Past Performance and Changes in Local Bias

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Current Version: January, 2011

Abstract: Recent research suggests that investors actively skew their portfolios toward local stocks. This study investigates whether fund managers increasingly shift their holdings toward local stocks when underperforming external benchmarks. Using a unique dataset consisting of detailed securities transactions and complete daily portfolio holdings of four large state retirement plans, I find evidence that negative plan performance leads to greater local bias. This finding is consistent with fund managers foregoing geographic diversification in favor of local stocks during periods of underperformance. I also find evidence consistent with fund managers possessing an information advantage in local stocks relative to non-local stocks; however this advantage varies with contractual incentives.

I thank my dissertation chairman, Karl Muller, for his continuous guidance and support in the development of this paper. I also thank the other members of my dissertation committee: Paul Fischer and Dan Givoly – as well as Ben Lansford, Rick Laux, Tom Miller, Adrienne Rhodes, Dan Russomanno, Kristy Schenck, Jim Vincent, Luke Watson and seminar participants at Penn State and Michigan State University for their helpful comments and suggestions.

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Abstract

Recent research suggests that investors actively skew their portfolios toward local stocks. This study investigates whether fund managers increasingly shift their holdings toward local stocks when underperforming external benchmarks. Using a unique dataset consisting of detailed securities transactions and complete daily portfolio holdings of four large state retirement plans, I find evidence that negative plan performance leads to greater local bias. This finding is consistent with fund managers foregoing geographic diversification in favor of local stocks during periods of underperformance. I also find evidence consistent with fund managers possessing an information advantage in local stocks relative to non-local stocks; however this advantage varies with contractual incentives.

I. INTRODUCTION

Prior research documents that investment managers alter their stock selection and portfolio risk profile in response to contractual incentives (e.g., Haugen and Lakonishok 1987; Cohen and Starks 1988; Grinblatt and Titman 1989; Brown et al. 1996; Chevalier and Ellison 1997; Elton et al. 2003). To this end, fund managers have been shown to increase portfolio risk following periods of underperformance and to lock in gains by further diversifying their portfolio following superior performance. However, due to data restrictions, prior research has been unable to explore the method by which fund managers adapt their investment behavior to past performance. By exploiting a unique dataset consisting of detailed securities transactions and complete daily portfolio holdings of four large state retirement pension plans, this paper examines the effect of past performance on fund managers' investment behavior.

Investors typically manage their own portfolios to maximize risk-adjusted returns. However, when the investment portfolio is delegated to managers, contractual incentives may not fully align the managers' interests with those of the fund clients, leading to potential agency costs. While the incentives to deviate from the market portfolio are well-established, the manner in which fund managers choose to deviate is less clear.[1] Prior research has concluded that fund managers overweight their portfolios with securities whose corporate headquarters are located in close proximity to the fund manager (e.g., Coval and Moskowitz 2001; Hau 2001; Ivkovic and Weisbenner 2005). This preference for local stocks may result from a real or perceived information advantage in local stocks

[1] See Chevalier and Ellison (1997), Brown et al. (1996), and Elton et al. (2003), for detailed discussions of managers' incentives to deviate from their benchmark portfolio. Also see Section 3 of this paper for an overview.

or from non-information-based preferences, such as simple familiarity with local companies.[2] If local stocks represent a subset of securities for which fund managers believe they are better-informed relative to non-local stocks, as prior literature suggests, then any intentional shifts in portfolio composition in response to past performance (e.g. changing the risk profile of the portfolio to earn a higher expected return) could be attained by actively trading local securities.

The empirical results support this hypothesis by establishing a negative relationship between past performance and changes in local bias in fund managers' portfolios. This negative relationship is more pronounced during the final quarter of the fund managers' annual evaluation period, suggesting that fund managers respond to their incentive compensation plan by shifting their investment portfolios toward local stocks when they are most likely to miss the bonus pool. Furthermore, the shift toward local securities is accomplished by more active trading (proportionally) in local securities, as opposed to a passive investment strategy, thus reducing the concern that local economic shocks are driving the mix of local and non-local securities in the portfolio. These results are consistent with the prior literature on incentive compensation driving changes in investment behavior.

Additional analyses reveals that fund managers have superior stock-picking skills in local securities during the first three quarters of their annual evaluation period; however this advantage disappears during the final quarter of the annual evaluation period if the managers are underperforming their benchmark. Coupled with the earlier

[2] Some possible causes of an information advantage in local stocks proposed in the prior literature include soft information, personal relationships, exposure to local media, knowledge of local economic factors, and cost of information acquisition.

result that fund managers increase their local bias when underperforming in the final quarter, the results are consistent with fund managers exhibiting overconfidence in their local trading activity. The results found in this paper complement the existing local bias literature by proposing a determinant of local bias and by providing evidence consistent with fund managers exhibiting a limited information advantage in local stocks.

II. BACKGROUND

Local Bias

Portfolio theory demonstrates that diversification provides the manager with an outlet for spreading risk and hedging against extreme market movements, whereas specialization allows the manager learn about a specific risk factor and exploit their own information advantage to maximize profits. It is not uncommon for investors to choose their portfolio composition by learning about particular risk factors, such as industries, firm size, and stock price characteristics. By attaining a certain level of expertise in a subset of the market, investors tilt their portfolios away from the overall market portfolio by adding exposure to a well-understood class of securities. Until recently, the academic literature had not widely considered geography as a risk factor for which the investor may possess an information advantage. Numerous academic studies and popular press articles have puzzled over investors' preference for geographically-proximate securities, offering reasons such as political risk, explicit trade barriers, cultural/language differences, loyalty toward one's community, overconfidence, and familiarity as potential causes for this well-documented bias toward local stocks.

Recently, however, several studies have documented that investors do indeed possess (and exploit) an information advantage in local stocks. Coval and Moskowitz (2001) find that fund managers in their sample earn 1.18 percent more per year on their local holdings compared to their non-local holdings, and that their local holdings outperform the local stocks they avoided by 3 percent per year. Ivkovic and Weisbenner (2005) document a 3.2 percent return advantage for local holdings relative to non-local holdings for their sample of individual investors. Looking at hedge funds, Teo (2009) finds that funds with a physical presence in an investment region outperform other hedge funds investing in the same region by a significant margin. Hau (2001), Dvorak (2005), and Baik et al. (2010) each support these earlier results by documenting superior performance for local investors relative to non-local investors.[3]

Geographic performance superiority is not isolated to equity investors. Malloy (2005) and Bae et al. (2008) document that local analysts possess an information advantage over foreign analysts. Uysal et al. (2008) find that when target and acquirer firms are located in close proximity to each other, the acquirer returns are more than twice that in non-local transactions. Ayers et al. (2010) find that geographic distance between a firm and its institutional investors impacts the cost of monitoring, leading to systematic differences in financial reporting discretion. Consistent with distance affecting monitoring costs, Degryse and Ongena (2005) document that loan rates decrease with the distance between the firm and its lending bank, while Butler (2008) shows that

[3] To be clear, not all evidence points toward local investment superiority. Zhu (2002); Grinblatt and Keloharju (2000); Ferreira et al. (2009); and Seasholes and Zhu (2010) all provide evidence consistent with investors not having an information advantage in local stocks. In light of these studies, I remain agnostic on whether or not the fund managers in my setting possess a real information advantage in local stocks. I conjecture that managers ***believe*** they have an information advantage in local stocks relative to non-local stocks. To what degree managers exploit this perceived advantage and realize abnormal returns is tested in subsequent analyses.

investment banks with a local presence have a comparative advantage in placing difficult bond issues. Geographic proximity also appears to positively affect venture capital performance by lowering monitoring costs (Tian 2008).

Together, these studies point toward geography playing an important role in investor decisions. While many investors consciously overweight their portfolios in local stocks, this paper is the first study to document a determinant of changes in local bias. I show that past performance drives changes in local bias in a systematic and predictable manner. Fund managers actively shift their exposure to local stocks in response to their own past performance relative to an exogenous benchmark. This result is consistent with fund managers *believing* they possess an information advantage in local stocks relative to non-local stocks.

Data Limitations – Prior Research

Recent work on local bias has been unable to dissect investor behavior due to data limitations. To investigate fund managers' reactions to past performance, three essential data elements are required: detailed transactions, portfolio holdings, and trader identity. Popular data sources, including quarterly equity holdings as reported on 13f filings (used in Ferriera et al. 2009 and Baik et al. 2010), individual investor monthly holdings and daily transactions from a single brokerage firm (used in Seasholes and Zhu 2010 and Miller and Shanthikumar 2010), and transaction-level data in Germany, Indonesia, Finland, and Korea (Hau 2001; Dvorak 2005; Grinblatt and Kelharju 2000; Choe et al. 2005) all contain a subset of the data necessary to perform a thorough analysis of investor reaction to past performance. With some exceptions, the transaction data used in prior

studies cannot be matched with a particular institutional investor to track portfolio holdings over time. This limiting feature of the existing data sources has prevented prior research from examining the trading activity of institutional investors to examine whether past performance influences trading behavior in and portfolio exposure to local stocks.

To measure local bias at a primitive level, I constructed a database of the daily portfolio holdings of four large state retirement pension plans, whose combined total assets were $330 billion in 2010. Contained within this dataset are detailed records of over one million domestic equity securities transactions from 2003-2009.[4] Each transaction record includes a trade date, asset class, transaction type, security identifier, shares traded, price, commissions, expenses, broker, cost/proceeds, and other details. The transactions data, coupled with periodic portfolio holdings for each fund in my sample, allowed me to create rolling daily portfolios to derive measures of local bias in each fund's portfolio.

This rich dataset offers several advantages over prior studies using quarterly portfolio holdings or detailed trade data provided by single brokerage houses, exchanges, or the Trade and Quote (TAQ) database. First, unlike quarterly portfolio holdings, which are susceptible to window dressing and other reporting manipulations, daily trade data allows the researcher to examine the trading behavior of the investor as information is released into the marketplace. Second, most transaction-level datasets are limited in scope; only containing a few stocks, covering short time periods, or concentrated on a single exchange or brokerage house.[5] Lastly, while the TAQ database provides daily

[4] The dataset contains over three million transactions across all asset classes.
[5] See Appendix A for examples of recent datasets used in the literature.

trade activity for all securities listed on NYSE, AMEX, NASDAQ, and Small Cap issues, it does not allow the researcher to clearly identify the investor.[6] Prior research has inferred the type of investor engaging in a particular trade using trade size, but this methodology has weakened over time and cannot clearly identify the investor. This anonymity limits the researcher's ability to address investor-specific questions. Recently, other proprietary data sets, such as that made available by the Abel Noser Corporation, also provide daily transaction data, but suffer from the same inability to accurately identify the investor. [7] My dataset addresses these shortcomings by enhancing the holdings data to a daily frequency, while also maintaining the trader identity, precise location, and past performance history.

Investment Practices of State Retirement Systems

State retirement system pension assets totaled $1.601 trillion in 2008.[8] Roughly two-thirds (66.8%) of these assets were allocated toward equities (including real estate and private equity), with the remaining one-third allocated toward debt instruments.[9] Most plans outsource their asset management to external managers, however according to Brown et al. (2009), almost half of all pension assets are managed internally. Because most state pension funds are defined benefit plans, beneficiaries have limited incentives to monitor investment policies. Instead, it is local taxpayers that bear the burden of

[6] Most other transaction-level databases used in the prior literature suffer from this shortcoming as well.
[7] The Abel Noser data has been used extensively in Irvine, Lipson, and Puckett (2006), Chemmanur, He, and Hu (2009), Puckett and Yan (2010), and Goldstein, Irvine, Kandel, and Weiner (2009). Other high-frequency proprietary trade data used in prior studies are often limited by the number of stocks it covers, trade restrictions, or short time periods.
[8] 2010 Wilshire Report on State Retirement Systems: Funding Levels and Asset Allocation dated March 3, 2010. The listed asset value was derived from the 107 state retirement systems reporting actuarial data for 2008.
[9] These numbers represent 2009 allocations as represented in Exhibit 13 of the 2010 Wilshire Report on State Retirement Systems.

investment shortfalls (Coronado et al. 2003). As such, states have established laws and statutes to govern the investment behavior of plan assets.

Historically, state laws and statutes have imposed investment restrictions on fund investments. Examples of such limitations include an 1895 South Carolina state law prohibiting pension funds from investing in equities[10], an 1851 article in the Indiana Constitution outlawing state pension fund investment in bank stocks[11], and a Minnesota state law prohibiting investment in international securities and venture capital.[12] While most of the provisions prohibiting investment in entire asset classes have been relaxed, many state pension plans currently restrict investments in companies that have dealings with Iran, Northern Ireland, and Sudan. Additionally, several states have restricted plan investments in tobacco companies. Offsetting these standard restrictions, state funds typically allow for short-selling, derivative use, and 'penny-stock' trading.

Generally, a board of trustees or an investment committee determines the portfolio allocation of state pension funds (Coronado et al. 2003). Board members can be elected officials or political appointees. The board or committee members have a fiduciary responsibility to manage plan assets prudently. For example, the Florida State Board of Administration states that it must "act with the care, skill, prudence and diligence under the prevailing circumstances that a prudent person familiar with such

[10] The 'Investment Safeguards Act', introduced in 1996, amended this law to allow investment in U.S. equities. Interestingly, two Representatives voted 'nay' on this resolution. A subsequent bill was ratified in 2005 to allow for international investments.
[11] The state law actually prohibited investment in any corporation's stock, but specifically highlighted banks. This law was amended in 1996 to exclude the public employee retirement fund from this prohibition. The amendment to allow investment in equities had previously been rejected twice, once in 1986, and again in 1990 (Indiana Fiscal Policy Report No. 12, 1996).
[12] Law was amended in 1998.

matters would use in making investments" and that it must "make decisions based on an investment strategy of diversification, balancing such investments with risk tolerance."[13]

To motivate managers to uphold these investment strategies, state retirement systems often implement incentive compensation plans, comparable to those found among mutual fund managers.[14] The typical fund manager in this setting receives a base salary plus performance-based incentive compensation. The incentive-pay component rewards a manager for outperforming a benchmark. For domestic equities, the benchmark is usually a market index, such as the Russell 3000 or S&P 1500. The manager must outperform the benchmark to be considered in the bonus pool; however a cap on the maximum possible bonus payout restricts the manager from receiving additional compensation beyond a predetermined performance goal. By including a maximum payout, the compensation contract induces the manager to alter their investment behavior upon reaching their performance goals.

III. HYPOTHESIS DEVELOPMENT AND RESEARCH DESIGN

Hypothesis Development

Boyle et al. (2009) suggests that when investors possess different degrees of familiarity across assets, the optimal portfolio consists of both familiar and unfamiliar

[13] Excerpt taken from "Overview of the State Board of Administration" accessed from http://www.sbafla.com/fsb/Home/tabid/706/Default.aspx on 10/25/10.

[14] For example, the Performance Incentive Pay Plan for the Teacher Retirement System of Texas outlines the salary and bonus structure of the investment staff. The plan identifies benchmark performance and peer-group performance as two components of incentive compensation. The incentive award opportunity ranges from 5-125% of the employee's base salary. Similar compensation plans exist for other retirement systems.

assets.[15] The investor chooses to hold a diversified portfolio, but also biases the portfolio toward familiar assets (i.e. the relative degree of ambiguity is lower than other assets). Given that fund managers are typically evaluated against a market index and that time constraints prevent managers from collecting and processing all available information (i.e. limited attention), the intuition presented in Boyle et al. (2009) is appealing.

Fund managers are likely to hold diversified portfolios, but also trade off a piece of this diversification by overweighting their portfolios toward familiar assets, searching for higher returns. The portfolio weights afforded to familiar assets may be adjusted as circumstances change. For example, when the fund manager is underperforming the market index, the manager may choose to further deviate from the market portfolio by increasing the portfolio weight of familiar assets in order to rebound from prior losses. Similarly, during periods of superior performance, the fund manager is likely to move closer toward the market portfolio to lock in gains.

It is unclear *ex ante* whether fund managers actually adjust their portfolios in this manner and whether geography is a valid proxy for asset familiarity. Prior research on the influence of past fund performance on investor behavior has focused on changes in the riskiness of the overall portfolio following periods of relative over/under performance. Brown et al. (1996) find that mid-year underperformance drives mutual funds to search for higher expected returns, thereby leading to increased fund volatility in the second half of the year.[16] Likewise, Chevalier and Ellison (1997) find similar results, but additionally

[15] In the extreme cases of sufficiently high (low) ambiguity between familiar and unfamiliar assets, Boyle et al. argues that the optimal portfolio holds only (no) familiar assets. This extreme difference in ambiguity is unlikely to occur in practice.

[16] Several papers have questioned the results of Brown et al. (1996). Taylor (2003) argues that fund managers will increase risk following superior returns in response to underperforming managers who also

find a relation between performance incentives and investor risk taking.[17] Although the general finding that portfolio risk is intentionally altered by investors is robust in these settings, there is no empirical evidence documenting whether investors trade off diversification in favor of familiar assets to accomplish this risk-adjustment.

To be clear, it is unlikely that fund managers intentionally increase risk simply to amass more volatile returns. The underlying assumption is that, absent the fund manager possessing private information about future stock returns, the only way to increase expected returns is to increase the risk profile of the entire portfolio. Relaxing this assumption, analytical models suggest that when investors hold both familiar and unfamiliar assets, the optimal portfolio depends upon the relative degree of uncertainty, risk preferences, and the correlation between assets (Boyle et al. 2009). Following this logical progression, if investors are relatively better informed about local assets, then *ceteris paribus* as investors seek to increase expected return the optimal portfolio should skew more toward familiar assets.

But are local stocks considered familiar assets? In other words, do managers believe they possess a better understanding (less ambiguous) of local stocks relative to non-local stocks? Recent research has provided mixed evidence concerning the impetus behind the 'local bias' phenomenon. Several reasons have been postulated, including cultural/language barriers to diversification; transaction impediments; familiarity with local stocks; lack of awareness of non-local stocks; sense of loyalty to the local

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increase their risk. Busse (2001) questions the methodology of using monthly returns to estimate fund volatility, and finds results opposite of Brown et al. (1996). While these papers offer support for a bi-directional hypothesis, I choose to follow the logic presented in Brown et al. (1996) throughout this paper.

[17] Comprix and Muller (2006) also find evidence consistent with past performance influencing risk-taking behavior. However, in their setting, the driving force appears to stem from contribution risk, rather than a performance-sensitive compensation contract.

community; hubris; overconfidence; and lastly, actual private information, that would explain why investors hold portfolios skewed toward local stocks.[18] For past performance to be correlated with changes in local bias, managers need only to *believe* that they possess a greater understanding of local stocks compared to non-local stocks. Actual private information is not necessary, as overconfident uninformed investors are expected to behave in the same manner as informed investors; both groups are expected to increase the local bias of their portfolios during periods of relative underperformance, and decrease local bias during periods of relative outperformance.

Fund managers may shift their exposure to local assets in two ways. First, fund managers may allow price movements to naturally shift their exposure in a particular market segment. For example, absent rebalancing, if stocks located in Illinois outperform the rest of the market, fund managers will experience a shift in their portfolio exposure to Illinois stocks. It may be counterintuitive to consider the absence of rebalancing as an active trading strategy, but given the high frequency of fund managers' normal trading activity, the option to not trade in a particular stock or sector may be considered an active decision. On the other hand, fund managers may take a more proactive stance by increasing the proportion of local trading activity. Prior research indicates that the proportion of informed trading is directly influenced by the investor's risk aversion (Easley and O'Hara 2004). Although fund managers do not necessarily change their risk aversion following recent fund performance, an incentive contract that rewards superior performance and punishes underperformance may influence fund managers to trade off diversification in favor of specialization following adverse fund conditions. I expect the

[18] Brennan and Cao (1997); Hau (2001); Huberman (2001); Coval and Moskowitz (1999, 2001); Grinblatt and Keloharju (2001); Hong et al. (2008)

proportion of informed (local) trade activity to increase as diversification becomes a less attractive option. The above discussion leads to the following hypotheses (both stated in alternative form).

H1: Change in local bias is negatively related to investors' past performance.

H2: The proportion of local to non-local trade volume is negatively related to the investor's past performance.

Research Design

To test whether investors adapt their investment behavior to changes in past performance, I use the following OLS model:

$$\text{LBiasDP} = \alpha_0 + \beta_1 \text{ PastPerf} + \beta_2 \text{ FinalQ} + \beta_3 \text{ PastPerf*FinalQ} + \beta_4 \text{ Flow} + \beta_5 \text{ MktRet} + \beta_6 \text{ FundSize} + \beta_7 \text{ VIXindex} + \beta_8 \Delta\text{StateRev} + \varepsilon \quad (1)$$

LBiasDP represents the local bias dependent variable. In testing H1, LBiasDP is the daily change in the fund's local bias. Local bias is calculated by dividing the fraction of the fund's portfolio that is invested in in-state securities by the fraction of the market portfolio comprised of in-state securities, and then subtracting one. For H2, LBiasDP is proportion of local daily trade volume to total daily trading volume; calculated as local trade volume / total trade volume.

Other variables are defined as follows:

PastPerf = the fund's cumulative benchmark-adjusted return starting on the first day of the annual evaluation period

FinalQ = an indicator variable equal to one if the date falls within the final quarter of the investor's annual performance evaluation period

Flow = daily dollar difference between buys and sells for each fund

MktRet = 22-trading day lagged market return (from Eugene Fama's website)

FundSize = total domestic equity assets of the fund (calculated as the sum of all domestic equity holdings for each day)

VIXindex = adjusted closing price of the VIX index

ΔStateRev = percentage change in total (fund's home) state revenues (measured quarterly)

Change in Local Bias

To test whether investors respond to changes in past performance by shifting the weight of local assets in their portfolios, I must first consider how the balance of local to non-local assets might be affected in the absence of any conscious effort to alter the mix. When local asset prices do not mirror general market movements, the local bias of the portfolio is likely to become more volatile, unless the investor actively chooses to rebalance the portfolio. In the absence of rebalancing, the market-adjusted returns to local stocks could have a positive impact on the change in local bias. To control for this absence of rebalancing, I adjust the change in local bias (dependent variable) for the change in the market portfolio.

Additionally, investors may choose a more passive investment style when further removed from a performance evaluation. Chevalier and Ellison (1997), find evidence consistent with this wait-and-see approach to investing by documenting that mutual funds alter the riskiness of their portfolio in the second half of the year, following a mid-year

performance assessment. If investors wait until they are closer to their evaluation period to respond to recent performance, then the effect of past performance on changes in local bias will be muted. To account for this potential delay, I include an indicator variable representing the final quarter of the fund manager's annual evaluation period.

I include the flow of capital into the fund to control for the possibility of non-information-based trading. Coval and Stafford (2007) find that mutual funds tend to increase (decrease) existing positions following large inflows (outflows) of capital. To control for the influence of general market conditions on portfolio composition, I include both the 30-day market return and the level of the VIX index. The benefits derived from diversification may be augmented during bull markets, when non-information based trades are still expected to yield positive returns. Similarly, diversification may be seen as less costly during periods of relatively low market uncertainty. Fund size is included as a control variable to account for the relative difficulty large funds may have in altering their portfolio weights. To control for the likelihood of receiving timely contributions to the plan, I include the change in state revenue on the right-hand side. As state revenues decline, managers may feel forced to increase the expected return of the pension plan to compensate for the lower expected contributions.

Consistent with Hypothesis 1, I expect a negative coefficient on β_1. I also expect the coefficient on the interaction term to be negative, as fund managers are likely to grow more sensitive to cumulative performance as the end of their evaluation period approaches.

Proportion of Trading in Local Stocks

To test Hypothesis 2 on the relative trading activity of local versus non-local stocks during periods of varying fund performance, I create a measure of the daily proportion of local trade volume (Local trade volume / Total trade volume). This measure captures investors' willingness to trade more or less aggressively in local stocks compared to non-local stocks. Consistent with Hypothesis 3, I expect a negative coefficient on β_1. If investors grow more sensitive to their incentive contract following mid-year performance, the interaction term, β_3, may subsume some of the effect of past performance on the tradeoff between local and non-local trade volume.

The motivation for including the control variables in this regression is similar to the previous discussion. While additional controls for the determinants of trading volume, such as the number of stocks experiencing extreme capital gains and losses and monthly stock price highs and lows, were considered, it is not clear that these factors would be different between local and non-local stocks, or why the mix would be expected to change over time.

IV. EMPIRICAL RESULTS

Descriptive Data

I collect transaction-level and portfolio holdings data from four large state pension plans: the New Jersey Division of Investment (NJDOI), the Teachers Retirement System of Illinois (IL TRS), the Florida State Board of Administration (FL SBA), and the Teachers Retirement System of Texas (Texas TRS). Together these systems manage over

$330 billion in assets as of June 30, 2010.[19] The data set employed in this study includes all of the U.S. domestic equity securities transactions executed by these institutions from the third quarter of 2003 through the first quarter of 2009.[20] In addition, holdings information has been computed for every firm-day combination throughout the entire sample period.

The data set includes 21 variables for domestic equity transactions. The variables used in this study include: transaction type, trade date, CUSIP, shares traded, price, and cost/proceeds. I use the 'stocknames' file from the Center for Research in Security Prices (CRSP) on the Wharton Research Data Services (WRDS) platform to match the CUSIP with the appropriate PERMNO. I then used the PERMNO to append firm-location variables from Compustat and daily stock data from CRSP. I use corporate headquarters to partition the sample into local and non-local stocks, using state boundaries. Summary statistics are presented in Table 1.

Panel A shows the total number of purchase and sale transactions for each state retirement plan over the 23 quarters represented in the sample. The NJDOI averaged 2,340 transactions per quarter; whereas the IL TRS, FL SBA, and TX TRS averaged 26,211; 23,005; and 6,125 transactions per quarter, respectively.[21] Roughly 50% of the NJDOI's transactions were purchases. The IL TRS and FL SBA plans both slightly skewed their executed transactions toward purchases (52% and 58%, respectively), while the TX TRS plan executed more sales (57% of total transactions) . All plans substantially

[19] Data for Texas TRS is as of 03/30/10.
[20] The FL SBA changed custodians in 2005, therefore only provided data from July 1, 2005 onward.
[21] The large disparity in trading activity between the NJDOI and TX TRS and the other two funds in the sample may be due to the use of external managers by IL TRS and FL SBA over this time period. The NJDOI and TX TRS internally managed their US equity portfolio throughout most of the sample period.

increased their trading activity over the sample period. The number of transactions executed in 2008 was 25-80% more than those executed in 2006.[22]

Panel B outlines the total dollar value of purchase and sale transactions for each state retirement plan by quarter. The NJDOI engages in almost $3.3 billion of domestic equity trade activity per quarter; whereas the IL TRS, FL SBA, and TX TRS average $4.6 billion, $14.8 billion, and $13.1 billion per quarter, respectively. Despite the relative matching of the number of purchase and sale transactions across funds, the dollar volume breakdown shows greater variance. Figures 1 illustrate the cumulative dollar amount of purchases and sales for each fund over time. Although, the NJDOI were net sellers over the entire sample period, averaging over $800 million more in sales than purchases per quarter, this difference stems from the latter half of the sample period. A similar pattern emerges at the FL SBA, as purchase and sale volume remain relatively equal until mid-2007, when they become net sellers. Conversely, the IL TRS and TX TRS are net buyers over the same time period.

Table 2 provides a quarterly breakdown of the local and non-local securities held in each fund. Panel A shows the number of unique securities held by each fund at a given time. Over the entire sample period, the NJDOI held 1,914 unique domestic equities, however on average, the fund held only 1,290 securities in a single quarter. The IL TRS held 5,721 unique securities over the same sample period, but only 2,627 securities on average per quarter. The FL SBA and Texas TRS held an average of 3,250 and 1,540

[22] The financial crisis of 2008 undoubtedly played a role in the trading behavior of these funds. I leave this analysis for future research.

securities per quarter. Roughly 3-8% of the securities held in each fund's portfolio were located in the fund's home state.

Panel B discloses the local bias of each fund by quarter. Surprisingly, the funds in this sample do not exhibit widespread local bias in their portfolios. In fact, two fund exhibit a negative average local bias per quarter. There is, however, great variation in local bias throughout the sample period. Local bias is calculated by dividing the fraction of the fund's portfolio that is invested in in-state securities by the fraction of the market portfolio comprised of in-state securities, and then subtracting one. The NJDOI exhibits a positive local bias in 15 out of 23 quarters, with a local bias ranging from 0.15-0.55 in every quarter since 2007. Interestingly, the IL TRS and FL SBA exhibit a negative local bias in all but one quarter of the sample. The TX TRS exhibits greater fluctuation in their local bias, ranging from -0.09 to 0.08 during the time period.[23]

Results

Table 4 presents the OLS regression analysis examining the effect of fund managers' past performance on changes in local bias. The dependent variable is calculated as the raw change in local bias from one trading day to the next. This variable captures the fund manager's decision to increase or decrease the concentration of local stocks in the portfolio. When considered alone, the coefficient on past performance is negative and significant (t-statistic = -3.93). The negative coefficient is consistent with fund managers increasing local bias during periods of poor performance. I test whether

[23] To understand the economic magnitude of a shift in local bias, consider the following example. On 08/31/2006, the Texas TRS held approximately $45 billion in domestic equities. Given the market value of Texas firms compared to the size of the overall market on that day, a local bias shift of 0.01 would require the TX TRS plan to shift $50 million into local stocks.

this effect is exacerbated in the final stages of the fund manager's annual evaluation period. The coefficient on the interaction term, *PastPerf*FinalQ*, is negative and significant (t-statistic = -3.57). This result is consistent with fund managers responding to their contractual incentives by foregoing diversification benefits in favor of local stocks during the 'worst' of times (cumulative underperformance near the end of their evaluation period).

The coefficient on *Flow* is negative, but not significant (t-statistic = -1.58). A negative relationship may emerge if fund managers instinctively invest unexpected inflows of capital into the benchmark index, thus reducing any positive local bias. Fund size is expected to be negatively associated with changes in local bias, as large funds may have more difficulty in shifting overall portfolio composition. The coefficient on *FundSize* is negative and marginally significant. Market returns, market volatility, and the percent change in state revenue are all insignificant in the regression.

Table 5 presents multivariate results from estimating equation (1) for all transactions, and then separately for buys and sells. The dependent variable measures the proportion of total daily trading volume transacted in local stocks. An increase in this measure indicates that managers focus relatively more of their trading activity on local stocks. I expect past performance to be negatively associated with the proportion of local trading volume as managers actively contract their investment set during periods of underperformance. Additionally, I expect this effect to be augmented during the final quarter of the manager's evaluation period. The coefficient on past performance is negative and significant across all regression models (t-statistics = -4.87, -3.98, and -3.57 for all transactions, buys, and sales, respectively). The coefficient on the interaction term

is negative, but not significant at conventional levels. The results are consistent with managers increasing the concentration of their trading activity in local stocks during periods of cumulative underperformance.

V. Additional Analyses

Returns Analysis

Until now, the investigation has focused on fund managers' adapting their investment behavior to past performance. In this section, I discuss the consequences of fund managers' actions. Table 6 considers the one-month buy minus sell abnormal return for all transactions in the sample. I partition the transactions into local and non-local, based on the location of the securities' corporate headquarters. For each traded security, only two options are present: the security is marked as non-local for all four funds, or the security is marked as local for one fund in the sample and as non-local for the other three funds. Given that the four funds in the sample represent four different states, no security is identified as local for two different funds.

Table 6 Panel A partitions the transactions into those occurring during a period when the fund's cumulative year-to-date benchmark-adjusted performance is negative and those when YTD performance is positive. While there is little difference between the returns generated by local and non-local transactions during period of good performance, stock selection appears to improve during periods of poor performance, especially for local transactions. On average, local transactions executed during periods of poor fund performance outperform the market by 20 basis points over a one-month horizon.

Panel B groups all transactions occurring during the first three quarters of the fund manager's annual evaluation period together, and compares the returns to those achieved during the final quarter. These result complement those found in Panel A, as there is little difference between local and non-local transaction during the first three quarters, but a significant increase in the final quarter. Overall, stock selection appears to improve during the final quarter of the fund manager's annual evaluation period. On average, local transactions executed during the final quarter outperform the market (non-local stocks) by 41 (30) basis points over a one-month horizon. The evidence points toward fund managers possessing an information advantage in local stocks.

Panel C paints a different picture. When funds are performing poorly during the final quarter of the fund manager's annual evaluation period, one-month returns on local transactions significantly decline. Fund managers underperform the market (non-local stocks) by 59 (47) basis points during this time. Given that fund managers typically increase their exposure to local stocks during this time, this underperformance is curious. Possible explanations include overconfidence and politically-influenced investing during the final quarter.

Time Horizon

While the current research on local bias asks whether or not investors possess an information advantage in local stocks, relatively little is known regarding the nature of the information advantage. Coval and Moskowitz (2001) document that managers trade non-local stocks far more frequently than local stocks; a finding consistent with managers adopting long-term beliefs for local stocks and more volatile views about non-local

stocks. Still, it is unclear whether the private information managers possess in local firms, if any, is long-lived or short-lived. Several recent papers[24] conclude that local investors/investments outperform non-local investors/investments over various time thresholds, suggesting that investors possess private information in geographically proximate securities. On the other hand, Seasholes and Zhu (2010) find that individual investors' portfolios of local holdings do not generate superior returns over a one-year holding period and Ferreira et al. (2009) find that foreign money managers outperform local money managers, using monthly excess returns to measure performance. The mixed evidence regarding the performance of local versus non-local investment decisions implies that the nature of the private information in local firms may be time-sensitive.

Investors may be able to implicitly derive short-term information from relationships with local executives; or, they may gather more fundamental information affecting long-term value, such as plans for expansion into new markets. If investors possess an information advantage in local securities, and this information contains both long-term and short-term components, we should expect investors to exploit long-lived private information early in their evaluation period, and short-lived private information later in their evaluation period. Furthermore, investors' performance relative to a benchmark may influence the degree to which they choose to exploit any short-term information advantage, as underperforming investors may be more willing to forego fundamental analyses in favor of short-term price movements.

[24] See Hau (2001), Coval and Moskowitz (2001), Ivkovic and Weisbenner (2005), Dvorak (2005), and Baik, Kang, and Kim (2010)

To test whether investment managers shift their focus toward short-term returns following poor past fund performance, I first calculate six-month future returns for each stock for which the fund engaged in a transaction during the sample period, starting on the first trading day following the transaction.[25] The raw returns are then partitioned into one-month returns and the subsequent five-month returns. The reason for this partition is to isolate any short-lived information the fund manager may have possessed at the time of the trade. Excess returns serve as the dependent variable, while indicator variables for past fund performance; in-state securities; the final quarter of the fund manager's annual evaluation period; and all interaction terms, are all on the right-hand side of the equation. Separate regressions are run for purchases and sales. Additional interaction terms in the regression allow for the joint effect of the evaluation period, geographic proximity, and past fund performance on the distribution of future returns. I remain agnostic on the signs of the variables of interest, as little is known concerning the nature of the information advantage possessed by local fund managers.

$$\begin{aligned} \text{Returns} = \text{1MonthRet}*\Big[& \alpha_0 + \alpha_1\, \text{D\_PastPerf} + \alpha_2\, \text{Local} + \alpha_3\, \text{FinalQ} + \\ & \alpha_4\, \text{D\_PastPerf*Local} + \alpha_5\, \text{D\_PastPerf*FinalQ} + \\ & \alpha_6\, \text{Local*MidYearD} + \alpha_7\, \text{D\_PastPerf*Local*FinalQ} \Big] \end{aligned}$$

$$\begin{aligned} + \text{6MonthRet}*\Big[& \beta_0 + \beta_1\, \text{D\_PastPerf} + \beta_2\, \text{Local} + \beta_3\, \text{FinalQ} + \\ & \beta_4\, \text{D\_PastPerf*Local} + \beta_5\, \text{D\_PastPerf*FinalQ} + \\ & \beta_6\, \text{Local*MidYearD} + \beta_7\, \text{D\_PastPerf*Local*FinalQ} \Big] + \varepsilon \end{aligned} \qquad (2)$$

Returns = Future one-month (or subsequent five monthly) raw buy-and-hold return for stock i.

1MonthRet = Indicator variable equal to 1 when the dependent variable is one-month returns; 0 otherwise

[25] In future work, I will consider other risk-adjustment models, such as the Fama-French three-factor model, the Carhart (1997) and the Ferson and Schadt (1996) models.

6MonthRet = Indicator variable equal to 1 when the dependent variable is the subsequent five monthly returns (monthly returns from 2-6 months following the transaction); 0 otherwise

D_PastPerf = Indicator variable equal to 1 when the fund's 30-day lagged return is negative; 0 otherwise

Local = Indicator variable equal to 1 if the securities' corporate headquarters are located in the same state as the fund; 0 otherwise

FinalQ = Indicator variable equal to 1 if the transaction occurred within the final quarter of the investor's performance evaluation period; 0 otherwise

Equation 2 represents the stacking of two regressions: the first where the dependent variable is one-month raw returns, and the second where the dependent variable is six-month raw returns (less the returns from the first month). Thus, 1MonthRet is an indicator variable equal to 1 when the dependent variable is one-month returns (0 otherwise), and the α coefficients measure association between investor trading behavior/past fund performance and future one-month stock performance. Likewise, 6MonthRet is an indicator variable equal to 1 when the dependent variable is the subsequent five monthly returns (0 otherwise), and the β coefficients measure the same associations with the subsequent five monthly returns.

Table 7 presents the equal-weighted raw returns for all transactions in the sample, partitioned by transaction type, locality, cumulative performance and time horizon. Fund managers appear to perform better on their local buys, relative to non-local buys, during periods of poor past performance and during the final quarter of their annual evaluation period. The one-month returns for a local stock that was sold exhibits negative returns, whereas the subsequent five months yield a positive return. This evidence is consistent

with managers exploiting a short-term information advantage in local stocks. This evidence is supported in Table 8, which presents results from a stacked regression assessing the effect of past performance on trading behavior. The difference in the coefficients on PastPerf_D * Local * FinalQ in Panel B is significant, with the one-month returns exhibiting more negative returns.

Negative Local Bias

Several papers document that investors' portfolios are overexposed to local stocks, when compared to the overall market portfolio (i.e. Coval and Moskowitz 1999; Zhu 2002; Baik et al. 2010 among many others). It is interesting to note that the fund managers found in my setting, at times, exhibit negative local bias. One of the unique features of the state pension fund setting is the state's finances are intertwined with the retirement system. For example, states can and have cut or deferred pension funding to ease fiscal difficulties. Conversely, states have at their disposal the ability to raise tax revenue to support a faltering pension plan. Given how closely intertwined the state's finances are to the local economy, some may argue that it is in the state's best interest to hedge against adverse local economic times by underweighting local stocks in the pension's portfolio. The optimal allocation of local stocks in a state's pension fund is beyond the scope of this paper, but it is fair to say that state pension funds have incentives to hold less than the market portfolio's share of local stocks.

VI. CONCLUSION

This paper examines the determinants of changes in local bias. While much of the prior literature has examined the potential origins of local bias, data limitations have

prevented researchers from examining the role of a fund's past performance on the decision to trade off diversification in favor of a greater share of local stocks. The empirical analyses reveal that past performance is negatively associated with changes in local bias. This effect is amplified during the final quarter of the fund manager's evaluation period. This result suggests that managers respond to their incentive compensation contracts by gravitating toward their comfort zone, in this case local stocks, when underperforming their benchmark especially when their evaluation period is approaching. The change in local bias appears to be driven, in part, by the decision to trade more actively in local stocks during periods of relative underperformance. The relative increase in trade volume appears in both buying and selling activities.

Additional analyses reveal that fund managers' local investments outperform their non-local investments during most periods. However, when fund managers increase their exposure to local stocks the most, during periods of underperformance in the final quarter of their annual evaluation period, any previously determined information advantage disappears. Fund managers appear to overexpose their portfolio to local stocks by making poor investment decisions during this time. Further analysis offer some support for fund managers selectively exploiting short-term information in times of need.

Overall, the results suggest that fund managers respond to contractual incentives by changing their investment strategy and trading behavior during periods of relative underperformance. This change manifests itself in a tradeoff between local and non-local stocks. Additionally, this paper presents evidence that fund managers shift their demand preferences in predictable ways. By considering the impact of past performance on local bias, researchers may gain a further understanding of the changing nature of investor

demands. As a result, it may be fruitful for future research to examine whether managers respond to these demand shifts through voluntary managerial actions.

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Appendix A: Selected datasets used in prior research on investor trading

PAPER	DATA SET	LIMITATIONS
Barber and Odean (2000)	Individual transactions from large brokerage house from 1991-1996	-Average household holds only 3 stocks -Single large brokerage house (cannot recreate entire portfolio)
Grinblatt and Keloharju (2000)	Shareholdings in Finnish Central Securities Depository stocks for all Finnish investors from 1994-1996. Daily stock trades are also included.	-Focus only on 16 largest Finnish stocks -Difficult to disentangle indirect and foreign shareholdings -Brief time period
Hau (2001)	Transactions from Electronic trading system Xetra from the Trading Surveillance Unit of the Frankfurt Security Exchange from Sept 1998-Dec 1998	-Trader is anonymous -Short time span (4-months) -Only 11 stocks in sample
Choe, Kho, and Stulz (2001)	Transactions on Korean Stock Exchange from 1996-1998	-Trader identification is limited to type of institution (e.g. mutual fund, bank, insurance company) -Cannot recreate portfolio holdings -Most trading done by individuals
Feng and Seasholes (2005)	Transactions from individual brokerage accounts in the People's Republic of China from 1999-2000	-Only selected trades -Unknown portfolio holdings -Low trading activity per account
Dvorak (2005)	Transactions from the Jakarta Stock Exchange in Indonesia from 1998-2001	-Trader identification only domestic/foreign (cannot separate institution and individual) -Cannot recreate portfolio holdings -Sample restricted to only 30 stocks
Massa and Simonov (2006)	Individual portfolio holdings of Swedish investors from 1995-2000. Demographic and personal income data is also included.	-Does not include detailed transaction history
Kaniel, Saar, and Titman (2008)	Buy and sell orders by individual investors from NYSE's Consolidated Equity Audit Trail Data files from 2000-2003	-Does not include portfolio holdings
Puckett and Yan (2010)	Institutional trading data from ANcerno from 1999-2005*	-Does not include portfolio holdings -Cannot identify investor -Only contains subset of investor's trade activity

*Note – TX TRS reports that Abel Noser (now ANcerno) accounted for only 0.39% of all of their domestic shares traded during fiscal year ending 08/31/09.

Figure 1: Time series of the cumulative trading volume (in $millions) by quarter for each fund in the sample

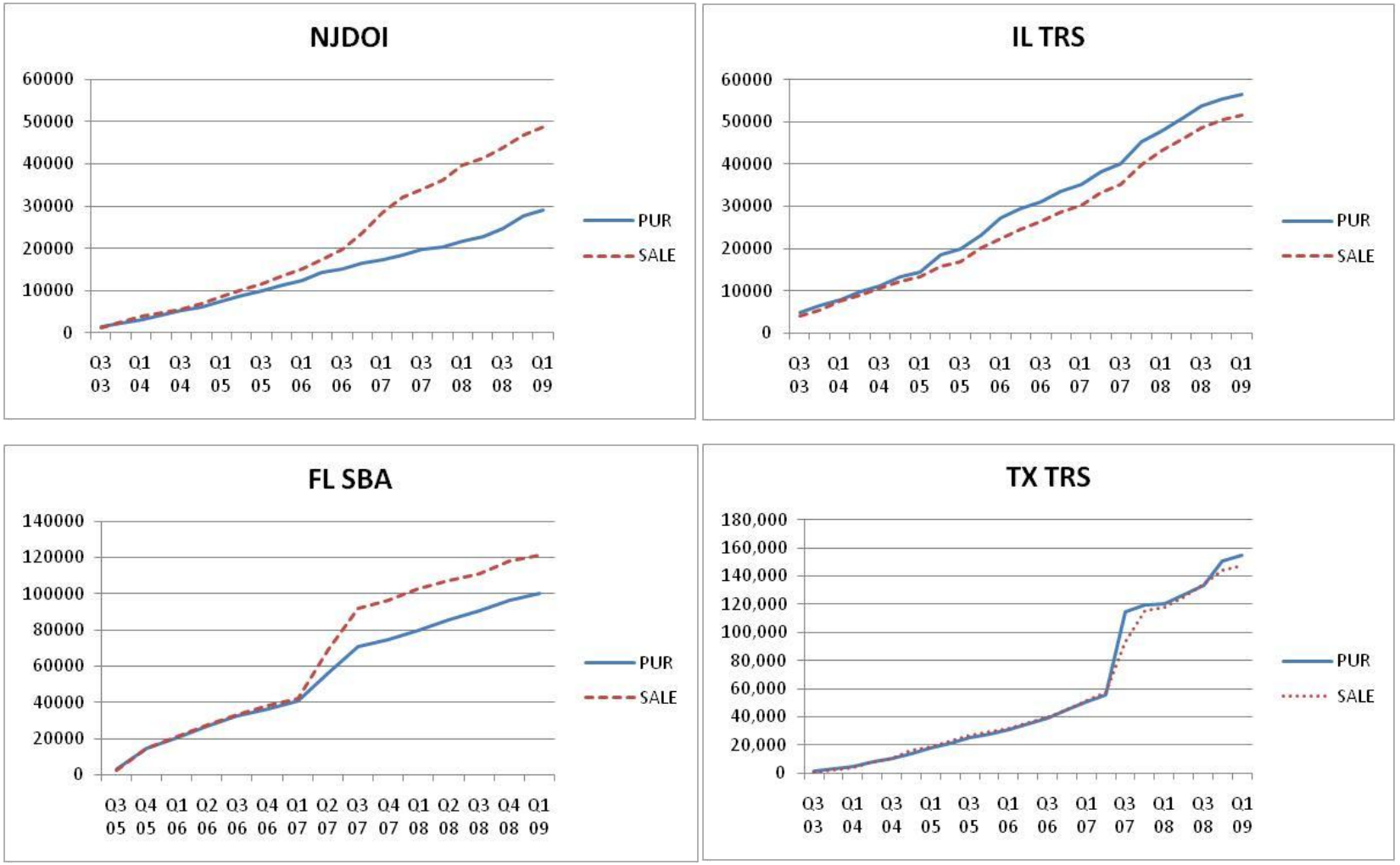
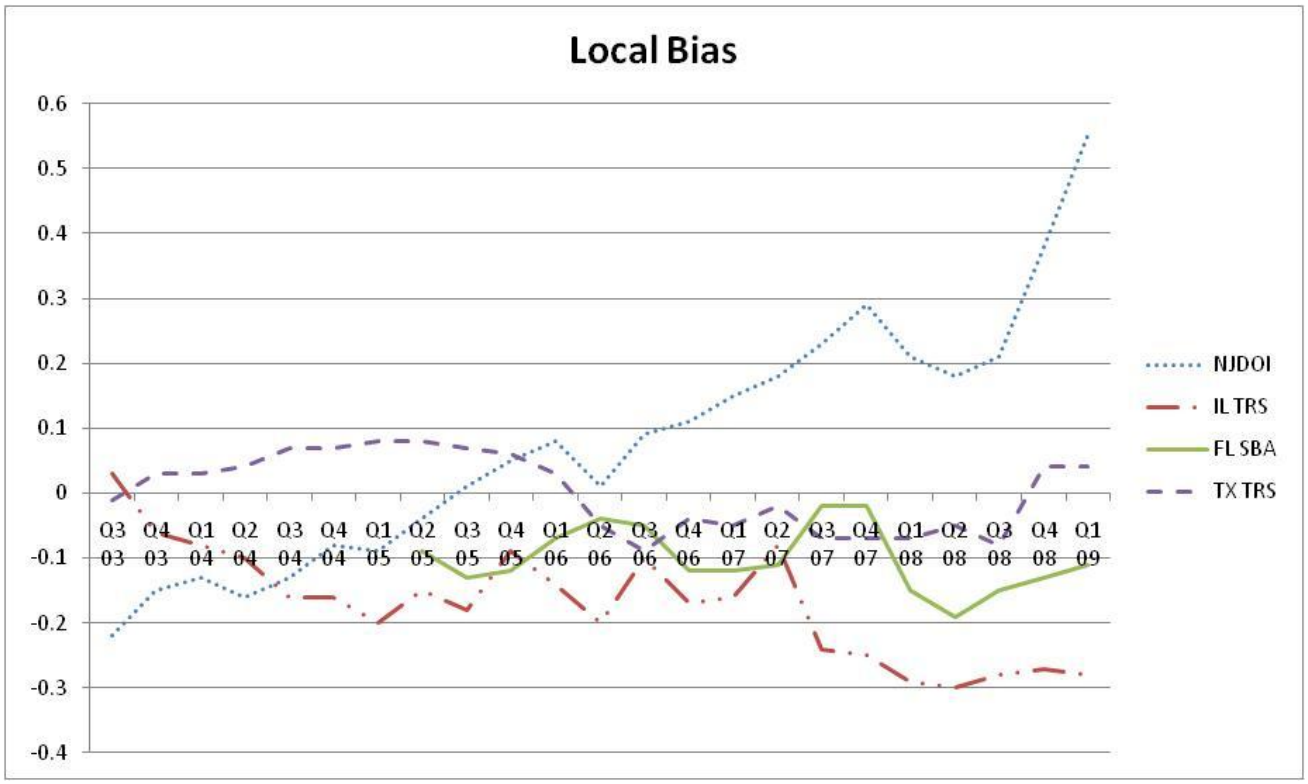


Figure 2: Local Bias by quarter



Local Bias is calculated by dividing the fraction of the fund's portfolio that is invested in in-state securities (local fund value) by the fraction of the market portfolio comprised of in-state securities, and then subtracting one. Local bias is measured quarterly, by equally-weighting each day's total and local fund value. Daily fund values are calculated by multiplying the holdings of each portfolio stock by the respective stock's closing price each trading day. The subset of total holdings that are located within the fund's home state comprise the daily local fund value. The market portfolio is comprised of all stocks listed in the CRSP database.

TABLE 1

Quarterly Domestic Equity Trade Statistics

PANEL A: Total count of purchase and sale transactions for each quarter from 2003Q3-2009Q1

		NJDOI			IL TRS			FL SBA			TEXAS TRS		
YEAR	QUARTER	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*
2003	3	970	952	1,922	13,054	14,054	27,108				1,467	854	2,321
2003	4	826	940	1,766	7,782	5,473	13,255				1,112	1,200	2,312
2004	1	1,043	873	1,916	6,318	6,041	12,359				1,235	3,273	4,508
2004	2	939	574	1,513	5,007	5,905	10,912				1,144	4,239	5,383
2004	3	774	639	1,413	14,785	6,272	21,057				957	2,182	3,139
2004	4	831	741	1,572	18,049	24,220	42,269				1,136	2,960	4,096
2005	1	1,059	661	1,720	6,216	6,752	12,968				1,625	1,406	3,031
2005	2	1,094	803	1,897	10,553	8,728	19,281				2,587	6,246	8,833
2005	3	984	974	1,958	7,840	7,389	15,229	9,720	4,453	14,173	2,307	2,700	5,007
2005	4	1,139	975	2,114	12,729	10,848	23,577	11,252	6,854	18,106	2,422	3,615	6,037
2006	1	959	955	1,914	11,193	9,051	20,244	6,072	6,080	12,152	5,217	5,569	10,786
2006	2	1,248	1,191	2,439	13,844	10,518	24,362	9,171	5,561	14,732	4,306	3,368	7,674
2006	3	1,095	1,293	2,388	10,369	10,356	20,725	11,527	6,596	18,123	2,585	2,320	4,905
2006	4	1,071	1,580	2,651	11,234	12,458	23,692	10,614	6,241	16,855	2,140	2,240	4,380
2007	1	1,291	1,737	3,028	9,882	11,360	21,242	13,369	5,964	19,333	1,789	2,499	4,288
2007	2	1,181	1,670	2,851	24,537	15,265	39,802	12,520	23,226	35,746	812	1,345	2,157
2007	3	1,301	1,068	2,369	12,618	10,546	23,164	14,369	20,656	35,025	5,034	1,818	6,852
2007	4	1,348	1,353	2,701	18,070	19,357	37,427	9,837	6,517	16,354	1,829	12,200	14,029
2008	1	1,311	1,539	2,850	16,256	15,476	31,732	10,549	6,307	16,856	554	1,188	1,742
2008	2	1,143	1,409	2,552	19,637	23,587	43,224	10,361	6,528	16,889	3,389	5,134	8,523
2008	3	1,591	1,502	3,093	23,959	17,248	41,207	18,076	9,964	28,040	6,818	6,994	13,812
2008	4	2,144	1,990	4,134	22,402	18,377	40,779	28,816	21,116	49,932	6,193	4,616	10,809
2009	1	1,686	1,368	3,054	17,997	19,235	37,232	23,485	9,271	32,756	4,198	2,044	6,242
AVERAGE:		**1,175**	**1,165**	**2,340**	**13,667**	**12,544**	**26,211**	**13,316**	**9,689**	**23,005**	**2,646**	**3,479**	**6,125**

TABLE 1

Quarterly Domestic Equity Trade Statistics

PANEL B: Total dollar value (in $millions) of purchase and sale transactions for each quarter from 2003Q3-2009Q1

		NJDOI			IL TRS			FL SBA			TEXAS TRS		
YEAR	QUARTER	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*	*PUR*	*SALE*	*TOTAL*
2003	3	1,379	1,057	2,436	4,816	3,938	8,754				1,479	1,005	2,484
2003	4	818	1,596	2,414	1,549	1,538	3,087				1,299	1,094	2,393
2004	1	984	1,140	2,124	1,442	2,089	3,531				2,012	1,948	3,960
2004	2	1,050	939	1,989	1,987	1,314	3,301				2,923	3,581	6,504
2004	3	983	926	1,909	1,261	1,670	2,931				2,952	2,896	5,848
2004	4	889	1,303	2,192	2,298	1,716	4,014				2,896	5,572	8,468
2005	1	1,363	1,213	2,576	1,080	1,076	2,156				4,204	2,940	7,144
2005	2	1,434	1,517	2,951	4,159	2,384	6,543				3,509	3,753	7,262
2005	3	917	1,352	2,269	1,295	1,208	2,503	2,997	2,710	5,707	4,219	3,806	8,025
2005	4	1,361	1,710	3,071	3,232	3,357	6,589	11,885	12,008	23,893	2,468	2,509	4,977
2006	1	1,272	1,735	3,007	4,073	1,994	6,067	5,289	6,382	11,671	3,361	3,078	6,439
2006	2	1,743	1,993	3,736	2,316	2,178	4,494	6,764	6,085	12,849	3,948	3,687	7,635
2006	3	1,052	2,547	3,599	1,651	1,893	3,544	5,374	6,226	11,600	4,130	3,980	8,110
2006	4	1,178	3,502	4,680	2,282	2,248	4,530	4,128	4,602	8,730	5,372	4,919	10,291
2007	1	919	5,059	5,978	1,683	1,741	3,424	4,095	4,144	8,239	6,215	6,655	12,870
2007	2	941	3,587	4,528	3,118	2,971	6,089	15,637	26,673	42,310	4,723	5,721	10,444
2007	3	1,454	1,719	3,173	1,741	1,847	3,588	14,387	23,381	37,768	58,839	36,522	95,361
2007	4	582	2,250	2,832	3,788	3,842	7.630	3,814	4,271	8,085	5,117	21,644	26,761
2008	1	1,309	3,545	4,854	2,668	3,122	5,790	5,600	6,200	11,800	539	2,670	3,209
2008	2	1,148	1,713	2,861	2,930	2,864	5,794	5,471	4,441	9,912	6,517	7,300	13,817
2008	3	1,979	2,401	4,380	2,868	2,764	5,632	4,897	4,212	9,109	6,427	8,662	15,089
2008	4	2,927	2,961	5,888	1,773	1,696	3,469	5,735	6,673	12,408	17,643	10,577	28,220
2009	1	1,398	2,064	3,462	1,177	1,165	2,342	4,292	3,077	7,369	4,144	2,580	6,724
AVERAGE:		**1,264**	**2,080**	**3,344**	**2,399**	**2,201**	**4,600**	**6,691**	**8,072**	**14,763**	**6,736**	**6,396**	**13,132**

TABLE 2

Quarterly Breakdown of Local and Non-Local Securities

PANEL A: Number of unique securities held in portfolio for each quarter from 2003Q3-2009Q1

		NJDOI			IL TRS			FL SBA			TEXAS TRS		
YEAR	QUARTER	*Local*	*Non-Local*	*TOTAL*	*Local*	*Non-Local*	*TOTAL*	*Local*	*Non-Local*	*TOTAL*	*Local*	*Non-Local*	*TOTAL*
2003	3	77	1,375	1,452	152	3,375	3,527				104	1,194	1,298
2003	4	77	1,361	1,438	71	1,444	1,515				103	1,198	1,301
2004	1	78	1,331	1,409	77	1,615	1,692				104	1,201	1,305
2004	2	75	1,333	1,408	78	1,576	1,654				106	1,201	1,307
2004	3	75	1,330	1,405	110	2,186	2,296				109	1,200	1,309
2004	4	76	1,331	1,407	191	4,249	4,440				107	1,208	1,315
2005	1	78	1,315	1,393	117	2,320	2,437				108	1,207	1,315
2005	2	80	1,316	1,396	124	2,474	2,598	114	2,808	2,922	106	1,209	1,315
2005	3	79	1,308	1,387	108	2,319	2,427	117	2,874	2,991	107	1,213	1,320
2005	4	77	1,291	1,368	134	2,592	2,726	118	2,926	3,044	107	1,216	1,323
2006	1	76	1,287	1,363	140	2,613	2,753	117	2,956	3,073	109	1,231	1,340
2006	2	72	1,265	1,337	142	2,694	2,836	124	3,214	3,338	109	1,226	1,335
2006	3	71	1,242	1,313	134	2,426	2,560	121	3,204	3,325	109	1,238	1,347
2006	4	68	1,219	1,287	133	2,467	2,600	116	3,106	3,222	109	1,238	1,347
2007	1	67	1,193	1,260	118	2,061	2,179	115	3,136	3,251	110	1,252	1,362
2007	2	65	1,153	1,218	153	3,113	3,266	115	3,217	3,332	111	1,256	1,367
2007	3	64	1,136	1,200	152	2,996	3,148	112	3,125	3,237	149	1,705	1,854
2007	4	62	1,122	1,184	151	3,009	3,160	109	3,135	3,244	161	1,824	1,985
2008	1	59	1,091	1,150	145	2,937	3,082	110	3,171	3,281	141	1,565	1,706
2008	2	53	1,017	1,070	149	3,165	3,314	116	3,400	3,516	144	1,580	1,724
2008	3	53	1,011	1,064	145	2,972	3,117	111	3,294	3,405	195	2,011	2,206
2008	4	55	1,036	1,091	144	2,931	3,075	109	3,302	3,411	205	2,145	2,350
2009	1	54	1,027	1,081	141	2,894	3,035	109	3,305	3,414	205	2,184	2,389
AVERAGE:		**69**	**1,221**	**1,290**	**131**	**2,627**	**2,758**	**114**	**3,136**	**3,250**	**127**	**1,413**	**1,540**

TABLE 2

Quarterly Breakdown of Local and Non-Local Securities

PANEL B: Local bias for each quarter from 2003Q3-2009Q1

		NJDOI			IL TRS			FL SBA			TEXAS TRS		
YEAR	QUARTER	*Port %*	*Mkt %*	*Local Bias*	*Port %*	*Mkt %*	*Local Bias*	*Port %*	*Mkt %*	*Local Bias*	*Port %*	*Mkt %*	*Local Bias*
2003	3	4.23	5.40	-0.22	5.55	5.40	0.03				8.43	8.49	-0.01
2003	4	4.28	5.04	-0.15	5.20	5.51	-0.06				8.68	8.45	0.03
2004	1	4.35	4.99	-0.13	5.14	5.56	-0.08				8.84	8.61	0.03
2004	2	4.23	5.01	-0.16	5.15	5.73	-0.10				9.18	8.82	0.04
2004	3	4.38	5.03	-0.13	4.59	5.45	-0.16				9.85	9.25	0.07
2004	4	4.40	4.76	-0.08	4.62	5.51	-0.16				10.19	9.50	0.07
2005	1	4.45	4.91	-0.09	4.42	5.55	-0.20				10.76	9.96	0.08
2005	2	4.89	5.09	-0.04	4.83	5.68	-0.15	1.47	1.62	-0.09	11.11	10.26	0.08
2005	3	4.91	4.88	0.01	4.74	5.75	-0.18	1.46	1.68	-0.13	11.58	10.84	0.07
2005	4	5.00	4.78	0.05	5.20	5.69	-0.09	1.48	1.69	-0.12	11.42	10.76	0.06
2006	1	5.10	4.72	0.08	4.94	5.72	-0.14	1.58	1.71	-0.07	11.32	11.01	0.03
2006	2	4.73	4.70	0.01	4.69	5.87	-0.20	1.61	1.68	-0.04	10.54	11.06	-0.05
2006	3	5.26	4.83	0.09	5.35	5.93	-0.10	1.51	1.59	-0.05	10.23	11.21	-0.09
2006	4	5.30	4.77	0.11	4.82	5.80	-0.17	1.40	1.60	-0.12	10.50	10.88	-0.04
2007	1	5.45	4.72	0.15	4.82	5.76	-0.16	1.38	1.58	-0.12	10.57	11.07	-0.05
2007	2	5.60	4.77	0.18	5.45	5.90	-0.08	1.37	1.54	-0.11	11.82	12.03	-0.02
2007	3	5.79	4.72	0.23	4.53	5.97	-0.24	1.41	1.43	-0.02	11.63	12.49	-0.07
2007	4	6.29	4.89	0.29	4.44	5.94	-0.25	1.35	1.38	-0.02	11.78	12.60	-0.07
2008	1	5.94	4.92	0.21	4.23	5.98	-0.29	1.19	1.40	-0.15	11.98	12.90	-0.07
2008	2	5.55	4.71	0.18	4.15	5.91	-0.30	1.18	1.45	-0.19	13.06	13.76	-0.05
2008	3	6.04	5.00	0.21	4.29	5.98	-0.28	1.25	1.47	-0.15	12.11	13.10	-0.08
2008	4	7.58	5.49	0.38	4.43	6.09	-0.27	1.22	1.40	-0.13	13.18	12.69	0.04
2009	1	9.04	5.84	0.55	4.52	6.29	-0.28	1.32	1.47	-0.11	13.81	13.22	0.04
AVERAGE:		**5.34**	**4.95**	**0.07**	**4.79**	**5.78**	**-0.17**	**1.39**	**1.54**	**-0.10**	**10.98**	**11.00**	**0.0**

TABLE 3
Pearson Correlations

Variable	***ΔLocalBias***	**LocalTradeP**	**PastPerf**	**DailyFlow**	**MktRet**	**FundSize**	**VIXindex**
LocalTradeP	0.114						
PastPerf	-0.044	-0.089					
DailyFlow	-0.008	0.001	-0.191				
MktRet	-0.001	0.040	-0.075	-0.041			
FundSize	-0.024	0.199	0.079	-0.091	0.157		
VIXindex	-0.002	-0.015	0.104	0.026	-0.628	-0.180	
ΔStateRev	0.011	0.076	-0.094	-0.030	0.111	0.143	-0.548

***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. N=3,566.

The table presents Pearson correlations for the variables

Variable definitions:

ΔLocalBias = Daily change in the fund's local bias. Local bias is calculated by dividing the fraction of the fund's portfolio that is invested in in-state securities by the fraction of the market portfolio comprised of in-state securities, and then subtracting one.
LocalTradeP = proportion of local daily trade volume to total daily trading volume, calculated as local trade volume / total trade volume
PastPerf = the fund's cumulative benchmark-adjusted return starting on the first day of the annual evaluation period
DailyFlow = daily dollar difference between buys and sells for each fund
MktRet = 22-trading day lagged market return (from Eugene Fama's website)
FundSize = total domestic equity assets of the fund (calculated as the sum of all domestic equity holdings for each day)
VIXindex = adjusted closing price of the VIX index
ΔStateRev = percentage change in total (fund's home) state revenues (measured quarterly)

TABLE 4
Effect of fund managers' past performance and compensation contract on changes in local bias

$$\Delta LocalBias_{it} = \alpha + \beta_1 PastPerf_{it} + \beta_2 FinalQ_{it} + \beta_3 PastPerf_{it}*FinalQ_{it} + \beta_4 Flow_{it} + \beta_5 MktRet_{it} + \beta_6 FundSize_{it} + \beta_7 VIXindex_{it} + \beta_8 \Delta StateRev_{it} + \varepsilon \quad (1)$$

Variable	Pred Sign	(1)	(2)	(3)
Intercept	*?*	*0.000909* *(0.48)*	*0.00704* *(0.95)*	*0.00956* *(1.25)*
Past Perf	(-)	*-0.03676* *(-3.93)***	*-0.03786* *(-3.98)***	*-0.01845* *(-1.68)**
FinalQ	(+/-)			*-0.00371* *(-0.81)*
*PastPerf * FinalQ*	(-)			*-0.07644* *(-3.57)***
Flow	(+/-)		*-0.00001* *(-1.45)*	*-0.00001* *(-1.58)*
MktRet	(-)		*-0.00891* *(-0.22)*	*-0.00889* *(-0.22)*
FundSize	(-)		*-0.00018* *(-1.67)**	*-0.00018* *(-1.73)**
VIXindex	(+)		*0.00000* *(0.00)*	*-0.00006* *(-0.23)*
$\Delta StateRev_i$	(-)		*-0.00001* *(-0.03)*	*-0.00011* *(-0.36)*
Adj. R^2		*0.0033*	*0.0030*	*0.0053*

The table presents the results of an OLS regression testing whether investors shift the concentration of local assets in their portfolio in response to one-month fund returns and whether this effect is stronger in the final quarter of their annual evaluation period.

***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. For all regressions, N=4,739.

Variable definitions:

$\Delta LocalBias$ =	Daily change in the fund's local bias. Local bias is calculated by dividing the fraction of the fund's portfolio that is invested in in-state securities by the fraction of the market portfolio comprised of in-state securities, and then subtracting one.
$PastPerf$ =	the fund's cumulative benchmark-adjusted return
$MidYearD$ =	an indicator variable equal to one if the date is within the final two quarters of the investor's annual performance evaluation period
$Flow$ =	net flow of capital into the fund.
$MktRet$ =	overall 30-day market return
$FundSize$ =	total assets of the fund
$VIXindex$ =	adjusted closing price of the VIX index
$FundedStatus$ =	total assets of the fund less total liabilities of the fund (alternatively, a dummy equal to 1 if above 90%, 0 if under 90%)
$\Delta StateRev$ =	percentage change in total (fund's home) state revenues

TABLE 5
Effect of past performance and compensation contracts on proportion of total trading volume in local stocks

$$LocalTradeP_{it} = \alpha + \beta_1 PastPerf_{it} + \beta_2 FinalQ_{it} + \beta_3 PastPerf_{it}*FinalQ_{it} + \beta_4 Flow_{it} + \beta_5 MktRet_{it} + \beta_6 FundSize_{it} + \beta_7 VIXindex_{it} + \beta_8 \Delta StateRev_{it} + \varepsilon \quad (2)$$

	Pred	All Transactions		Buys		Sales	
Variable	Sign	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	*?*	*0.08040* *(40.19)****	*0.00302* *(0.43)*	*0.07779* *(32.62)***	*0.01377* *(1.63)*	*0.08035* *(32.47)****	*0.00093* *(0.11)*
Past Perf	(-)	*-0.03385* *(-3.76)****	*-0.04306* *(-4.87)****	*-0.03390* *(-3.16)****	*-0.04266* *(-3.98)****	*-0.03266* *(-2.93)****	*-0.03939* *(-3.57)****
FinalQ	(+/-)	0.00202 (0.47)	*0.00479* *(1.14)*	*0.00483* *(0.95)*	*0.00811* *(1.59)*	*0.00092* *(0.17)*	*0.00296* *(0.56)*
*PastPerf * FinalQ*	(-)	-0.03129 (-1.74)*	*-0.01471* *(-0.84)*	*-0.03341* *(-1.56)*	*-0.01792* *(-0.84)*	*-0.03470* *(-1.56)*	*-0.01758* *(-0.80)*
DailyFlow	(-)		*0.00001* *(1.62)*		*0.00002* *(2.65)****		*0.00001* *(1.58)*
MktRet	(-)		*0.13465* *(3.67)****		*0.03509* *(0.79)*		*0.20972* *(4.58)****
FundSize	(+/-)		*0.00125* *(13.48)****		*0.00111* *(9.94)****		*0.00122* *(10.56)****
VIXindex	(-)		*0.00141* *(5.83)****		*0.00109* *(3.70)****		*0.00149* *(4.95)****
$\Delta StateRev_i$	(-)		*0.00210* *(6.90)****		*0.00151* *(4.08)****		*0.00242* *(6.35)****
Adj. R^2		*0.0080*	*0.0700*	*0.0059*	*0.0370*	*0.0049*	*0.0495*

The table presents the results of an OLS regression testing whether investors shift the concentration of local assets in their trading activity in response to one-month fund returns and whether this effect is stronger in the final quarter of their annual evaluation period.

***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. For all regressions, N=3,566.

Variable definitions:

LocalTradeP	=	proportion of local daily trade volume to total daily trading volume, calculated as local trade volume / total trade volume
PastPerf	=	the fund's cumulative benchmark-adjusted return
MidYearD	=	an indicator variable equal to one if the date is within the final two quarters of the investor's annual performance evaluation period
Flow	=	net flow of capital into the fund.
MktRet	=	overall 30-day market return
FundSize	=	total assets of the fund
MktVol	=	overall 30-day market volatility
FundedStatus	=	total assets of the fund less total liabilities of the fund (alternatively, a dummy equal to 1 if above 90%, 0 if under 90%)
ΔStateRev	=	percentage change in total (fund's home) state revenues

TABLE 6
Buy – Sell One-Month CAR for all transactions included in sample

Panel A: Cumulative Year-to-Date Fund Performance

	Poor Past Perf	Good Past Perf
Local Transactions	0.20%	(0.22%)
Non-Local Transactions	(0.05%)	(0.26%)

Panel B: Final Quarter of Funds' Annual Evaluation Period

	Final Quarter	First Three Quarters
Local Transactions	0.41%	(0.26%)
Non-Local Transactions	0.11%	(0.30%)

Panel C: Performance and Timing

	Poor PP. in Final Q	All other transactions
Local Transactions	(0.59%)	(0.05%)
Non-Local Transactions	(0.12%)	(0.21%)

This table presents equal-weighted one month market-adjusted net (buy – sell) returns from transactions executed during the sample period.

Local Transactions: buy and sell transactions in stocks located in the funds' home state (e.g. IL TRS transactions in IL; TX TRS transactions in TX).

Non-Local Transactions: buy and sell transactions in stocks located outside the funds' home state.

Panel A partitions transactions by the cumulative past performance of the fund. Poor (Good) Past Performance indicates that the funds' year-to-date performance is below (above) their benchmark. Panel B partitions transactions into those executed during the final quarter of the funds' annual evaluation period and those executed during the first three quarters of the annual evaluation period. Panel C combines the performance and timing attributes by separating the transactions executed during the final quarter of the funds' annual evaluation periods when the fund is below their benchmark.

TABLE 7
Equal-weighted average raw returns for all transactions included in sample

Panel A: Buys

	One-Month			Five-Month		
	Local		Non-Local	Local		Non-Local
Poor Past Performance	0.0511	>	-0.2894	-0.2296	>	-0.5474
Good Past Performance	-0.2248		-0.0511	-0.5663		-0.3986
**********						
Final Quarter	-0.1582	>	-0.3074	-2.0201	>	-2.1927
Other 3 Quarters	-0.1375		-0.0588	-0.0624		0.0252

Panel B: Sales

	One-Month		Five-Month	
	Local	Non-Local	Local	Non-Local
Poor Past Performance	-0.4673	-0.5584	0.3982	-0.5400
Good Past Performance	0.9933	0.9677	0.0295	-0.2620
**********				
Final Quarter	-0.6900	-0.2341	-1.6165	-2.4181
Other 3 Quarters	0.9651	0.8080	0.6637	0.2494

The table presents the equal-weighted average future returns of all transactions included in the sample. The One-Month returns are the raw 22-trading day returns commencing on the trade date. The Five-Month returns are the average monthly raw returns from the subsequent 100 trading days commencing on the 23rd trading day following the transaction. In short, the Five-Month returns capture future monthly returns from months 2-6 following the trade date. The Local – Non-Local partition is based on whether the firm's corporate headquarters are located within the same state as the fund. The same firm could be identified as local for one fund and non-local for the other funds in the sample. Poor (Good) past performance is identified as underperformance (over-performance) relative to the fund's benchmark. Final Quarter (Other 3 Quarters) indicates that the transaction occurred within (outside) the final quarter of the fund manager's annual evaluation period.

N=1,035,162

TABLE 8
Stacked Regression: Effect of past performance and compensation contract on trading behavior

Panel A: Buys

Variable	One-Month Returns % (1)	Five-Month Returns % (2)	Test Across Diff. (F-test) (3)
Intercept	*-0.00134*	*-0.00767*	
*PastPerf_D * Local * FinalQ*	*-0.01220* *(-2.00)***	*-0.01538* *(-2.46)***	*0.13*
Past Perf_D	*0.00976* *(13.04)****	*0.01351* *(17.76)****	*12.37****
Local	-0.00222 (-0.95)	*-0.00679* *(-2.88)****	*1.90*
FinalQ	-0.00537 (-5.25)***	*-0.12290* *(-116.04)****	*6377.38****
*PastPerf_D * Local*	*0.00534* *(1.27)*	*0.00481* *(1.14)*	*0.01*
*PastPerf_D * FinalQ*	*-0.01628* *(-11.83)****	*-0.09147* *(-64.58)*	*1449.52****
*Local * FinalQ*	*0.00693* *(1.44)*	*0.01952* *(3.87)****	*3.26**
System Weighted R^2		*0.0167*	

***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. For all regressions, N=526,727.

The table presents the results of a stacked OLS regression testing the future returns from trading activities under varying conditions. Parameter estimates are based on the following model:

$$\begin{aligned}\text{Returns} = 1\text{MonthRet}*\Big[&\alpha_0 + \alpha_1\,\text{D\_PastPerf} + \alpha_2\,\text{Local} + \alpha_3\,\text{FinalQ} + \\ &\alpha_4\,\text{D\_PastPerf*Local} + \alpha_5\,\text{D\_PastPerf*FinalQ} + \\ &\alpha_6\,\text{Local*MidYearD} + \alpha_7\,\text{D\_PastPerf*Local*FinalQ}\Big] \\ + 6\text{MonthRet}*\Big[&\beta_0 + \beta_1\,\text{D\_PastPerf} + \beta_2\,\text{Local} + \beta_3\,\text{FinalQ} + \\ &\beta_4\,\text{D\_PastPerf*Local} + \beta_5\,\text{D\_PastPerf*FinalQ} + \\ &\beta_6\,\text{Local*MidYearD} + \beta_7\,\text{D\_PastPerf*Local*FinalQ}\Big] + \varepsilon\end{aligned}$$

TABLE 8 (cont.)
Stacked Regression: Effect of past performance and compensation contract on trading behavior

Panel B: Sales

Variable	One-Month Returns % (1)	Five-Month Returns % (2)	Test Across Diff. (F-test) (3)
Intercept	*0.00641*	*0.02028*	
*PastPerf_D * Local * FinalQ*	*-0.02908* *(-4.87)****	*-0.00225* *(-0.37)*	*9.83****
Past Perf_D	*0.01475* *(22.50)****	*0.01043* *(15.58)****	*21.27****
Local	-0.00320 (-1.22)	*0.02103* *(7.81)****	*41.60****
FinalQ	-0.01611 (-14.07)***	*-0.14634* *(-121.25)****	*6129.86****
*PastPerf_D * Local*	*0.01871* *(3.99)****	*-0.00990* *(-2.08)***	*18.32****
*PastPerf_D * FinalQ*	*-0.02945* *(-17.26)****	*-0.12526* *(-69.51)****	*1490.38****
*Local * FinalQ*	*0.00615* *(1.19)*	*0.02706* *(4.90)****	*7.63****
System Weighted R^2		*0.0199*	

***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. For all regressions, N=498,438.

The table presents the results of a stacked OLS regression testing the future returns from trading activities under varying conditions. Parameter estimates are based on the following model:

$$\begin{aligned}\text{Returns} = 1\text{MonthRet}*&\left[\begin{array}{l}\alpha_0 + \alpha_1\ \text{D\_PastPerf} + \alpha_2\ \text{Local} + \alpha_3\ \text{FinalQ} + \\ \alpha_4\ \text{D\_PastPerf*Local} + \alpha_5\ \text{D\_PastPerf*FinalQ} + \\ \alpha_6\ \text{Local*MidYearD} + \alpha_7\ \text{D\_PastPerf*Local*FinalQ}\end{array}\right] \\ + 6\text{MonthRet}*&\left[\begin{array}{l}\beta_0 + \beta_1\ \text{D\_PastPerf} + \beta_2\ \text{Local} + \beta_3\ \text{FinalQ} + \\ \beta_4\ \text{D\_PastPerf*Local} + \beta_5\ \text{D\_PastPerf*FinalQ} + \\ \beta_6\ \text{Local*MidYearD} + \beta_7\ \text{D\_PastPerf*Local*FinalQ}\end{array}\right] + \varepsilon\end{aligned}$$

Variable definitions:

Returns =	Future one-month (or subsequent five monthly) raw buy-and-hold return for stock i.
1MonthRet =	Indicator variable equal to 1 when the dependent variable is one-month returns; 0 otherwise
6MonthRet =	Indicator variable equal to 1 when the dependent variable is the subsequent five monthly returns (monthly returns from 2-6 months following the transaction); 0 otherwise
D_PastPerf =	Indicator variable equal to 1 when the fund's 30-day lagged return is negative; 0 otherwise
Local =	Indicator variable equal to 1 if the securities' corporate headquarters are located in the same state as the fund; 0 otherwise
FinalQ =	Indicator variable equal to 1 if the transaction occurred within the final quarter of the investor's performance evaluation period; 0 otherwise