Liu, M., and Qian, J. 2006. Buy-Side Analysts, Sell-Side Analysts, and Investment Decisions of Money Managers. Journal of Financial and Quantitative Analysis 41 (1): 51-83.

Collins, D.W., Gong, G.J., and Hribar, P. 2003. Investor sophistication and the mispricing of accruals. *Review of Accounting Studies* 8 (2-3): 251-276.

Conrad, J., and Kaul, G. 1993. Long-term market overreaction or biases in computed returns. *Journal of Finance* 48 (1): 39-63.

Damodaran, A. 2003. Investment Philosophies: Successful Investment Philosophies and the Greatest Investors Who Made Them Work. *Wiley Finance*: 312-349.

Daniel, K., Hirshleifer, D. and Subrahmanyam, A. 1998. Investor Psychology and Security Market Under- and Overreactions. *Journal of Finance* 53(6):1839–1885.

Debondt, W. and Thaler, R. 1985. Does the Stock Market Overreact? *Journal of Finance*, 40(3): 793-805.

Del Guercio, D. 1996. The distorting effect of the prudent-man laws on institutional equity investments. *Journal of Financial Economics*, 40(1):31-62.

Falkenstein, E., 1996. Preferences for stock characteristics as revealed by mutual fund portfolio holdings. *Journal of Finance* 51:111-135.

Fama, E.F. and French, K. 1992. The Cross-Section of Expected Returns. *The Journal of Finance*, 47(2): 427-465.

Farber, D. 2005. Restoring Trust After Fraud: Does Corporate Governance Matter? *The Accounting Review*, 80(2): 539-561.

Francis, J., Nanda, D. and Wang, X. 2006. Re-examining the effects of regulation fair disclosure using foreign listed firms to control for concurrent shocks. *Journal of Accounting & Economics*, 41 (3): 271-292.

Gleason, C.A., and Lee, C.M.C. 2003. Analyst forecast revisions and market price discovery. *Accounting Review* 78 (1): 193-225.

Glosten, L. and Milgrom, P., 1985. Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders. *Journal of Financial Economics* 14:71-100.

Goetzmann, W. and Kumar, A., 2007. Why Do Individual Investors Hold Under-Diversified Portfolios? *Working Paper – Yale University*.

Gompers, P. and Metrick, A. 2001. Institutional Investors and Equity Prices. *Quarterly Journal of Economics*, 116(1):229-259.

Heaton, J.B. 2002. Managerial Optimism and Corporate Finance. *Financial Management*, 31(2): 33-45

Huddart, S., Ke, B., and Shi, C. 2007. Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings. *Journal of Accounting & Economics* ,43 (1): 3-36.

Hunton and McEwen. 1997. An Assessment of the Relation between Analysts' Earnings Forecast Accuracy, Motivational Incentives and Cognitive Information Search Strategy. *The Accounting Review*, 72(4): 497-515

Irvine, P. 2000. Do analysts generate trade for their firms? Evidence from the Toronto stock exchange. *Journal of Accounting and Economics* 30(2): 209-226.

Jeegadeesh, N. and Titman, S. 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *Journal of Finance* 48 (1): 65-91.

Jegadeesh, N., Kim, J., Krische, S.D., and Lee, C.M.C. 2004. Analyzing the analysts: When do recommendations add value? *Journal of Finance*, 59(3): 1083-1124.

Ke, B., Huddart, S., and Petroni, K. 2003. What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of Accounting & Economics*, 35 (3): 315-346.

Ke, B., and Petroni, K. 2004. How informed are actively trading institutional investors? Evidence from their trading behavior before a break in a string of consecutive earnings increases. *Journal of Accounting Research*, 42 (5): 895-927,

Ke, B., Petroni, K., and Yu, Y. 2007. The effect of Regulation FD on transient institutional investors' trading behavior. *Working Paper – Penn State University*.

Ke, B., and Ramalingegowda, S. 2005. Do institutional investors exploit the post-earnings announcement drift? *Journal of Accounting & Economics*, 39(1): 25-53.

Lakonishok, J., and Lee, I. 2001. Are insider trades informative? *Review of Financial Studies* 14 (1): 79-111.

Lakonishok, J., Shleifer, A., Thaler, R., and Vishny, R. 1991. Window dressing by pension fund managers. *American Economic Review* 81 (2): 227-231.

Lin, H. and McNichols, M. 1998. Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics*, 25(1): 101-127.

Malmendier, U. and Shanthikumar, D., 2007. Do Security Analysts Speak in Two Tongues? *Working Paper – University of California, Berkeley*.

Malmendier, U. and Tate, G. 2005. CEO Overconfidence and Corporate Investment. *The Journal of Finance*, 60(6): 2661–2700.

Michaely, R. and Womack, K. 1999. Conflict of interest and the credibility of underwriter analyst recommendations. *Review of Financial Studies*, 12(4): 653-686.

Miller, E. 1977. Risk, Uncertainty, and Divergence of Opinion. *The Journal of Finance*, 32(4):1151-1168.

O'Brien, P. and Bhushan, R. 1990. Analyst Following and Institutional Holding, *Journal of Accounting Research*, 28: 55-76.

O'Neal, E.S. 2007. Window dressing and equity mutual funds. *Working Paper – Wake Forest University*.

Piotroski, J.D., and Roulstone, D.T. 2004. The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices. *Accounting Review* 79 (4): 1119-1151.

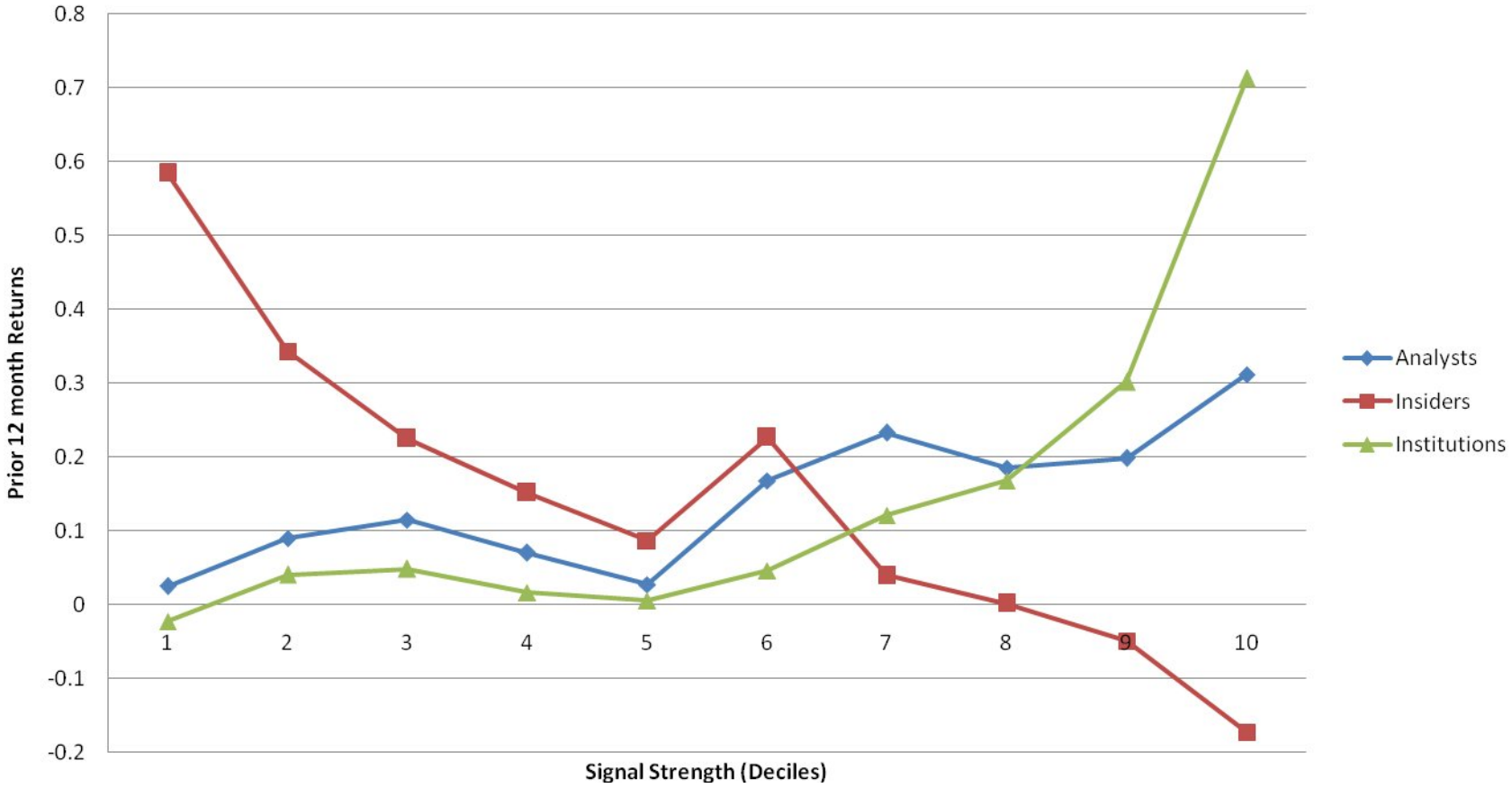
Piotroski, J.D., and Roulstone, D.T. 2005. Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations? *Journal of Accounting & Economics* 39 (1): 55-81.

Rozeff, M.S., and Zaman, M.A. 1998. Overreaction and insider trading: Evidence from growth and value portfolios. *Journal of Finance* 53 (2): 701-716.

Shleifer, A., and Vishny, R.W. 1997. The limits of arbitrage. *Journal of Finance* 52(1): 35-55.

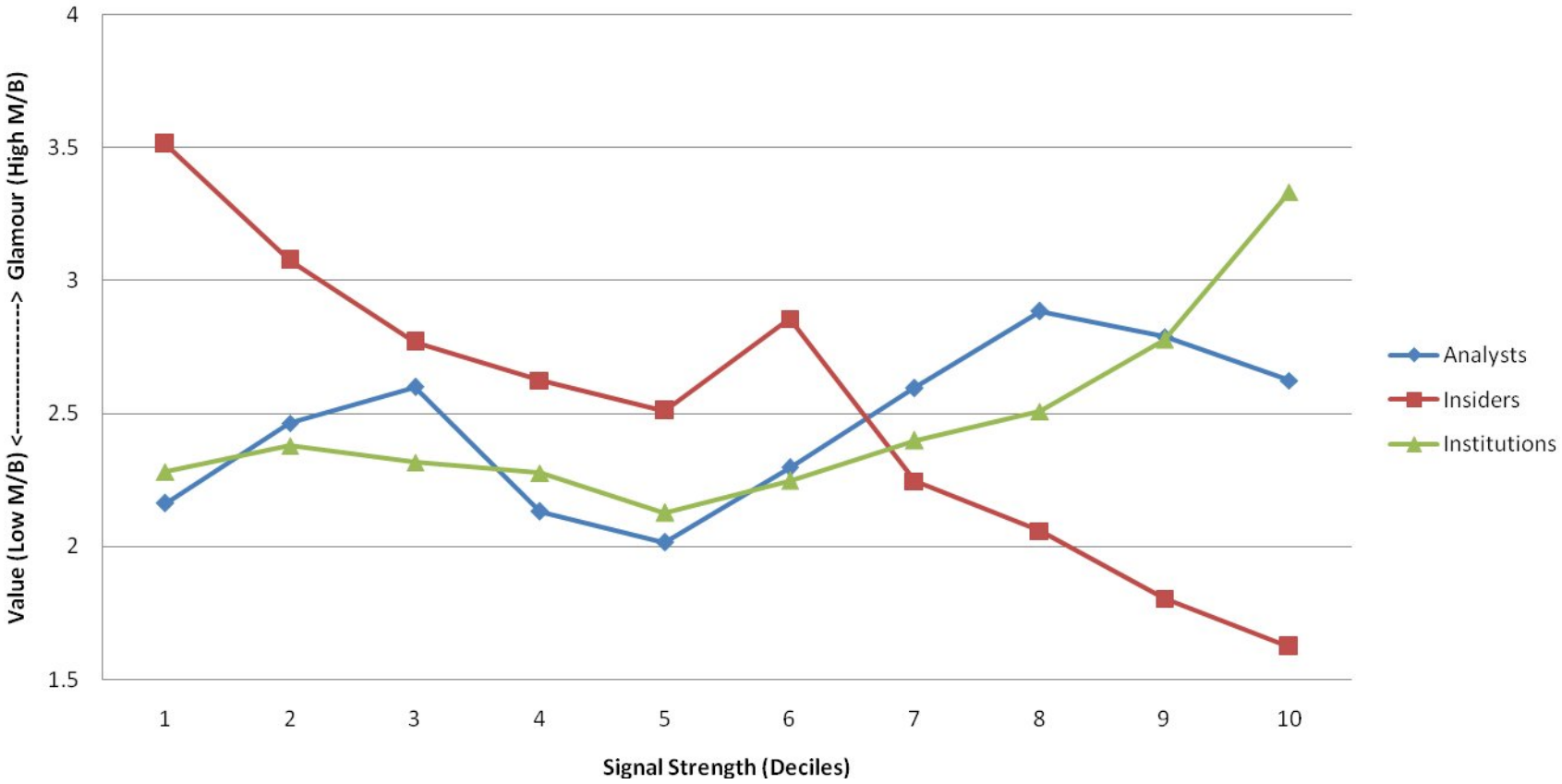
Yan, X. and Zhang, Z. 2007. Institutional Investors and Equity Returns: Are Short-term Institutions Better Informed? *The Review of Financial Studies*, Forthcoming.

Figure 1
12 Month Prior Returns vs. Informed Signals



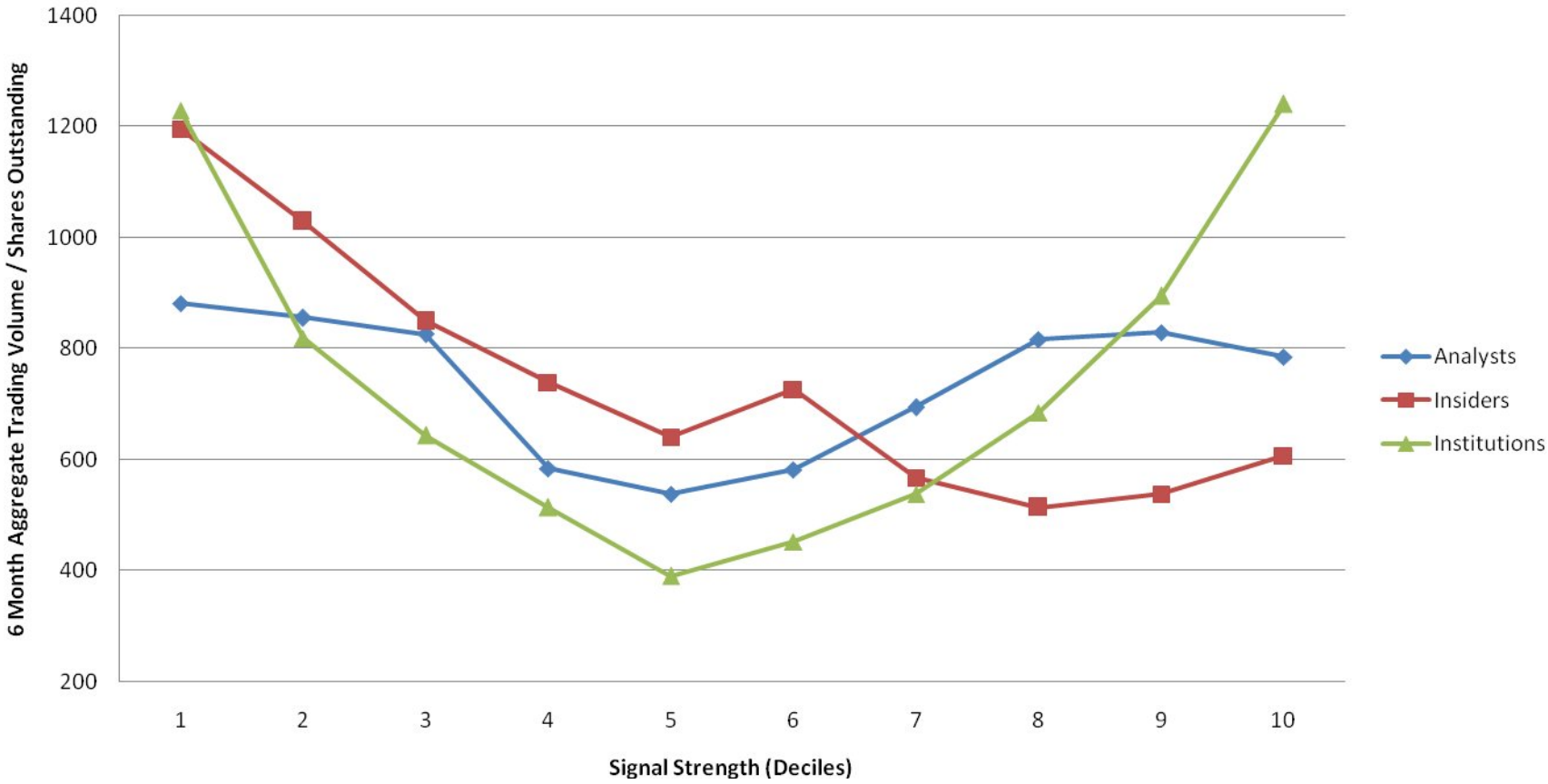
This figure presents average prior 12-month returns from NYSE/NASDAQ/AMEX firms between 1994-2005 across the decile-ranked informed signals of analysts, transient institutions, and analysts, as detailed in Section IV.B. Prior 12-month returns are calculated as monthly compounded raw returns using the Center for Research in Security Prices (CRSP) monthly stock file.

Figure 2
Market-to-Book vs. Informed Signals



This figure presents market-to-book ratios from NYSE/NASDAQ/AMEX firms between 1994-2005 across the decile-ranked informed signals of analysts, transient institutions, and analysts, as detailed in Section IV.B. Market-to-book ratios are calculated using the Compustat Industrial Quarterly database at the start of each quarter as the market value of equity (product of common shares outstanding multiplied by share price) divided by the book value of equity.

Figure 3
6-Month Trading Volume vs. Informed Signals



This figure presents trading volume from NYSE/NASDAQ/AMEX firms between 1994-2005 across the decile-ranked informed signals of analysts, transient institutions, and analysts, as detailed in Section IV.B. Trading volume is calculated as the sum of monthly volume for each firm over the prior six months divided by the firm's total number of common shares outstanding at the start of each quarter.

Table 1
Summary Statistics of Informed Parties' Actions from 1994-2005

Year	# of Firms	Insider Net Trade Ratio (Shares)	Insider Net Trade Ratio (Dollars)	Analysts Consensus Rec	Change in Analysts Consensus Rec	Average of Analysts Recs per firm	Analyst Std Dev of Consensus Rec	Percent Change in Transient Institutions Holdings (Shares)	Disagreement
1994	2899	-0.13649	-0.20153	2.9381	-0.01949	7.26664	0.68659	-0.08007	798.112
1995	3479	-0.20146	-0.22312	2.92112	-0.03255	7.12963	0.66104	0.20575	795.325
1996	3885	-0.18634	-0.26993	2.93705	-0.01182	6.98095	0.65282	0.22054	814.05
1997	4234	-0.23509	-0.24955	3.01584	-0.01586	6.65281	0.60844	0.23024	795.455
1998	4612	-0.04887	-0.12244	3.0093	-0.02731	6.77472	0.59711	0.05212	838.606
1999	4576	0.01082	-0.15262	2.99226	-0.01587	7.9646	0.57542	0.14264	884.211
2000	4737	-0.13232	-0.26245	3.03092	-0.02094	8.1159	0.56008	0.15551	892.146
2001	4809	-0.35212	-0.36424	2.99378	-0.01738	7.66937	0.58772	0.91293	883.911
2002	4706	-0.26944	-0.26591	2.79048	-0.10029	7.66532	0.65553	0.07357	935.595
2003	4901	-0.46631	-0.37087	2.55432	-0.02422	7.77311	0.7163	0.69929	905.491
2004	5561	-0.54504	-0.37177	2.61188	0.00532	8.14817	0.7121	0.43613	841.694
2005	5567	-0.52345	-0.31549	2.67925	0.00163	8.54338	0.72282	0.23205	784.172

This table provides descriptive statistics at an annual level for the firms included in the sample. The total number of firm-quarters in the sample is 53,966. The sample consists of all firms listed on NYSE, AMEX, or NASDAQ stock exchanges from 1994-2005, a total of 48 quarters, with data being taken from the CDA/Spectrum database (Form 13F disclosures of institutional holdings), the filings of insider trades (SEC Forms 3, 4, 5), and the Institutional Brokers Estimate System (IBES) database. The insider net trade ratios is calculated as the total number of purchases less the number of sells (in either shares or dollars traded), divided by the sum of shares and purchases. The change in transient institutions holdings is calculated as the difference in shares held by transient institutions from the current quarter to the previous quarter, divided by the number of shares outstanding at the end of the preceding quarter. Change in analyst consensus recommendation level is calculated as the change in the mean level of recommendation from the preceding to the current quarter. Disagreement is calculated as the variance across percentile-ranked signals.

Table 2
Multivariate Analysis of Relative Preferences for Volume, B/M, and Momentum for Informed Parties

$$Signal_t = \alpha + \beta_0 Volume_{t,t-6} + \beta_1 Momentum_{t,t-12} + \beta_2 B/M_t + \beta_3 Size_t + \varepsilon_t$$

PANEL A: FAVORABLE SIGNALS						
	ANA	TI	CI	ANA - CI	TI - CI	TI - ANA
VOLUME	0.00202***	0.00421***	-0.0003302***	0.002350***	0.004540***	0.002190***
B/M	-0.61698***	-1.54654***	2.01024***	-2.627220***	-3.556780***	-0.929560***
MOMENTUM	0.13486	1.80527***	-2.27198***	2.406840***	4.077250***	1.670410***
SIZE	2.46627***	-0.43121***	-3.19219***	5.65846***	2.76098***	-2.89748***

PANEL B: UNFAVORABLE SIGNALS						
	ANA	TI	CI	ANA - CI	TI - CI	TI - ANA
VOLUME	0.00009011	0.00532***	0.00192***	-0.001830***	0.003400***	0.005230***
B/M	-0.17249***	0.51121***	-3.23554***	3.063050***	3.746750***	0.683700***
MOMENTUM	0.06366	-1.21541***	1.21882***	-1.155160***	-2.434230***	-1.279070***
SIZE	-2.86346***	0.17009***	-2.9832***	0.11974*	3.15329***	3.03355***

Volume is calculated as the aggregated number of shares traded in the prior six months, divided by the number of shares outstanding at the start of each quarter. Book-to-market is calculated as the log (Book Value of Equity/Market Value of Equity) at the start of each quarter. Momentum is calculated as the compounded raw returns using CRSP monthly data over the prior 12 months. Size is taken as the log (Market Value of Equity) at the beginning of each quarter, and is used as a control.

Panel A indicates the regression coefficient for each characteristic when regressed on the party's signal. (Un)Favorable signals are those (below) above the median signal rank, calculated as discussed in Section IVB. In Panel B, the ranked signal is multiplied by -1, such that coefficients on the independent variables now proxy for increases in net selling/downgrading behavior. Two-tailed statistical significance levels at 1%, 5%, and 10% are indicated as ***, **, and * respectively, based on t-statistics calculated with Newey-West autocorrelation consistent standard errors.

Table 3
Future Returns by Informed Party Signal Strength

	Analysts (ANA)			Transient Institutions (TI)			Corporate Insiders (CI)		
Ranked Signal Strength By Decile	3 Month Future Returns	6 Month Future Returns	12 Month Future Returns	3 Month Future Returns	6 Month Future Returns	12 Month Future Returns	3 Month Future Returns	6 Month Future Returns	12 Month Future Returns
1	-0.003301	0.003546	0.030453	0.007541	0.003061	0.028621	-0.008941	-0.013817	-0.018065
2	-0.001668	-0.004727	0.006703	0.005502	0.006476	0.016641	-0.002616	0.007927	0.00385
3	-0.000474	0.004133	0.017223	0.001388	0.004137	0.024632	-0.001791	0.003831	0.010012
4	0.006424	0.009369	0.027595	0.001064	0.007654	0.025874	0.001953	0.000822	0.019234
5	0.009896	0.015901	0.031716	0.006208	0.014345	0.027563	-0.000766	-0.000909	0.01184
6	0.012315	0.019027	0.03986	0.002427	0.010941	0.047204	0.003718	0.004307	0.006686
7	0.012448	0.015863	0.030601	0.006431	0.012397	0.020043	0.010056	0.019354	0.032666
8	0.002217	0.005463	0.011649	0.007599	0.020474	0.042241	0.007198	0.015679	0.030269
9	0.008162	0.013976	0.024697	0.002708	0.00915	0.015904	0.01877	0.023027	0.057903
10	0.010677	0.022834	0.03388	0.014891	0.01471	0.003922	0.028109	0.043189	0.098653
SELL (1-2)	-0.0024845	-0.0005905**	0.018578***	0.0065215***	0.0047685***	0.022631***	-0.0057785*	-0.002945	-0.0071075*
BUY (9-10)	0.0094195***	0.018405***	0.0292885***	0.0087995***	0.01193***	0.009913***	0.0234395***	0.033108***	0.078278***
BUY - SELL	0.011904***	0.0189955***	0.0107105	0.002278*	0.0071615**	-0.012718	0.029218***	0.036053***	0.0853855***

This table documents average future buy and hold size-adjusted returns calculated as described in Barber, Lyon, and Tsai (1999) for each ranked signal, sorted by decile over three, six, and twelve month time horizons. The signals of analysts, transient institutions, and analysts, ANA, TI, and CI, are detailed in Section IV.B. Hedge returns are calculated by subtracting the SELL portfolio from the BUY portfolio returns, where BUY and SELL portfolios correspond to the lowest and highest quintile of signal strength for each group, respectively. Two-tailed statistical significance levels at 1%, 5%, and 10% are indicated as ***, **, and * respectively.

Table 4
Regressions of Future Returns on Informed Signals

	3 Month Future Returns		6 Month Future Returns		12 Month Future Returns	
	Estimate	t value	Estimate	t value	Estimate	t value
INTERCEPT	0.022095	3.59***	0.042699	4.29***	0.125155	6.88***
SIZE	-0.00349	-4.99***	-0.00559	-4.46***	-0.01447	-5.88***
B/M	0.014061	6.9***	0.022778	6.35***	0.039824	5.55***
MOMO	0.014772	6.42***	0.019957	4.75***	0.010737	1.94*
ANA	0.0153	4.07***	0.0213	3.87***	0.0213	2.33**
CI	0.0223	5.17***	0.0274	3.78***	0.0653	4.92***
TI	0.0073	1.75*	0.0156	2.48**	0.0152	1.46

This table reports regressions of future market-adjusted buy-and-hold abnormal (BHAR) returns on all three signals. Size, book-to-market, and momentum are used as controls for expected returns. Market-adjusted BHAR's are calculated as monthly compounded returns over the given horizon less the monthly compounded returns of the value-weighted CRSP index. Size is taken as the log (Market Value of Equity) at the beginning of each quarter. Book-to-market is calculated as the log (Book Value of Equity/Market Value of Equity) at the start of each quarter. Momentum is calculated by compounding prior raw returns using monthly data over the prior 12 months. Two-tailed statistical significance levels at 1%, 5%, and 10% are indicated as ***, **, and * respectively, based on t-statistics calculated with Newey-West autocorrelation consistent standard errors.

Table 5
Hedge Portfolio Returns of Informed Signals Under Inter-Party Disagreement

		Future Returns	Mean	t-stat	Excess Return of Deviating BUY over Consensus SELL	t-stat
	Consensus SELL	3 Month	-0.036446	-3.05***		
		6 Month	-0.036231	-2.29**		
		12 Month	-0.021236	-0.68		
PANEL A: DEVIATING BUY SIGNALS	CI	3 Month	0.019247	1.6	5.57%	4.65***
		6 Month	0.007720	0.52	4.40%	2.81***
		12 Month	0.059998	2.48***	8.12%	2.05**
	ANA	3 Month	-0.010860	-0.82	2.56%	2.23**
		6 Month	0.003337	0.18	3.96%	2.47**
		12 Month	-0.002731	-0.1	1.85%	0.45
	TI	3 Month	-0.009486	-0.8	2.70%	2.25**
		6 Month	-0.029593	-1.87*	0.66%	0.42
		12 Month	-0.027511	-0.99	-0.63%	-0.15
		Future Returns	Mean	t-stat	Excess Return of Deviating SELL over Consensus BUY	t-stat
	Consensus BUY	3 Month	0.037141	2.4***		
		6 Month	0.057334	2.49***		
		12 Month	0.071428	2.09**		
PANEL B: DEVIATING SELL SIGNALS	CI	3 Month	0.012725	1.22	-2.44%	-1.18
		6 Month	0.028576	1.82*	-2.88%	-0.67
		12 Month	0.000753	0.03	-7.07%	-1.58
	ANA	3 Month	0.028434	1.75*	-0.87%	-0.65
		6 Month	0.036751	1.57	-2.06%	-0.92
		12 Month	0.072892	2.02**	0.15%	0.03
	TI	3 Month	0.049796	3.25***	1.27%	0.85
		6 Month	0.036553	1.85*	-2.08%	-0.64
		12 Month	0.064177	2.21**	-0.73%	-0.16

This table reports hedge portfolio returns using the means of size-adjusted buy-and-hold abnormal returns, calculated as described in Barber, Lyon, and Tsai (1999), over three, six, and twelve month horizons when one group's action deviates from the actions of the other two. In Panel A, the deviating party has a BUY signal, where the other two parties issue SELL signals within the same quarter. In Panel B, the deviating party has a SELL signal, where the other two party members issue BUY signals within the same quarter. BUY (SELL) signals are those that fall into the highest (lowest) quintile of signal ranks for each informed party within the given period. Hedge portfolio returns for each group are calculated in panel A (B) as the difference between deviating signal portfolios and the full-consensus SELL (BUY) portfolios. Statistical significances at 1%, 5%, and 10% are reported as ***, **, and *, respectively.

Table 6
Regressions of Future Returns on Informed Signals Partitioned by Synchronicity

		High Synchronicity		Low Synchronicity	
	Parameter	Estimate	t Value	Estimate	t Value
Panel A: 12 Month Future Returns	INTERCEPT	0.128876	2.86***	0.064945	1.56
	SIZE	-0.01467	-2.76***	0.003897	0.66
	B/M	0.042696	2.74***	0.078962	3.85***
	MOMO	0.005465	0.5	0.04501	3.15***
	ANA	0.00715	0.29	0.03715	1.82*
	CI	0.09035	2.49***	0.01446	0.6
	TI	0.04654	1.71*	-0.0255	-0.98
Panel B: 6 Month Future Returns	INTERCEPT	0.051119	1.99**	0.022537	0.91
	SIZE	-0.00479	-1.65*	0.002025	0.61
	B/M	0.026218	3.22***	0.031826	3.22***
	MOMO	0.0153	1.75*	0.023475	2.6**
	ANA	0.01192	0.84	0.01929	1.53
	CI	0.02651	1.33	0.01028	0.68
	TI	0.01504	0.95	-0.0056	-0.36
Panel C: 3 Month Future Returns	INTERCEPT	0.036785	1.9*	0.007952	0.53
	SIZE	-0.0032	-1.85*	0.000562	0.29
	B/M	0.022046	4.02***	0.016279	2.77***
	MOMO	0.014581	2.73***	0.014883	2.66***
	ANA	0.00589	0.64	0.01468	1.77*
	CI	0.01618	1.26	0.00935	1
	TI	0.00774	0.73	-0.0002	-0.02

This table reports regressions of future market-adjusted buy-and-hold abnormal (BHAR) returns on all three informed signals, using size, book-to-market, and momentum as controls for expected returns, identical to Table 6. Panels A, B, and C report future BHAR's at the 12, 6, and 3 month horizons, respectively, in both high and low synchronicity conditions. Synchronicity, detailed in Section V.B. is calculated using a rolling regression over the past 60 months for each firm following Piotroski and Roulstone (2004), and is further described in Section V.B. The high (low) synchronicity conditions in each panel consist of the highest (lowest) quintile of firms. Two-tailed statistical significance levels at 1%, 5%, and 10% are indicated as ***, **, and * respectively, based on t-statistics calculated with Newey-West autocorrelation consistent standard errors.

Table 7
Regressions of Future Returns on Informed Signals Partitioned by Pre and Post-Regulation FD periods

		Pre Reg-FD		Post Reg-FD	
	Parameter	Estimate	t Value	Estimate	t Value
Panel A: 12 Month Future Returns	INTERCEPT	-0.00547	-0.2	0.274192	12.48***
	SIZE	-0.01061	-2.79***	-0.0265	-10.54***
	B/M	0.008693	0.75	0.063851	9.88***
	MOMO	-0.00214	-0.27	0.007332	1.15
	ANA	0.03407	2.18**	0.01396	1.39
	CI	0.09382	4.38***	0.08478	6.05***
	TI	0.04664	2.53**	-0.0175	-1.56
Panel B: 6 Month Future Returns	INTERCEPT	-0.03582	-2.4**	0.143844	11.12***
	SIZE	-0.00208	-1.11	-0.01474	-9.96***
	B/M	0.012892	2.33**	0.029855	7.83***
	MOMO	0.024144	4.08***	0.004551	1.08
	ANA	0.02483	2.81***	0.01799	2.77***
	CI	0.04555	4.09***	0.03798	4.47***
	TI	0.0367	3.45***	-0.0066	-0.93
Panel C: 3 Month Future Returns	INTERCEPT	-0.02999	-3.45***	0.090899	9.59***
	SIZE	-0.00095	-0.91	-0.01004	-10.39***
	B/M	0.00809	2.59***	0.018462	7.4***
	MOMO	0.019605	5.67***	0.001941	0.84
	ANA	0.01516	2.75***	0.0177	3.67***
	CI	0.03586	5.74***	0.02809	4.66***
	TI	0.01935	3.01***	-0.0065	-1.21

This table reports regressions of future market-adjusted buy-and-hold abnormal (BHAR) returns on all three informed signals, using size, book-to-market, and momentum as controls for expected returns. Panels A, B, and C report future BHAR's at the 12, 6, and 3 month horizons, respectively, in both the pre Reg-FD (1994-2000) and post Reg-FD (2001-2005) eras. Two-tailed statistical significance levels at 1%, 5%, and 10% are indicated as ***, **, and * respectively, based on t-statistics calculated with Newey-West autocorrelation consistent standard errors.