Accepted Manuscript

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PII: S0378-4266(09)00202-7
DOI: 10.1016/j.jbankfin.2009.08.006
Reference: JBF 3082

To appear in: *Journal of Banking & Finance*

Received Date: 6 August 2008
Accepted Date: 7 August 2009

Mutual fund trades and the value of contradictory private information

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This version: July 27th, 2009

Abstract

We investigate the performance of mutual funds that trade using private information. These funds are uniquely identified from a set of 2,730 funds with 44,315 fund-periods between 1994 and 2005. We compare the alignment of fund trades with brokers' recommendations, which we regard as "public information" in the universe of informed and uninformed mutual funds. Funds that systematically trade counter to the public information form a homogenous subset of the privately informed funds. By using private information that contradicts the public information, these funds exhibit a superior average performance. After we control for serial correlation in fund returns, we assess this advantage as being an economically significant 1.7% per annum. We also show empirically that smaller funds are better able to capture the benefit of private information.

JEL classification: G2; G11; G14; G23

Keywords: Mutual fund; Broker recommendations; Private information

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1. Introduction

Grossman and Stiglitz (1980) present a rational expectations equilibrium model in which informed investors respond to private information concerning a risky asset while uninformed investors respond to price information that partially reveals the private signal. They suggest private information should provide investors with the opportunity to earn greater returns. To test this proposition, most studies use information available to a subset of investors to proxy private information, and assess its return benefit relative to the performance of the wider, uninformed population.

Kacperczyk and Seru (2007) classify mutual funds as uninformed when they trade using a proxy for public information, and as informed when they conduct trades that appear inconsistent with this information. Similar to Kacperczyk and Seru (2007), we use broker recommendations as a proxy for public information. We also use broker recommendations to identify mutual funds that systematically trade on public information, which we classify as uninformed. However, in contrast to Kacperczyk and Seru (2007), we statistically identify funds that trade counter to brokers' recommendations, and classify these as informed investors. We use the Grossman and Stiglitz (1980) rational expectations equilibrium framework to develop our predictions.

Our empirical technique integrates the periodic stock holdings of mutual funds obtained from Thomson Financial Services Inc. with the consensus recommendations provided by Institutional Brokers' Estimate System (IBES). By analyzing the trades of equity mutual funds in 44,315 fund-periods between 1994 and 2005, we are able to identify individual funds that align their trades with brokers' recommendations, and those that trade counter to the recommendations. We compare the return distributions of these two groups, and find that funds that trade contrary to brokers' recommendations earn statistically and economically significant higher average returns. We suggest that this reflects private information.

In Section 2 a brief review of the literature using brokers' recommendations to proxy private or public information is presented. Section 3 derives our empirical predictions. In Section 4 we describe the data and outline our research procedure. We analyze the alignment of mutual fund trades with recommendations and how this affects fund returns in Section 5. In Section 6, we perform robustness tests while Section 7 summarizes and concludes the research.

2. Literature review: Broker recommendations

Earlier studies invariably used brokers' recommendations as a proxy for private information, while more recent studies use them as a proxy for either private or public information.[1] However, determining whether they are being used to proxy private or public information depends more on the context in which they are used rather than the researcher's view of how widely the recommendations are disseminated. For example, when researchers use brokers' recommendations as "information", which they compare with the alternative "no information", the context most closely approximates our usage of the term "private information".

Elton, Gruber, and Grossman (1986) view brokers' recommendations as a proxy for private information. They demonstrate that by using these recommendations to create hypothetical portfolios of stocks, it is possible to earn excess returns. While changes to recommendations provide greater returns, standing recommendations also contain valuable information. They

[1] For example, Elton, Gruber and Grossman (1986) use *IBOS* and Womack (1996) uses *First Call*, obtained from proprietary data providers, for their source of brokers' recommendations. These recommendations are now more easily accessed.

report that significant excess returns are earned in the month of publication of the recommendation, and in the following month. Stickel (1995) and Womack (1996) also use brokers' recommendations to proxy private information, but focus on changes using event study methodologies. Both studies find that excess returns are possible, and Womack (1996) shows that they can persist for six months after the change.

Several studies have examined circumstances where brokers' recommendations contain varying private information. Sant and Zaman (1996) show that brokers' recommendations have greater value when the stocks are followed by fewer analysts. Similarly, Bradley, Chan, Kim and Singh (2008) find that for initial public offerings, analyst's recommendations contain less information when firms are widely followed, while Boulatov, Hatch, Johnson and Lei (2009) suggest that stocks which receive less attention by dealers are less efficiently priced. Autore, Kovacs and Sharma (2009) advise that analysts expend significant resources identifying mispriced securities.[2] These costs may be avoided if analysts are affiliated to firms which reveal their private information. However, since the introduction of Regulation Fair Disclosure which sought to limit the release of information to affiliated analysts, Cornett, Tehranian and Yalcin (2007) find that the more pronounced market reaction to the downgrades of affiliated analysts has decreased.

Brokers' recommendations adopted by institutional investors are also used as "private" information in studies by Barber, Lehavy, McNichols, and Trueman (2001), Chen and Cheng (2006), and Brown, Wei, and Wermers (2008). Barber, Lehavy, McNichols, and Trueman (2001) examine the returns from hypothetical portfolios formed using consensus recommendations, and

[2] Autore, Kovacs and Sharma (2009) show that brokers garner private information from their assessment of corporate governance quality.

demonstrate that private information can provide excess returns, but only when transaction costs are ignored. Chen and Cheng (2006) find that changes to the proportions of institutional stock ownership are positively correlated with contemporaneous brokers' recommendations. They also find that, as a consequence of the recommendations, institutions increase (decrease) their ownership of stocks that subsequently out-perform (under-perform) after risk adjustment. Accordingly, they conclude that recommendations contribute to the superior performance of mutual funds.

Kacperczyk and Seru (2007) use brokers' recommendations to proxy stock specific public information that is available to mutual fund managers. They use changes to the composition of a fund's portfolio that are uncorrelated with recent changes to brokers' recommendations as evidence of private information. Hence, they compare the returns of the funds that rely on the recommendations (uninformed investors) with the returns of funds that do not (informed investors). Their empirical results indicate a negative relation between fund performance and reliance on public information. That is, funds underperform if they select stocks based on brokers' recommendations but outperform if their selection of stocks is based on private information.

Intuition suggests that mutual funds would only trade counter to brokers' recommendations on a systematic basis if they possessed private information. However, Kacperczyk and Seru (2007) regard such trades as being motivated by public information because they are correlated, albeit negatively, with these recommendations. Furthermore, because they classify trades that are uncorrelated with recommendations as being motivated by private information, they are unable to distinguish informed funds from those that select stocks randomly.

Brown, Wei and Wermers (2008) focus on the interaction of broker recommendations and the associated herding behavior on individual stock returns when mutual funds in unison adopt the recommendation. This herding behavior changes the return profiles of the stocks. They report that stocks with both broker recommendation upgrades and buy herding behavior in the following quarter are characterized by initial superior performance, whereas stocks with broker recommendation downgrades and sell herding behavior initially underperform. Notably, both groups exhibit stock price reversals which are delayed until the third and fourth quarters after herding, probably because herding behavior is persistent. By implication, mutual funds that acquire (sell) stocks with recommendation upgrades (downgrades) as part of a herd may initially outperform funds that neither follow broker recommendations nor herd, and may also exhibit relative underperformance six months later.

The present study empirically determines whether the individual fund's trades are positively, negatively or uncorrelated with brokers' recommendations. While the initial returns of funds with positively correlated trades may be enhanced by herding behavior, funds with negatively or uncorrelated trades should be unaffected. Accordingly, herding does not offer an alternative explanation to our premise that funds which trade counter to public information use private information which, assuming it is correct, will result in positive abnormal returns.

3. Empirical predictions

We derive our empirical predictions within the Grossman and Stiglitz (1980) rational expectations equilibrium framework. In the application of this model to the universe of mutual fund investors, we regard brokers' recommendations as publicly available information. These recommendations do not provide an expected valuation of an asset, but rather provide a recommendation as to whether it should be purchased or sold given its current market price. Nonetheless, this information is available to all mutual fund investors, and as Brown, Wei, and Wermers (2008) demonstrate, is impounded in their collective buying and selling behavior.

In the same way that public information about an asset is impounded in the trading behavior of the mutual funds, public information is impounded in the return expectations of the privately informed mutual funds. This insight allows us to apply the Grossman and Stiglitz (1980) framework, and demonstrate that a private (information) signal about an asset is directly related to informed investor demand for that asset.[3] Accordingly, informed investors increase (decrease) their demand when private expected returns on a risky asset are high (low), irrespective of the observed buying and selling behavior of the uninformed investors.

The trades of privately informed mutual funds may exhibit a range of alignments with brokers' recommendations as a consequence of their response to private signals that are variously aligned. Notably, and in contrast to Kacperczyk and Seru (2007), this includes funds that trade counter to brokers' recommendations. Where mutual funds trade in the same direction with respect to brokers' recommendations, it is not possible to distinguish privately informed from uninformed funds. However, informed funds distinguish themselves when they systematically trade in the opposite direction from their uninformed counterparts.

Similar to Kacperczyk and Seru (2007) we use the alignment of fund trades to identify funds that are privately informed. However, they classify funds as privately informed when their trades are uncorrelated[4] with brokers' recommendations whereas we classify funds as uniquely

[3]By assuming all public information is impounded in the return expectations of privately informed funds, we avoid the Kacperczyk and Seru (2007) requirement for two types of signal – one public and one private.

[4] Funds may be motivated to trade particular stocks for other reasons such as the stock's liquidity, portfolio rebalancing, risk management and a response to fund flows. These trades may be independent of information in

privately informed only when they trade counter to brokers' recommendations. In addition, we conjecture that private information may be incrementally more valuable when it contradicts public information compared to when it provides the same signal to buy or sell a stock as the brokers' recommendations.

Consistent with the Grossman and Stiglitz (1980) prediction that informed investors increase their demand when expected returns on the risky asset are high, and that these trades will result in positive abnormal returns if the private information proves to be accurate,[5] we formally predict:

Prediction 1: *Mutual funds that trade counter to the direction of brokers' recommendations will receive higher risk adjusted returns.*

Prior research has shown that fund size can impact the prices of the shares that are traded. Keim and Madhavan (1998) find that large trades have the greatest price effect, and are more likely to reveal information because they are commonly traded in packages or "shopped" before execution. Chen, Hong, Huang, and Kubik (2004) show that fund performance decreases with fund size, and attribute this to transaction costs associated with liquidity or price impact. Small funds have less price impact on the stocks they wish to trade, with less information leakage, and are therefore better placed to capture the higher risk adjusted returns. Therefore, we also predict:

Prediction 2: *Of the mutual funds that trade counter to the direction of brokers recommendations, smaller funds will generate higher risk adjusted returns.*

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either the private or public domain such that, in common with the trades that Kacperczyk and Seru (2007) classify as informed, they do not correlate with broker's recommendations.

[5] We thank an anonymous reviewer for succinctly stating this proposition.

4. Data description and methodology

4.1. Data description

We use mean brokers' recommendations, which IBES reports monthly, for the period January 1994 – December 2005 to proxy publicly available information. Covering the same interval, we obtain the periodic stock holdings of all US equity mutual funds from Thomson Financial Services Ltd. We infer transactions from changes to the holdings, which are most commonly reported quarterly, while allowing for stock capitalization changes. Monthly and daily stock price, return and turnover data are obtained from Center for Research in Security Prices (CRSP) and are used to calculate quarterly excess returns and stock liquidity measures before being combined with the holdings data. The CRSP mutual fund returns are matched with the Thomson's holdings data using Mutual Fund Links.[6]

4.2. Method

Initially, we develop a procedure to rank stocks based on the mean brokers' recommendation and change in recommendation. We use this ranking to assign each fund's stocks to several "broker-rank" buckets. We then use regression analysis to determine which funds trade consistent with, and which funds trade counter to, brokers' recommendations. Finally, we

[6] To ensure that our data covers most of the changes to a mutual fund's portfolio, we restrict our sample to funds with average equity holdings exceeding 80% and average cash holdings below 10% of fund assets. In a further restriction to limit data errors and omissions, we must be able to replicate within 10% of the value of the fund's net tangible assets by using the stock holdings data and assuming start-of-period prices for the stock for it to remain in our sample.

compare the return performances of funds that we identify as aligning their trades with brokers' recommendations, with those of funds that trade counter to recommendations.[7]

4.2.1. Ranking by brokers' recommendation

IBES averages the recommendations of a varying number of brokers, which are coded on a 1 to 5 scale, with 1 being a "strong buy" recommendation. The mean recommendations are reported monthly, and on average only 36% change in successive months, while over three months 59% change. We reason that since much of the information used to form the mean brokers' recommendation is dated, funds may be more inclined to act on upgrades (or downgrades) of the recommendation in choosing stocks to buy (or sell). But, it is expected that the level of the brokers' recommendation will moderate the decision to buy based on the magnitude of an upgrade. That is, a one point upgrade from "buy" to "strong buy" is viewed more favorably than an upgrade from "sell" to "hold". Furthermore, where the motive for buying and selling stocks is a response to fund flows, the trades will be informed by the standing recommendation. Our intuition is supported by Elton, Gruber, and Grossman (1986), who find both brokers' recommendation and change in brokers' recommendation predict higher stock returns.

A regression is used to determine the relation between the net purchases of a stock and the stock's brokers' recommendations and the changes to these recommendations. Similar to Brown, Wei, and Wermers (2008) we include only those stocks that have been traded by five or more

[7] Elton, Gruber, Krasny and Ozelge (2006) caution the use of quarterly mutual fund holdings since approximately 20% of the within-quarter transactions are omitted. We recognize that this is a limitation of our analyses but argue that these omitted transactions should not differentially affect trades consistent with and trades contrary to brokers' recommendations.

funds in a period.[8] We calculate the net number of funds that purchased each stock (the number of funds buying a stock minus the number of funds that were sellers) during that period.[9] By using the net number of funds purchasing a stock, we implicitly give equal weight to the decisions of each fund irrespective of its size, and thus avoid a measure (such as net purchases by value) that is dominated by the actions of large funds.

Using a pooled regression, we use equation (1) to estimate the relation between net purchasers and mean brokers' recommendation and the change in the mean brokers' recommendation over three months.

$$\text{Net purchasers}_{it} = a_0 + b_1\,\text{BrokRec}_{it} + b_2\,\Delta\text{BrokRec}_{it} + \varepsilon_{it} \qquad (1)$$

where:

$$\begin{aligned} \text{Net purchasers}_{it} &= \text{number of funds buying stock i in period t} \\ &\quad - \text{number of funds selling stock i in period t;} \\ \text{BrokRec}_{it} &= \text{mean brokers' recommendation for stock i at end period t; and} \\ \Delta\text{BrokRec}_{it} &= \text{change in mean brokers' recommendation over three months.} \end{aligned}$$

[Insert Table 1]

The results from this regression are presented in Table 1 and summarized in equation (2). As expected, the explanatory power is low, but the regressor coefficients have the expected sign, and are significant at the 1% level.[10] This supports our use of the predicted net number of funds

[8] We seek to limit the influence that thinly traded stocks have on our model by excluding them from the estimation.

[9] By calculating the net number of funds purchasing stocks, we implicitly assign equal weight to funds' buy and sell decisions in estimating our proxy for "broker-ranking". However, the motivations for buying or selling stock may differ, and possibly respond to a fund's inflows or outflows during a period.

[10] We also estimate alternative models with contemporaneous monthly mean brokers' recommendation and up to six lagged terms. The model we use performs similarly, and is selected because of its parsimony and intuitive appeal. We also establish that the regression coefficients are reasonably stable over time through successive cross-sectional

purchasing a stock as a measure of its "quasi-broker-ranking". Accordingly, the estimated model is employed to rank stocks based on their quasi-broker-ranking (QBR) using their mean brokers' recommendations as follows:

$$Q\hat{B}R_{it} = 4.16 - 1.24 BrokRec_{it} - 2.19 \Delta BrokRec_{it} \qquad (2)$$

To determine if changes to a fund's stock holdings are aligned with or are contrary to brokers' recommendations, we rank stocks held by a fund at the start of a period by using the QBRs.

4.2.2. Assignment to broker-rank buckets

For each mutual fund, we construct twenty approximately equal-value buckets (QBR_Buckets) using the QBR rankings. Thus, each bucket accounts for approximately 5% of the fund's start-of-period holdings by value. Additionally, since we wish to examine changes to a fund's holdings that include stocks that were not held at the start of the period, we include these in the ranking process to ensure their assignment to the appropriate QBR_Bucket. Our QBR_Buckets are ranked in ascending order, and are only approximately equal in value. This is because we assign complete holdings of each stock to a bucket, and where a stock straddles a preferred boundary half of the holdings and trades are assigned to the bucket on either side. Furthermore, we assign stocks to 10 QBR_Buckets when we are unable to do so for 20, such as when the holding of a particular stock exceeds 5% of a fund's holding.

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regressions. Our model parallels Kacperczyk and Seru (2007), who use quarterly changes in brokers' recommendations with four lagged terms as regressors. However, as a ratio (per cent change in holdings of individual stock), the dependent variable used by Kacperczyk and Seru (2007) has several potential problems. It gives equal weight to a small holding of a stock as to a large stock holding. Potentially, the impact of a large dollar disposal of a large stock holding may be dwarfed by a relatively small dollar acquisition of a small stock holding with a similar change in broker ranking. Furthermore, the minimum ratio will be -1 (disposals) but the maximum ratio depends on how small the initial holding is relative to the (buy) trade.

In calculating the value of trading in each QBR_Bucket, stock purchases are assigned a positive value, and sales a negative value. Our assignment of stocks to approximately equal value buckets permits us to conclude that preferential trading with respect to the quasi-broker-ranking of the stock has occurred for any fund-period if we observe a significant relation between trades and QBR across QBR Buckets.

4.2.3. Regression analysis of brokers' recommendation adoptions

The association between brokers' recommendations and the fund's decision to trade stocks is assessed by regressing the value of bucket j traded on the QBR of bucket j as follows:

$$\text{TradeValue}_j = \alpha + \beta\,\text{QBR\_Bucket}_j + \varepsilon_j \tag{3}$$

where:

$$\begin{aligned}
\text{TradeValue}_j &\equiv \sum_{i=1}^{n} \text{Value stock}_i \text{ traded};\\
\text{QBR_Bucket}_j &\equiv \sum_{i=1}^{n} \Big(\hat{\text{QBR}}_i \times \frac{\text{Value stock}_i \text{ held}}{\sum_{i=1}^{n} \text{Value stock}_i \text{ held}}\Big);\\
\text{Value stock}_i \text{ traded} &= \text{value of stock i traded during period t};\\
\text{Value stock}_i \text{ held} &= \text{value of stock i held at the start of period t};\\
\hat{\text{QBR}}_i &= 4.16 - 1.24\,\text{BrokRec}_i - 2.19\,\Delta\text{BrokRec}_i;\\
\text{BrokRec}_i &= \text{mean brokers' recommendation for stock i at end period t};\\
\Delta\text{BrokRec}_i &= \text{change in mean brokers' recommendation over three months to time t; and}\\
n &= \text{number of stocks in QBR_Bucket j.}
\end{aligned}$$

We repeat this regression for each of the 44,315 fund-periods.

By construction, the value of stock in each QBR_Bucket at the start of a period is unrelated to the buckets' QBR. A significantly negative or positive coefficient on "QBR_Bucket" will indicate that the fund has preferentially traded stocks with respect to brokers' recommendations.[11] A positive coefficient (which we term "brokers' recommendation beta") indicates that in a fund-period, the stocks that brokers recommend are being purchased, while lower recommended stocks are being sold. Conversely, a negative brokers' recommendation beta identifies portfolio adjustments that are systematically counter to brokers' recommendations. The number of brokers' recommendation betas (at various levels of significance) from the 44,315 repeat regressions is then compared with critical values from the cumulative binomial distribution to establish whether they exceed random expectation with 99% certainty.

4.2.4. Fund returns

We use two measures of excess returns for funds with significant brokers' recommendation betas. These returns are calculated for the preceding three- and six-month intervals, the period in which the trades occur, and the following three- and six-month intervals. The first is annualized excess returns (AER) which we obtain by subtracting the market return from the fund's return. In the second measure, we follow Thompson (1978) and Cheng, Copeland, and O'Hanlon (1994) in summing regression residuals, but obtain ours from the Carhart (1997) augmented model of Fama and French (1995). Specifically, we estimate equation (4) for each fund using 60 monthly returns centered[12] on the period of interest to obtain these residuals.

$$R_{jt} - R_{Ft} = a_{j0} + b_{j1}(R_{Mt} - R_{Ft}) + b_{j2}SMB_t + b_{j3}HML_t + b_{j4}UMD_t + \varepsilon_{jt} \tag{4}$$

where:

[11] Similar to the method used in Clarke, Cullen, and Gasbarro (2007).

[12] We maintain the requirement for a 60-month return window, but where necessary (for example, towards the end of our sample period), we use a leading or lagged estimation window.

$$R_{jt} = \text{return on fund j at time t;}$$
$$R_{Ft} = \text{risk-free return (one-month treasury bill rate)}$$
$$R_{Mt} = \text{value-weighted NYSE/AMEX market return;}$$
$$SMB_t = \text{returns for small minus large stock portfolios;}$$
$$HML_t = \text{returns for high minus low book-to-market portfolios; and}$$
$$UMD_t = \text{high prior-year return minus low prior-year return.}$$

We sum the residuals for the relevant intervals and annualize, and refer to the measures as annualized cumulative residuals (ACR).

To determine whether return performance is related to the alignment of a fund's trades with brokers' recommendations, we partition our fund-periods on the basis of brokers' recommendation betas that are statistically negative or positive. We employ t-tests to determine whether the mean returns are statistically different for these two groups, for both the AER and ACR measures.

5. Trade alignment and returns

5.1. Descriptive statistics

Our sample contains 2,730 distinct mutual funds, and 44,315 fund-periods that meet our selection and data quality criteria. Panel A of Table 2 shows the distribution of days in each period and number of stocks in each fund. These reflect the predominance of 90-day periods (28,234), and a small number of funds holding a large number of stocks. Panel B documents annualized excess returns (AER) and annualized cumulative residuals (ACR) over three months following trading for 20,864 fund-periods in which we can match returns. We also present returns for partitions based on the median size, liquidity[13] and turnover. For each variable, we

[13] We define fund liquidity as a value weighted average of stock liquidity. Stock liquidity is determined from a variant of the Amihud (2002) illiquidity measure: $\text{Stock liquidity}_i \equiv -\ln\left(\frac{1}{T}\sum_{t=1}^{T}\frac{|\text{Stock return}_{it}|}{\text{Price}_{it}\times \text{Vol}_{it}}\right)$ where: T= number of days in

determine the median for each year from the full sample and use these to partition the data. This mitigates the bias from increasing fund size and liquidity over the 12-year period. The arithmetic mean return of all funds over the three-month interval following the period in which we examine fund trades is -0.5% per annum measured by AER and -0.3% per annum measured by ACR. The partitions based on size and turnover highlight minor differences using both AER and ACR. When measured by AER, funds with less-liquid portfolios outperform by 4.5% per annum, but perform similarly when measured by ACR. The difference between these two measures likely reflects the superior performance of the low capitalization stocks over the period of the study.

[Insert Table 2]

5.2. Regression analyses

Using equation (3), we perform 44,315 univariate linear regressions to determine if there is a relation between brokers' recommendations and proportion of stocks traded by a fund during a period. Each regression is for one fund-period, and fund-periods with recommendation betas significant at the various levels are identified. A positive recommendation beta indicates that adjustments to a fund's portfolio during a period are consistent with brokers' recommendations; highly recommended stocks are purchased and lower recommended stocks are sold. A negative recommendation beta suggests funds are using private information; buying lower recommended stocks and selling those with higher brokers' recommendations.

Table 3 reports the pooled count over the twelve-year period for the 5%, 10% and 20% significance levels (two-tailed). Using the binomial distribution, we are able to determine that the frequency of all recommendation betas differs from that expected by random occurrence with

a quarter; Stock $return_{it}$ = daily stock return; $Price_{it}$= daily price for stock i; and Vol_{it}= daily market turnover of stock i.

99% statistical confidence. Our interest is in funds with significantly negative betas since we classify these as trading only on private information. To support our belief that they are correctly classified, we compare different significance levels on our regressions. If a significant negative beta arises randomly, then altering the level of significance would cause the proportions of funds exhibiting significant brokers' recommendation betas to approximate these levels. As can be seen, at 5% significance, 3.3% is observed, and when we relax the level to 20%, only 8.8% is observed. The former is above the expected proportion of 2.5%, while the latter is below the expected proportion of 10%. While some misclassification is expected, the relative stability of these proportions is indicative of appropriate identification.

[Insert Table 3]

In subsequent analyses we use betas from the regressions that are significant at the 10% level. Our methodology allows the identification of funds that use private information to conduct their trades. These comprise 5.4% of the fund-periods,[14] compared with 20.7% of fund-periods that align their trades with brokers' recommendations. Approximately four times as many funds trade with brokers' recommendations as trade counter to the recommendations.

5.3. Fund returns

Our interest is whether funds that trade using private information are able to outperform funds that use publicly available information. Accordingly, we compare the returns of the funds that trade counter to brokers' recommendations with those that adopt them using both the AER and ACR measures for the 3- and 6-month intervals following the period in which we observe the

[14] The funds of interest are those that trade on private information that we can statistically confirm at the 10% level as having negative brokers' recommendation betas. Other funds may also trade similarly, but this relation is either non-linear or not statistically significant. Furthermore, funds that use private information that is coincidental with brokers' recommendations are likely to exist, however, we cannot uniquely classify this group.

funds' trades. Our sample is reduced to approximately 21,000 fund-periods because we are unable to match return and holdings data, and because return outliers are eliminated and a minimum of 60 months of returns are required to calculate ACRs.

Table 4 shows that, on average, funds that trade counter to the brokers' recommendations statistically and economically outperform funds that align their trades with brokers' recommendations.[15] While this is apparent on both AER and ACR return measures, the difference in AER means is an annualized return of 2.7% over both the three- and six-month intervals following the trades. These results are consistent with our prediction that funds that trade on private information which contradicts publicly available information will, on average, earn superior returns.

[Insert Table 4]

It is clear from the standard errors in Table 4 that mutual funds exhibit a range of return performances irrespective of the alignment of their trades with brokers' recommendations. That is, while the mean performances of the two groups differ, the advantage of using private information to conduct trades is evident as a systematic effect only after a large number of fund-periods are examined.

6. Robustness and extensions

[15] It is possible that individual funds that trade counter to brokers' recommendation may achieve a positive abnormal return through stock price reversals following an over-reaction of herds to brokers' recommendations. Funds that are tardy in their trades may receive only the penalty of the price reversal, and receive it sooner than the six-month lag documented by Brown, Wei and Wermers (2008). However, in analyses we document in Tables 5 and 7 our results do not appear to be driven by the underperformance of fund's that align their trades with brokers' recommendations as this possibility would suggest.

6.1. Trade alignment and fund performance with control variables

We next investigate the relation between the alignment of a fund's trades with brokers' recommendations and its performance while controlling for serial correlation of fund returns.[16] To achieve this, we estimate equation (5) which includes lagged returns and separate dummy variables for brokers' recommendation betas that are statistically negative, (NBR) and for those that are statistically positive (PBR) along with liquidity, turnover and size. Furthermore, the multiplicative interaction of NBR and PBR with the lagged return and fund size are included.

$$\begin{aligned} R_{jt+1} = {} & a_0 + b_1 PBR_{jt} + b_2 NBR_{jt} + b_3 R_{jt} + b_4 R_{jt-1} + b_5 Liq_{jt} + b_6 TO_{jt} + b_7 Size_{jt} \\ & + PBR(b_8 R_{jt} + b_9 R_{jt-1} + b_{10} Size_{jt}) \\ & + NBR(b_{11} R_{jt} + b_{12} R_{jt-1} + b_{13} Size_{jt}) + \varepsilon_{jt} \end{aligned} \tag{5}$$

where:

$$\begin{aligned} R_{jt+1} &= \text{return on fund j in interval } t+1; \\ PBR_{jt} &= \text{dummy variable for positive brokers' recommendation beta for fund j in period t;} \\ NBR_{jt} &= \text{dummy variable for negative brokers' recommendation beta for fund j in period t;} \\ R_{jt} &= \text{return on fund j in period t;} \\ R_{jt-1} &= \text{return on fund j in interval } t-1; \\ Liq_{jt} &= \text{standardized average portfolio liquidity of fund j in interval t;} \\ TO_{jt} &= \text{standardized portfolio turnover of fund j in interval t; and} \\ Size_{jt} &= \text{standardized capitalization of fund j in interval t.} \end{aligned}$$

In this analysis, the returns R_{jt+1}, R_{jt} and R_{jt-1} are either annualized excess returns (AER) or annualized cumulative residuals (ACR) depending on the model under consideration.

Table 5 reports the results from various specifications of this regression. Consistent with Prediction 1, the coefficient on the negative brokers' recommendation beta dummy variable is always significant and positive when returns are measured by both AER and ACR. In contrast, for the positive brokers' recommendation beta dummy variable, the coefficient is not statistically

[16] For example, Ferris and Yan (2009) report significant positive serial correlation of fund performance.

different from zero.[17] Model 1 confirms the result for the '3-month after' return in Table 4 that funds that trade counter to brokers' recommendations outperform funds that align their trades with recommendations.[18]

Model 2 shows that AERs in the three months following trading are positively correlated with the contemporaneous-period and prior-period returns in panel A. The positive correlation disappears, with the coefficient on the period return in panel B becoming negative when the Fama-French-Carhart adjusted ACR returns are considered. The difference between the measures suggests the positive correlation observed in AERs is driven by a common response to one or more of the factors in the Fama-French-Carhart model. However, our objective is to control for serial correlation while observing the effect of trade alignment on fund returns and this is achieved with either of the return measures. Indeed, model 2 demonstrates that on both measures the superior performance of funds that trade counter to brokers' recommendations (relative to funds that align their trades) persists after controlling for past performance. On AER, the superior average performance reduces to 1.7% per annum whereas it is almost unchanged from model 1 at 1.3% per annum on ACR.

Model 3 allows us to investigate whether the serial correlation of fund returns is affected by the alignment of the fund's trades with recommendations. This is achieved by relaxing the restriction in model 2 that the coefficients on the period and prior returns remain the same, irrespective of the alignment of a fund's trades. It is apparent that how a fund's prior returns affect its returns after the trading period, depends on trade alignment. The period AER of funds

[17] With the exception of model 5 in panel A.

[18] For example, the sum of the intercept and the coefficient on the positive brokers' recommendation dummy in model 1 in panel A of Table 5 yields -0.007 as tabulated in panel A (positive betas column) of Table 4.

that trade counter to brokers' recommendations explains 17.3%[19] of this return, compared to 1.3%[20] for funds with positive brokers' recommendation betas. Given our presumption that funds that align their trades counter to brokers' recommendations are acting on private information, this result suggests that persistence in fund performance (good and bad) is largely driven by funds that use this information. When measured by ACR, return autocorrelations continue to demonstrate a dependence on the alignment of trades with information. However, the negative autocorrelation observed in model 2 persists, and becomes more negative when trades are aligned.

With the exception of funds that experience low AERs, it can be shown from the results of model 3 that counter recommendation traders outperform funds that align their trades with brokers' recommendations. Consistently, within the range of normal returns, funds with negative brokers' recommendation betas are shown to outperform funds with positive betas using the ACR measure of return. The average superior performance of negative beta funds is 1.9% per annum when measured by AER and 1.4% per annum when measured by ACR.

Models 4 and 5 include additional liquidity, turnover, and size explanatory variables. We include these variables to control for the size and liquidity effects documented by Chen, Hong, Huang, and Kubik (2004), and because portfolio turnover may affect returns either as a return to active management, or because of momentum in the returns of the stocks in the funds' extant portfolios. Size and turnover are also used as control variables by Kacperczyk and Seru (2007). We observe a negative relation between fund return and liquidity in panel A which disappears in panel B. This may be attributed to the superior performance of the low capitalization stocks held

[19] 0.113 + 0.060 = 0.173

[20] 0.113 - 0.100 = 0.013

by funds over the sample period (Table 2, panel B), which is controlled in the ACR return measure. Turnover insignificantly affects AER and has a modest positive relation with return measured by ACR. This suggests that active management provides marginally superior risk adjusted gross returns, and does not support the interpretation that the momentum of the stocks in the funds' extant portfolios is responsible for their return performance. The latter is confirmed in separate tests (not reported), which include interaction terms between turnover and prior and contemporaneous period return in the regression. In model 4 of Table 5, the difference in the average performance of negative and positive beta funds is relatively unchanged from model 3 at 1.8% per annum and 1.4% per annum when measured by AER and ACR respectively.

[Insert Table 5]

6.2. Fund size, trade alignment and performance

Model 5 of Table 5 shows that over the 3-month interval following trading, returns decrease with fund size, at least for funds that either align their trades with brokers' recommendations or trade counter to them on both return measures. This result is consistent with Chen, Hong, Huang, and Kubik (2004), Kacperczyk and Seru (2007) and the observed results in the partition on fund size in Table 2. It is apparent from the large negative coefficient on the size variable for funds that trade counter to brokers' recommendations (NBR x Size) that the greatest impact of fund size is for funds that trade counter to broker's recommendations. Our finding that funds with negative brokers' recommendation betas outperform positive beta funds by a greater amount when they are small is consistent with Prediction 2.

6.3. Robustness of counter-recommendation trading classification

According to Chen and Cheng (2006), institutional investors have "timely access" to stock recommendations through soft-dollar arrangements. Therefore, it is possible that the funds we identify as trading counter to brokers' recommendations are simply more efficient users of the information on which the recommendations are based, and garner excess returns by first aligning their trades with the recommendations and subsequently reversing them. This would give the appearance of being counter-recommendation traders. To test this possibility, we investigate whether the alignment of a fund's trades to yet-to-be-announced brokers' recommendations differs from their alignment to announced recommendations. If the funds we identify as trading counter to recommendations are simply more efficient users of the information, we would expect to see alignment of their trades with leading recommendations.

[Insert Table 6]

We apply equation (2) to leading brokers' recommendations to rank the stocks in each fund-period before performing a suite of regressions using equation (3) and using the 10% significance level. The results presented in Table 6 show that less than 1.5% of funds previously identified as counter-recommendation traders align their trades with yet-to-be-announced recommendations. In contrast, 22.4% of the funds previously identified as counter-recommendation traders also trade counter to yet-to-be announced recommendations. Therefore, it does not appear that trade reversals are driving the results.

6.4. Alternative classification of privately informed trading

Kacperczyk and Seru (2007) classify funds with trades that do not correlate with brokers' recommendations as informed traders. In our analyses, these funds are equivalent to those with brokers' recommendation betas that are not significantly different from zero. We document the differences between the mean returns of this group and the fund-periods we identify as having negative and positive brokers' recommendation betas in Table 7.

[Insert Table 7]

On both AER and ACR measures, the performance of the funds with zero brokers' recommendation betas is not statistically different from funds with positive recommendation betas over the 3- and 6-month intervals following the period of the trades. That is, funds with trades that are uncorrelated with brokers' recommendations have no return advantage over funds that align their trades with brokers' recommendations. While some funds in both groups may have access to private information, either similar proportions of these funds are present in each group, or they represent small proportions. In contrast, the funds that trade counter to brokers' recommendations, which we classify as privately informed, statistically and economically outperform funds whose stock selection is uncorrelated with brokers' recommendations.

By classifying funds whose trades are uncorrelated with recommendations as the "informed traders", Kacperczyk and Seru (2007) would predict that these funds should outperform funds with positive recommendation betas. However, our results do not identify any significant return difference. Furthermore, they would predict that zero recommendation beta funds would outperform negative recommendation beta funds, while our results show the reverse. Kacperczyk and Seru (2007) do not distinguish between the funds we partition into negative and positive betas and accordingly do not identify the performance difference that we observe.

7. Conclusions

Integrating the quarterly reported stock holdings of mutual funds obtained from Thomson Financial Services Inc., with the IBES consensus recommendations, we develop a method to examine whether a mutual fund aligns its trades with the IBES recommendations. The combined dataset covers 44,315 fund-periods between 1994 and 2005. Following Kacperczyk and Seru (2007), we classify these brokers' recommendations as public information, that is, available to the universe of informed and uninformed mutual funds.

We identify fund-periods characterized by systematic trading in the opposite direction to what would be expected if they followed recommendations, and argue that they do so using private information. These privately informed funds exhibit a superior average performance of 1.7% per annum after we control for serial correlation of fund returns. We also predict that smaller funds are better able to capture the benefit of private information, and consistent with this expectation, find empirically that small funds which trade counter to brokers' recommendations earn even greater average returns.

Our results are robust to autocorrelation of fund returns and to the inclusion of fund size, portfolio liquidity and turnover control variables. Furthermore, we establish that our results are not driven by funds that more efficiently use publicly available information and subsequently reverse their position.

References

Amihud, Y., 2002. Illiquidity and stock returns: Cross-section and time series effects. Journal of Financial Markets 5, 31-56.

Autore, D.M., Kovacs, T., Sharma, T., 2009. Do analyst recommendations reflect shareholder rights? Journal of Banking and Finance 33, 193-202.

Barber, B., Lehavy, R., McNichols, M., Trueman, B., 2001. Can investors profit from the prophets? Security analyst recommendations and stock returns. Journal of Finance 56, 531-563.

Bradley, D., Chan, K., Kim, J., Singh, A., 2008. Are there long-run implications of analyst coverage? Journal of Banking and Finance 32, 1120-1132.

Brown, N.C., Wei, K.D., Wermers, R., 2008. Analyst recommendations, mutual fund herding and overreaction in stock prices. Available at SSRN: http://ssrn.com/abstract=1092744.

Boulatov, A., Hatch, B.C., Johnson, S.A., Lei, A.Y.C., 2009. Dealer attention, the speed of quote adjustment to information, and net dealer revenue. Journal of Banking and Finance 33, 1531-1542.

Carhart, M., 1997. On persistence in mutual fund performance. Journal of Finance 52, 57-82.

Chen, J., Hong, H., Huang, M., Kubik, J.D., 2004. Does fund size erode mutual fund performance? The role of liquidity and organization, American Economic Review 94, 1276-1302.

Chen, X., Cheng, Q., 2006. Institutional holdings and analysts' stock recommendations. Journal of Accounting, Auditing and Finance 21, 399-440.

Cheng, A., Copeland, L., O'Hanlon, J., 1994. Investment trust discounts and abnormal returns: UK evidence. Journal of Business Finance and Accounting 21, 813-831.

Clarke, A., Cullen, G.S., Gasbarro, D., 2007. Mutual fund trades: Asymmetric liquidity preferences and fund performance. Journal of Financial Research 30, 515-532.

Cornett, M.M., Tehranian, H., Yalcin, A., 2007. Regulation fair disclosure and the market's reaction to analyst investment recommendation changes. Journal of Banking and Finance 31, 567-588.

Elton, E.J., Gruber, M.J., Grossman, S., 1986. Discrete expectational data and portfolio performance. Journal of Finance 41, 699-713.

Elton, E.J., Gruber, M.J., Krasny, Y., Ozelge, S., 2006. The effect of the frequency of holding data on conclusions about mutual fund behavior. Available at SSRN: http://ssrn.com/abstract=920840.

Fama, E.F., French, K.R., 1995. Size and book-to-market factors in earnings and returns. Journal of Finance 50, 131-155.

Ferris, S.P., Yan, X., 2009. Agency costs, governance, and organizational forms: Evidence from the mutual fund industry. Journal of Banking and Finance 33, 609-626.

Grossman, S.J., Stiglitz, J.E., 1980. On the impossibility of informationally efficient markets. American Economic Review 70, 393-408.

Kacperczyk, M., Seru, A., 2007. Fund manager use of public information: New evidence on managerial skills. Journal of Finance 62, 485-528.

Keim, D.B., Madhavan, A., 1998. The cost of institutional equity trades. Financial Analysts Journal 54, 50-69.

Sant, R., Zaman, M.A., 1996. Market reaction to Business Week 'Inside Wall Street' column: A self-fulfilling prophecy. Journal of Banking and Finance 20, 617-643.

Stickel, S.E., 1995. The anatomy of the performance of buy and sell recommendations. Financial Analysts Journal 51, 25-39.

Thompson, R., 1978. The information content of discounts and premiums on closed-end funds. Journal of Financial Economics 6, 151-186.

Womack, K.L., 1996. Do brokerage analysts' recommendations have investment value? Journal of Finance 51, 137-167.

Table 1

Brokers recommendations and net purchases, 1994 to 2005

Model	Coefficient	t-statistic	Adjusted R Square
Constant	4.16***	36.29	0.013
Brok Rec	-1.24***	-23.73	
Δ Brok Rec	-2.19***	-23.50	

$\text{Net purchasers}_{it} = a_0 + b_1 \text{BrokRec}_{it} + b_2 \Delta\text{BrokRec}_{it} + \varepsilon_{it}$, where: Net purchasers_{it} = number of funds buying stock i in period t – number of funds selling stock i in period t, Brok Rec_{it} = mean broker's recommendation for stock i in period t, Δ Brok Rec_{it} = change in mean brokers' recommendation over three months.

***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 2

Descriptive statistics, 1994 to 2005

Panel A. Fund descriptive statistics

	Mean	Median	Standard Deviation
Number of fund periods	44,315		
Number of Funds	2,730		
Days in Period	118	92	43
Number of Stocks in Portfolio	154	93	239

Panel B. Fund returns over three months following trading

	N	Annualized Excess Return		Annualized Cumulative Residuals	
		Mean	Standard Deviation	Mean	Standard Deviation
All Fund-Periods	20,864	-0.005	0.205	-0.003	0.126
Fund Size - Small	10,365	0.000	0.219	0.002	0.135
Fund Size - Large	10,499	-0.011	0.191	-0.008	0.116
Portfolio Liquidity - Low	10,458	0.017	0.243	-0.004	0.151
Portfolio Liquidity - High	10,406	-0.028	0.155	-0.002	0.094
Portfolio Turnover - Low	10,250	-0.008	0.195	0.000	0.115
Portfolio Turnover - High	10,614	-0.003	0.214	-0.006	0.131

Fund liquidity is defined as a value weighted average of stock liquidity, which is determined from: $\text{Stockliquidity}_i \equiv -\ln\left(\frac{1}{T}\sum_{t=1}^{T}\frac{|\text{Stock return}_{it}|}{\text{Price}_{it} \times \text{Vol}_{it}}\right)$ where: T= number of days in a quarter; Stock return_{it} = daily stock return; Price_{it}= daily price for stock i; and Vol_{it}= daily market turnover of stock i.

Table 3

Significant brokers' recommendation betas, 1994 to 2005

Significance Level	N	Binomial CV Range		Recommendation Beta			
				Negative		Positive	
		Min	Max	Count	Percent	Count	Percent
5%	44,315	1,032	1,185	1,457	3.3%***	6,341	14.3%***
10%		2,108	2,323	2,394	5.4%***	9,176	20.7%***
20%		4,285	4,579	3,906	8.8%***	13,137	29.6%***

The number of statistically significant (at the respective levels) brokers' recommendation betas is generated from linear regressions of: $\mathrm{TradeValue}_j = \alpha + \beta\,\mathrm{QBR\_Bucket}_j + \varepsilon_j$ where:

$$\mathrm{TradeValue}_j \equiv \sum_{i=1}^{n} \mathrm{Value\ stock}_i\ \mathrm{traded};$$

$$\mathrm{QBR\_Bucket}_j \equiv \sum_{i=1}^{n} \left(\mathrm{Quasi\_\hat{B}roker\_ranking}_i \times \frac{\mathrm{Value\ stock}_i\ \mathrm{held}}{\sum_{i=1}^{n} \mathrm{Value\ stock}_i\ \mathrm{held}}\right);$$

$$\mathrm{Value\ stock}_i\ \mathrm{traded} = \text{value of stock i traded during period t};$$

$$\mathrm{Value\ stock}_i\ \mathrm{held} = \text{value of stock i held at the start of period t};$$

$$\mathrm{Quasi\,\hat{B}roker\_ranking}_i = 4.16 - 1.24\,\mathrm{BrokRec}_i - 2.19\,\Delta\mathrm{BrokRec}_i;$$

$$\mathrm{BrokRec}_i = \text{mean brokers' recommendation for stock i at end period t};$$

$$\Delta\mathrm{BrokRec}_i = \text{change in mean brokers' recommendation over three months to time t; a}$$

$$n = \text{number of stocks in QBR\_Bucket j.}$$

Cumulative binomial distribution critical values (Bin CV) reflect a 1% probability that a lower (Min) or greater (Max) count occurs by chance.

*** indicates significance at the 1 percent level.

Table 4

Mean returns for funds with significant broker recommendation betas

Interval	N	Negative betas	Positive betas	Difference
Panel A. Annualized excess return 1994–2005				
3-month after	23,189	0.020	-0.007	0.027***
		(0.006)	(0.003)	(0.007)
6-month after	23,042	0.010	-0.017	0.027***
		(0.005)	(0.002)	(0.005)
Panel B. Annualized cumulative residuals 1994–2005				
3-month after	19,916	0.009	-0.005	0.014***
		(0.003)	(0.002)	(0.004)
6-month after	19,776	0.003	-0.001	0.005*
		(0.002)	(0.001)	(0.003)

Mean returns and their differences are accompanied by their standard errors in parentheses. The t-distribution is used to determine the significance of the difference between the negative and positive mean returns. We calculate annualized excess return by subtracting the market return from the fund's return. To obtain annualized cumulative residual return, we estimate:

$$R_{jt} - R_{ft} = a_{j0} + b_{j1}(R_{mt} - R_{ft}) + b_{j2}SMB_t + b_{j3}HML_t + b_{j4}UMD_t + \varepsilon_{jt}$$

for each fund using monthly returns and cumulate the residuals over their respective intervals, where R_{jt} is the return on fund j at time t, R_{ft} is the risk-free return, R_{mt} is the value weighted market return, SMB_t is the return for small minus large stock portfolios, HML_t is the returns for high minus low book-to-market portfolios and UMD_t is high prior-year return minus low prior-year return. Brokers' recommendation betas are obtained from the regression: $\text{TradeValue}_j = \alpha + \beta\, \text{QBR\_Bucket}_j + \varepsilon_j$ when a 10% significance level (2-tailed) is used.

***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 5
Performance after alignment of fund trades with brokers' recommendations

	Model				
	(1)	(2)	(3)	(4)	(5)
Panel A. 3-Month annualized excess return 1994–2005					
Intercept	-0.002	-0.003	-0.002	0.366***	0.347***
	(-1.46)	(-1.57)	(-1.49)	(15.73)	(13.95)
PBR_{jt}	-0.005	-0.002	-0.004	-0.004	0.082**
	(-1.37)	(-0.49)	(-1.21)	(-1.07)	(2.04)
NBR_{jt}	0.023***	0.015**	0.015**	0.014**	0.201***
	(3.64)	(2.48)	(2.42)	(2.24)	(3.03)
R_{jt}		0.096***	0.113***	0.097***	0.097***
		(12.402)	(12.48)	(10.78)	(10.77)
PBR_{jt} x R_{jt}			-0.100***	-0.088***	-0.088***
			(-5.52)	(-4.61)	(-4.62)
NBR_{jt} x R_{jt}			0.060*	0.064**	0.066**
			(1.82)	(1.98)	(2.04)
R_{jt-1} (3-month)		0.061***	0.067***	0.057***	0.032***
		(9.76)	(9.07)	(7.76)	(2.57)
PBR_{jt} x R_{jt-1}			-0.026*	-0.024	-0.023
			(-1.70)	(-1.54)	(-1.52)
NBR_{jt} x R_{jt-1}			-0.011	-0.014	-0.014
			(-0.39)	(-0.52)	(-0.53)
Liq_{jt}				-0.353***	-0.356***
				(-17.58)	(-17.72)
TO_{jt}				0.001	-0.005
				(0.51)	(-1.03)
$Size_{jt}$				-0.025	0.000
				(-1.58)	(-0.02)
PBR_{jt} x $Size_{jt}$					-0.085**
					(-2.14)
NBR_{jt} x $Size_{jt}$					-0.186***
					(-2.84)
N	23,188	22,292	22,292	22,292	22,292
Adjusted R^2	0.001	0.013	0.014	0.029	0.030

Panel B. 3-Month annualized cumulative residuals 1994–2005					
Intercept	-0.002	-0.002	-0.002	0.009	0.004
	(-1.85)	(-2.18)	(-2.17)	(0.71)	(0.30)
PBR_{jt}	-0.003	-0.002	-0.003	-0.003	0.010
	(-1.42)	(-1.24)	(-1.40)	(-1.40)	(0.46)
NBR_{jt}	0.011***	0.011***	0.011***	0.011***	0.088**
	(3.04)	(3.18)	(3.13)	(3.23)	(2.35)
R_{jt}		-0.036***	-0.023**	-0.024***	-0.024***
		(-4.69)	(-2.55)	(-2.65)	(-2.62)
PBR_{jt} x R_{jt}			-0.055***	-0.054***	-0.055***
			(-2.92)	(-2.89)	(-2.92)
NBR_{jt} x R_{jt}			-0.006	-0.006	-0.010
			(-0.18)	(-0.18)	(-0.29)
R_{jt-1} (3-month)		0.010	0.018**	0.018**	0.018**
		(1.41)	(2.16)	(2.16)	(2.17)
PBR_{jt} x R_{jt-1}			-0.036**	-0.036**	-0.037**
			(-2.10)	(-2.11)	(-2.12)
NBR_{jt} x R_{jt-1}			0.008	0.008	0.005
			(0.26)	(0.25)	(0.15)
Liq_{jt}				0.020*	0.019*
				(1.74)	(1.68)
TO_{jt}				0.002*	0.003
				(1.70)	(1.06)
$Size_{jt}$				-0.032***	-0.026**
				(-3.60)	(-2.51)
PBR_{jt} x $Size_{jt}$					-0.013
					(-0.58)
NBR_{jt} x $Size_{jt}$					-0.076**
					(-2.06)
N	19,915	19,386	19,386	19,386	19,386
Adjusted R^2	0.001	0.002	0.002	0.003	0.003

Table 5 (*continued*)

Regression of:

$$R_{jt+1} = a_0 + b_1 PBR_{jt} + b_2 NBR_{jt} + b_3 R_{jt} + b_4 R_{jt-1} + b_5 Liq_{jt} + b_6 TO_{jt} + b_7 Size_{jt}$$
$$+ PBR(b_8 R_{jt} + b_9 R_{jt-1} + b_{10} Size_{jt})$$
$$+ NBR(b_{11} R_{jt} + b_{12} R_{jt-1} + b_{13} Size_{jt}) + \varepsilon_{jt}$$

where:

R_{jt+1} = return on fund j in interval t + 1;

PBR_{jt} = dummy variable for positive brokers' recommendation beta for fund j in period t;

NBR_{jt} = dummy variable for negative brokers' recommendation beta for fund j in period t;

R_{jt} = return on fund j in period t;

R_{jt-1} = return on fund j in interval t − 1;

Liq_{jt} = standardized average portfolio liquidity of fund j in interval t;

TO_{jt} = standardized portfolio turnover of fund j in interval t; and

$Size_{jt}$ = standardized capitalization of fund j in interval t.

The dummy variables are the betas from the regression $TradeValue_j = \alpha + \beta\, QBR\_Bucket_j + \varepsilon_j$ that are significantly negative or positive at the 10% level.

The returns R_{jt+1}, R_{jt} and R_{jt-1} are either annualized excess returns (AER) or annualized cumulative residuals (ACR) depending on the panel under consideration.

***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 6

Contemporaneous and leading brokers' recommendations

	Leading Recommendations			
	Reject Recommendation	Not Significant	Accept Recommendation	Total
Reject Recommendation In Current Period	518 (22.4%)	1,763 (76.2%)	34 (1.5%)	2,282 (100.0%)

Crosstabulation of funds' alignment of trades with contemporaneous brokers' recommendations with their alignment with leading recommendations. The brokers' recommendation betas are obtained from the regression: $TradeValue_j = \alpha + \beta\, QBR\_Bucket_j + \varepsilon_j$ when a 10% significance level (2-tailed) is used

Table 7

Broker Recommendation Betas and Mean Returns Differences

Interval	N	Negative minus-Zero Betas	Zero minus-Positive Betas
Panel A. Annualized Excess Return 1994–2005			
3-month after	23,189	0.025***	0.002
		(0.010)	(0.008)
6-month after	23,042	0.023***	0.004
		(0.008)	(0.006)
Panel B. Annualized Cumulative Residuals 1994–2005			
3-month after	19,916	0.011**	0.002
		(0.005)	(0.005)
6-month after	19,776	0.005	0.000
		(0.004)	(0.003)

Mean return differences are accompanied by their standard errors in parentheses. The t-distribution is used to determine the significance of the differences between the negative and positive mean, negative and zero, and zero and positive beta returns. We calculate annualized excess return by subtracting the market return from the fund's return. To obtain annualized cumulative residual return, we estimate:

$$R_{jt} - R_{ft} = a_{j0} + b_{j1}(R_{mt} - R_{ft}) + b_{j2}SMB_t + b_{j3}HML_t + b_{j4}UMD_t + \varepsilon_{jt}$$

for each fund using monthly returns and cumulate the residuals over their respective intervals, where R_{jt} is the return on fund j at time t, R_{ft} is the risk-free return, R_{mt} is the value weighted market return, SMB_t is the return for small minus large stock portfolios, HML_t is the returns for high minus low book-to-market portfolios and UMD_t is high prior-year return minus low prior-year return. Brokers' recommendation betas are obtained from the regression: $TradeValue_j = \alpha + \beta\, QBR\_Bucket_j + \varepsilon_j$ when a 10% significance level (2-tailed) is used.

***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.