The Geography of Investment: Informed Trading and Asset Prices

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Applying a geographic lens to mutual fund performance, this study finds that fund managers earn substantial abnormal returns in nearby investments. These returns are particularly strong among funds that are small and old, focus on few holdings, and operate out of remote areas. Furthermore, we find that while the average fund exhibits only a modest bias toward local stocks, certain funds strongly bias their holdings locally and exhibit even greater local performance. Finally, we demonstrate that the extent to which a firm is held by nearby investors is positively related to its future expected return. Our results suggest that investors trade local securities at an informational advantage and point toward a link between such trading and asset prices.

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I. Introduction

This paper identifies a strong geographic link between mutual fund investment and performance. Analyzing the equity holdings of a large sample of actively managed mutual funds, we find that fund managers appear to earn substantial abnormal returns in their geographically proximate investments. The average fund manager generates an additional return of 2.67 percent per year from her local investments (defined as holdings within 100 kilometers of the fund headquarters) relative to her nonlocal holdings. When we adjust for risk, her local investments earn 1.84 percent per year above passive benchmark portfolios and earn 1.18 percent per year more than her distant holdings. Furthermore, local stocks avoided by the manager underperform local stocks actually held by a risk-adjusted 3 percent per year. The results are robust across a wide array of fund types, to various local definitions, and to a variety of alternative specifications.

These findings, which demonstrate that fund managers have substantial ability to select local stocks, are uncharacteristic of those of the performance literature as a whole. Studies of mutual fund managers (e.g., Jensen 1968; Malkiel 1995; Carhart 1997; Daniel et al. 1997; Chevalier and Ellison 1999*a*), pension fund managers (e.g., Lakonishok, Shleifer, and Vishny 1992*b*), and individual investors (e.g., Barber and Odean 2000) all find that their investors, if anything, consistently *underperform* the market and other passive benchmark portfolios. Rather than examine the total returns of a particular class of investors, we use geography to isolate those investments in which evidence of stock selection ability is most likely to emerge. By examining the nearby holdings of mutual fund managers, we focus on the segment of their portfolio in which their advantage over competitors should be most pronounced.

Our findings suggest that fund managers are exploiting informational advantages in their selections of nearby stocks. Managers appear to earn abnormal returns in their local holdings as compensation for information they may acquire about local companies. This information may be the result of improved monitoring capabilities or access to private information of geographically proximate firms. Consistent with this view, the gains from local investment are larger among funds better able to exploit local knowledge. For instance, funds that are more agile—including smaller funds, funds with relatively few holdings, and older funds—generate higher local returns and invest more heavily in local stocks. In addition, areas in which local information may be more valuable and more difficult for outsiders to obtain, such as small cities and remote locations, offer larger profits for local investors.

Moreover, funds better able to select local stocks concentrate their holdings more locally. Despite the apparent gains from investing locally,

the average fund in our sample exhibits only a modest bias toward local stocks. Certain managers, on the other hand, exhibit a strong local bias, tilting their portfolios by as much as 20–25 percent toward local stocks. These funds also generate the largest gains from local investment, outperforming their distant holdings by as much as 3 percent per year and outpacing local stocks not held by 4–5 percent per year, on a risk-adjusted basis. Conversely, funds that do not exhibit a local bias generate no abnormal performance in their local holdings. These results suggest an informational link between geography and investment.

More broadly, the study of information pervades economic theory. In theories of asset pricing and market efficiency, for instance, informed agents play a central role. However, empirically, actual sightings of informed traders are rare. Theory offers little guidance in identifying informed investors and in distinguishing between securities with scarce information and those with widely available information. Since investors located near potential investments exhibit a significant ability to select stocks, geographic proximity may be useful in identifying informed trading. With this in mind, we shift the focus of our analysis from the perspective of the fund manager to that of the stock, examining the relation between local investor ownership and asset prices. We find that the extent to which a firm is owned by local investors is positively related to its future expected return, even in the presence of factors known to capture a sizable portion of the cross-sectional variation in average returns. The risk-adjusted premium for locally held stocks over firms held by the market is 1.1 percent per year but increases to over 3 percent per year among the smallest firms and among firms with high levels of mutual fund ownership. These findings suggest that geographic location, informed trading, and asset prices are closely related.

In addition, the local abnormal returns we document do not disappear immediately, persisting for several months after portfolio formation. Therefore, if uninformed or distant investors could obtain timely local portfolio positions of funds, they might be able to replicate some of the local gains achieved by our managers. Hence, our results, which at least appear inconsistent with the strongest notion of market efficiency, may also violate a semistrong efficient market if portfolio positions become publicly accessible within several months of filings with the Securities and Exchange Commission (SEC) (on which our holdings data are based). At the same time, once investors are aware of this possibility, the gains from local investing might disappear or become shorter-lived.

Finally, this paper contributes to a growing literature on the economic importance of geography (e.g., Krugman 1991; Lucas 1993; Audretsch and Feldman 1996; Audretsch and Stephan 1996). The geographic link between investment and performance we document highlights a new

dimension for portfolio choice. For instance, our findings may help address various explanations offered for the geographic investment phenomenon documented by Coval and Moskowitz (1999*a*) and Huberman (in press) and may help shed light on the international home bias puzzle: the fact that investors severely overweight their portfolios toward domestic assets. We present an additional dimension to the geographic component of investment by relating it to performance.

The remainder of the paper is organized as follows. Section II describes the data used in this study. Section III examines the performance of local and nonlocal investments across mutual fund managers. Section IV analyzes geographic investment from a stock perspective, assessing the relation between the cross section of expected returns and the degree of local investment in a firm. Section V analyzes the trading behavior of local investors. Section VI concludes the paper.

II. Data

For our sample we merged the Investment Company Common Stock Holdings and Transactions tapes, from CDA Investment Technologies, with latitude and longitude data obtained from *Geographic Names Information System Digital Gazetteer* (GNISDG), published by the U.S. Geological Survey. The CDA tapes list the quarterly equity holdings of virtually all U.S. mutual funds from January 1, 1975, to December 31, 1994. Since CDA does not require any minimum survival period for its included funds, this database does not suffer from survivorship bias. Further details on the construction of this database and summary statistics can be found in Wermers (1999). We examine only those funds with at least five equity holdings and then match each fund with its management company from *Nelson's Directory of Investment Managers,* obtaining the corresponding location of the fund manager (city and state). We also exclude index funds from our analysis (identified by *Nelson's Directory*), focusing on active managers, who presumably make informed decisions. This reduces our sample of funds from 393 to 150 in 1975 and from approximately 2,400 to 1,258 in 1994. Using the GNISDG database, which contains the latitude and longitude of every U.S. city, we translate the location of every fund manager into latitude and longitude coordinates.

We then match the quarterly domestic equity holdings of mutual funds from CDA with monthly equity returns from the Center for Re-

search in Security Prices (CRSP) at the time they are held.[1] In addition, we obtain the location of each stock's firm headquarters[2] from *Disclosure* and translate it into latitude and longitude coordinates via the GNISDG. The mutual funds in our sample hold between 330 and 4,617 different companies, with the average fund holding equity in roughly 40 different firms.

III. Local Holdings and Local Performance

In this section, we examine the relationship between geography and investment performance among mutual fund managers. We compare the returns of fund local investments to their distant holdings and to local companies ignored by local funds.

A. *Local Holdings*

To begin, we require a metric with which to identify stocks that are local to a given fund. For simplicity, we classify any stock within 100 kilometers of the fund headquarters as a local stock. As in Coval and Moskowitz (1999*a*), we compute the actual distance between fund i and the headquarters of each firm j it holds.[3] The results we report in the paper are robust to using different local distance thresholds and to employing more sophisticated metrics. For brevity, we report only results using the

[1] Since only CRSP-listed equities are examined, hypothetical rather than actual portfolio weights are employed; we recompute the weights on each holding as though the true portfolio consisted of CRSP-listed equities only. This is done to ensure that the portfolio weights of each fund sum to one. The CRSP-listed equities cover over 90 percent of our mutual funds' holdings.

[2] Location of headquarters is used as opposed to state of incorporation for the simple reason that firms tend to incorporate in a state with favorable tax, bankruptcy, and takeover laws, rather than for operational reasons, and typically do not have the majority of their operations in their state of incorporation. In fact, few firms in our sample were headquartered in the same state in which they were incorporated.

[3] Since locations are identified by latitude and longitude, we calculate the arc length, d_{ij}, between fund i and firm j as

$$d_{ij} = \arccos(\deg_{\text{latlon}}) \times \frac{2\pi r}{360},$$

$$\begin{aligned}\deg_{\text{latlon}} = {} & \cos(\text{lat}_i) \times \cos(\text{lon}_i) \times \cos(\text{lat}_j) \times \cos(\text{lon}_j) \\ & + \cos(\text{lat}_i) \times \sin(\text{lon}_i) \times \cos(\text{lat}_j) \times \sin(\text{lon}_j) \\ & + \sin(\text{lat}_i) \times \sin(\text{lat}_j),\end{aligned}$$

where lat and lon are fund and company latitudes and longitudes, and r is the radius of the earth (≈6,378 kilometers). See Coval and Moskowitz (1999*a*) for further details.

100-kilometer metric, since results are qualitatively and, in most cases, quantitatively similar under alternative local definitions.[4]

To gauge the degree to which a manager invests locally, we compute the fraction of fund assets invested in stocks located within 100 kilometers of the manager. However, since funds differ in terms of the density of available investments within their local area, we compare this fraction to the fraction of the market of available investments that resides within 100 kilometers of the fund.[5] The difference between these two fractions is our local bias measure, representing the degree to which a manager invests locally in excess of what she would hold locally if she held the market portfolio. We average these local bias measures across funds, value-weighting funds by their total asset value, and report the time-series average and *t*-statistics of these measures in table 1.

Columns 1–3 of panel A of table 1 report the average fraction of fund holdings within 100 kilometers, the average fraction of the market within 100 kilometers of the fund, and the difference between them. Over the entire sample period (January 1975 to December 1994) and within each of the two halves of the sample, managers exhibit a modest bias in favor of nearby companies. The average fund manager invests almost 7 percent of her assets locally, even though only 6.16 percent of the market of securities is located within her local area. On average, the fraction of fund holdings allocated to local stocks is 0.8 percent greater than the fraction of local stocks in the market portfolio. This difference is highly statistically significant and qualitatively consistent with the findings of Coval and Moskowitz (1999*a*), who gauge the bias toward local equities in terms of physical distance rather than share of portfolio assets. Analyzing the portfolio share of local investments provides a nice economic interpretation of the degree of fund local bias. However, the 0.8 percent bias in holdings we find appears to be of only modest economic significance. We address further below the economic significance and impact of investing locally.

[4] Since funds vary in terms of their distance to the market (e.g., a fund located in Denver will have far fewer stocks within 100 kilometers than a fund located in New York City), we also employed an alternative definition of local investment using a fund-specific distance threshold. For a given manager, we defined local investments as those that are 95 percent closer to the manager than the average stock in the market. This translated into a 98.2-kilometer average definition of local for our funds. Finding no significant differences in our results, for brevity we report only results from the simple 100-kilometer local threshold.

[5] Only those firms being held by at least one fund are considered as the universe of assets available for investment, since funds may be restricted from holding or simply ignore certain firms. We also ran tests using all available stocks (regardless of whether they were held by at least one of our funds) as the set of equities available for investment and found very similar results.

TABLE 1
PERFORMANCE OF LOCAL FUND POSITIONS (Percentage Annualized Returns)
A. LOCAL BIAS AND RAW RETURNS OF LOCAL VS. DISTANT HOLDINGS

	Assets Residing Locally			Raw Excess Returns		
	% Held ≤100 km (1)	% Market ≤100 km (2)	Difference (3)	Local: $\tilde{R}^L$ (4)	Distant: $\tilde{R}^D$ (5)	$\tilde{R}^L - \tilde{R}^D$ (6)
1975–94	6.95	6.16	.79	8.71	6.04	2.67
			(10.60)	[.36]	[.42]	(3.26)
1975–84	6.73	5.85	.89	12.07	6.57	5.50
			(7.03)	[.46]	[.46]	(4.15)
1985–94	7.18	6.48	.70	5.52	5.36	.16
			(8.62)	[.38]	[.24]	(.17)

B. RISK-ADJUSTED RETURNS OF LOCAL FUND HOLDINGS

				Local, Not Held:		
	Local: $\tilde{R}^L$ (1)	Distant: $\tilde{R}^D$ (2)	$\tilde{R}^L - \tilde{R}^D$ (3)	$\tilde{R}^{LN}$ (4)	$\tilde{R}^L - \tilde{R}^{LN}$ (5)	$\tilde{R}^{L+} - \tilde{R}^{L-}$ (6)
1975–94	1.84	.66	1.18	−1.17	3.01	1.24
	[.33]	[.22]	(3.49)	[−.29]	(7.55)	(2.87)
1975–84	2.32	.00	2.32	−2.05	4.37	1.27
	[.42]	[.00]	(4.84)	[−.42]	(5.80)	(2.36)
1985–94	1.36	1.32	.04	−.68	2.04	1.20
	[.24]	[.38]	(.09)	[−.10]	(4.82)	(2.64)

NOTE.—Every quarter from January 1975 to December 1994, each fund is split into a "local" portion (defined as any holding located within 100 kilometers of the fund manager's location) and a "distant" portion. The dollar-weighted average annualized return and Sharpe ratio (in brackets) of these portfolios are computed for each fund every month and then averaged across all funds (value-weighted by total asset value) and reported, along with the average difference between them (*t*-statistics are in parentheses). Panel A reports the raw returns in excess of the three-month Treasury bill rate for the local and distant fund portions and reports the fraction of fund assets devoted to local equities (i.e., within 100 kilometers), the fraction of total market capitalization that exists within 100 kilometers of the fund, and their difference. Panel B reports the risk-adjusted returns (adjusted for size, BE/ME, and momentum via Daniel et al. [1997]) of the local and distant fund portions, the risk-adjusted return of local stocks *not being held* by local funds ($\tilde{R}^{LN}$), the difference between the performance of these firms and the local stocks actually being held, and the risk-adjusted return difference between the local buy and local sell portfolios, defined as the portfolio of local stocks held by funds that had an increase in shares ($\tilde{R}^{L+}$) and a decrease in shares ($\tilde{R}^{L-}$), respectively. Statistics are reported over the whole sample period and for each half of the sample separately. Reported returns are expressed in annual percentage rates.

B. *Local versus Distant Performance*

We begin by examining the difference in performance between the local and distant holdings of our mutual funds.

1. Raw Returns

We start with a simple comparison of the raw returns funds obtain from their local investments relative to their distant ones. We divide each fund manager's portfolio into a local and distant portion, using the 100-kilometer threshold. Holdings within both the local and distant portions of the fund are rescaled to sum to one, thereby creating a "local" and "distant" portfolio for each fund manager. Since CDA contains quarterly holdings positions, we do not know whether these positions reflect be-

ginning or end of quarter holdings (or something in between) for a given fund. Therefore, we update the fund's portfolio holdings at the beginning of every quarter, on the basis of the reported holdings from the previous quarter, and hold them constant over the subsequent three months. For example, the fund positions from the third quarter of 1980 (ending September 1980) are employed with returns from October, November, and December 1980. This conservative approach ensures that reporting biases do not contaminate our results. For instance, "window dressing" (the tendency of money managers to buy the most recent best-performing stocks and sell the worst-performing stocks shortly before they report their quarterly position statements to investors) would tend to overstate fund performance and, if it affected local and distant stocks differently, would distort our findings. We avoid these potential distortions by employing the previous quarter's reported holdings.

We compute monthly returns on both the local and distant portions of every fund. For fund manager i at time t, this is calculated as

$$\tilde{R}^L_{i,t} = \frac{1}{3}\sum_{z=1}^{3}\sum_{j=1}^{L_{i,t}} w^L_{ij,t}\tilde{r}_{j,t+z},$$
$$\tilde{R}^D_{i,t} = \frac{1}{3}\sum_{z=1}^{3}\sum_{j=1}^{D_{i,t}} w^D_{ij,t}\tilde{r}_{j,t+z}, \tag{1}$$

where $\tilde{R}^L_{i,t}$ and $\tilde{R}^D_{i,t}$ are the average monthly returns over the quarter on fund i's local and distant holdings, respectively; $L_{i,t}$ and $D_{i,t}$ are the number of local and distant firms held by fund i at time t; $w^L_{i,t}$ and $w^D_{i,t}$ are the rescaled (to sum to one) portfolio weights applied to fund i's local and distant holdings; and $\tilde{r}_{j,t}$ is the return on stock j at time t minus the three-month Treasury bill rate (obtained from CRSP). We average each local and distant return across funds at time t, weighted by total asset value, and report their time-series average, as well as the difference between them, in table 1.

We value-weight returns across funds for two reasons. First, the reported returns correspond to a simple investment strategy of investing in local and distant portfolios in proportion to the amounts held by our sample of mutual funds. Second, the Daniel et al. (1997) risk adjustment procedure we employ uses value-weighted benchmarks itself and therefore may distort the risk adjustment if compared to non-value-weighted portfolios. It can be noted that most of our results are more pronounced in smaller funds, and so value-weighting across funds delivers conservative estimates.

Columns 4–6 of panel A of table 1 report the average annualized monthly raw excess returns of the local and distant portions of funds. Local stocks held earn just over 8.7 percent per year above the Treasury bill rate, compared to only a 6 percent premium for distant equities,

indicating that over our sample period mutual funds gained an additional 2.67 percent per year (statistically significant at less than the 1 percent level) from their local investments. However, the annualized Sharpe ratios of the local and distant fund positions (reported in brackets below the returns) indicate that the local positions are much riskier. This is consistent with the findings of Coval and Moskowitz (1999*a*), who show that locally held securities tend to be small cap and highly levered, firm characteristics that are associated with more volatile, higher average returns. Consequently, we are interested in examining the risk-adjusted return performance of local and distant holdings.

2. Risk-Adjusted Returns

We employ the risk adjustment method of Daniel et al. (1997), who subtract from each stock return the return of a well-diversified portfolio of similar size, book-to-market equity (BE/ME), and momentum (past-year return) attributes. These three stock characteristics have been shown to be the best predictors of average stock returns (see Fama and French 1992, 1993, 1996; Jegadeesh and Titman 1993; Daniel and Titman 1997) and represent feasible investment strategies investors could pursue with no knowledge of firm-specific information. The procedure first sorts all stocks into size quintiles, then within each size quintile sorts stocks into BE/ME quintiles, and finally within BE/ME quintiles sorts stocks into momentum (past 12-month return) quintiles. The benchmark portfolios are formed by value-weighting the stocks within each of these 125 groups. Stock j is then matched with one of the 125 portfolios on the basis of its size, BE/ME, and past-year return from the previous month, and the return of the matched portfolio is subtracted from stock j's return at time t. Daniel et al. (1997), Daniel and Titman (1997), and Moskowitz and Grinblatt (1999) demonstrate that this characteristic adjustment method also accounts for the influence of market beta on stock returns.[6]

Panel B of table 1 shows that locally held stocks beat passive benchmarks of size, BE/ME, and momentum by an average 184 basis points per year. Furthermore, even after we adjust for size, BE/ME, and momentum, local holdings still significantly outperform distant holdings by a highly statistically significant 118 basis points per year. This performance difference is primarily driven by the first half of the sample, however, where local positions earn 2.32 percent per year more than distant ones. These results may be consistent with limited information

[6] In unreported results, we also adjust returns for industry effects, regional return effects, and the possibility that funds purchase local initial public offerings (IPOs) driving the local performance results. Finding negligible quantitative differences in the results, we omit them from the tables for brevity.

dissemination and availability, less competition in the money management industry, and smaller scope for investment during the first half of the sample period, making the gains from investing locally larger during this time. However, we also show below that the gains from investing locally are not exclusive to the first half of the sample, using other metrics to gauge local performance.

C. *Local Stocks* Not *Held by Local Funds*

In addition to examining the performance of stocks in which fund managers invest, it is interesting to examine the performance of stocks in which they chose not to invest. In particular, what is the subsequent performance of local stocks *not chosen* by the fund manager? Presumably, local fund managers receive bad news as well as good news about local companies. However, since mutual funds are largely restricted from taking short positions in firms, both legally and otherwise, analyzing fund holdings may not fully reflect their informational advantage. As a result of bad news about a local firm, local managers may simply ignore the firm. If geographic proximity reflects information quality, then the performance of local stocks not held by local funds should be significantly worse than the performance of local stocks being held, and may even be worse than passive portfolio benchmarks.

For each fund, we compute the value-weighted portfolio return of all local stocks *not* held by the fund (but held by at least one other fund); returns are adjusted for size, BE/ME, and momentum via Daniel et al. (1997). The risk-adjusted return on this portfolio of local, but not held, stocks, denoted as $\tilde{R}^{LN}$, is averaged across funds weighted by total asset value and reported in panel B of table 1. The time-series mean risk-adjusted return of these stocks is −1.17 percent per year, indicating that local stocks ignored by local funds significantly underperform passive benchmarks. Moreover, when it is compared to the risk-adjusted return of local stocks actually held by funds (col. 1), there is a strong 3 percent premium between local holdings and local stocks avoided by local funds. Furthermore, this premium, while larger in the first half of the sample (4.37 percent with a t-statistic of 5.80), is still a robust 2.04 percent (t-statistic of 4.82) in the second half of the sample.

This evidence further supports that local fund managers have an informational advantage in local stocks. The positive performance of local holdings and significant negative performance of local stocks ignored by funds compellingly demonstrates fund managers' ability to select stocks in local markets. Furthermore, the underperformance of local, ignored stocks indicates that our previous results of local investment outperformance cannot be due to regional return effects or characteristics associated with a particular region. For instance, if analysts,

the media, and the investment public (other than local investors) are largely unaware of firms located in certain areas, then the abnormal performance of local stocks may be due to a neglected firm effect. However, if this were the case, the performance of local stocks not held by local funds should be as high as those actually held.

D. *Changes in Local Positions*

We have so far considered the local positions of funds at a point in time, documenting that funds earn abnormal returns from these positions. Our findings suggest that fund managers are able to trade on private information, attainable only through geographic proximity. If this is the case and markets are semistrong form efficient, then the abnormal performance of local investments will be relatively short-lived, and it should be the *changes* in local holdings that more strongly predict returns. We therefore consider returns on portfolios constructed on the basis of changes in local holdings.

We compute the value-weighted portfolio return of all local stocks in which fund i increased its holdings (number of shares) from the previous quarter. Again, returns are risk-adjusted via Daniel et al. (1997). The return on this portfolio of local stocks in which holdings increased, $\tilde{R}^{L^+}$, is computed for each fund at time t and averaged across funds weighted by total asset value. In the same way, the risk-adjusted return corresponding to a portfolio of local stocks in which holdings decreased, $\tilde{R}^{L^-}_{i,t}$, is calculated and averaged across funds. These two portfolios represent the net purchases ($\tilde{R}^{L^+}$) and net sales ($\tilde{R}^{L^-}$) of local stocks, respectively. If managers possess private local information, then the local stocks they buy should significantly outperform the local stocks they sell. Column 6 of panel B reports the average difference between these two sets of returns. Local stocks bought outperform local stocks sold by a highly significant 124 basis points per year. This is consistent with our previous measures of local performance. The return differential is quite similar to that obtained using the previous measures. Moreover, as with the return difference between local holdings and local stocks not held, the return premium of local buys over local sales is strong over both halves of the sample.

From the evidence in table 1, it appears that active mutual fund managers possess an ability to select local stocks, generating significant abnormal performance in their local holdings and from local trades. Their advantage in local assets may be the result of private local information, unattainable from afar, or improved monitoring of firms via their proximity. While this appears to violate the strongest form of market efficiency, it may be consistent with a semistrong efficient market if

uninformed investors cannot successfully mimic the local investments of informed managers.

For instance, our methodology for evaluating local performance appears to represent a seemingly feasible investment strategy: one that is long all of the local holdings of every fund and short all of their distant holdings or their local stocks not held. Furthermore, since each local holding is defined in reference to a particular fund manager, this aggregate local minus distant or locally held minus locally not held strategy will be geographically diversified. However, such a strategy could be implemented in practice only if mutual fund positions from quarterly SEC filings can be accessed in a timely fashion. If uninformed investors were, indeed, able to mimic the positions of locally informed mutual fund managers, this would appear to be a violation of semistrong form market efficiency.

E. The Persistence of Local Performance

To test whether uninformed and distant investors can successfully replicate local fund positions, we examine the persistence of local fund performance. If fund managers' local advantage is short-lived, then uninformed investors may not be able to capture any local rents. We repeat our three local performance measures—the risk-adjusted return difference between local and distant holdings, between local stocks held and not held, and between the local buy and local sell portfolios—using various additional lags between the previous quarter's reported fund holdings and returns. That is, we reconstruct our portfolios using implied weights from the previous quarter's reported fund positions with an additional lag between these positions and returns of one, three, six, and 12 months. The resulting returns reflect those of portfolios that can be replicated if investors have access to holdings data between one and 12 months after the quarterly SEC filings are made.

Table 2 reports that all three investment strategies continue to yield significant abnormal risk-adjusted returns when weights are lagged an additional month. When local holdings are compared to distant holdings, the abnormal returns persist for up to three months and then disappear. The return differential between local holdings and local stocks not held declines but remains statistically and economically significant for up to six months, disappearing at the 12-month lag. Finally, the returns of local stocks with increases in holdings (purchases) remain greater than those with decreases in holdings (sales) for one month after reported fund positions, but then become insignificant at three-month lags and beyond, suggesting that changes in local holdings forecast returns at shorter horizons than levels. This evidence suggests that a profitable trading rule would be available to uninformed investors

TABLE 2
REPORTING LAGS AND LOCAL FUND PERFORMANCE (Percentage Annualized Returns)

	Lags between Reported Holdings and Risk-Adjusted Returns			
	1 Month	3 Months	6 Months	12 Months
$\tilde{R}^L - \tilde{R}^D$	1.06	1.01	.01	−.50
	(3.13)	(2.41)	(.04)	(−1.94)
$\tilde{R}^L - \tilde{R}^{LN}$	3.05	2.86	1.51	.60
	(7.55)	(6.23)	(2.22)	(.91)
$\tilde{R}^{L^+} - \tilde{R}^{L^-}$	1.01	.90	.13	−.20
	(2.11)	(1.88)	(.15)	(−.54)

NOTE.—Risk-adjusted returns of the difference between local and distant fund portions, the difference between local stocks being held and local stocks not being held by funds, and the difference between the local buy and local sell portfolios are reported using various lags between the reported fund holdings and returns over the January 1975 to December 1994 sample period. *t*-statistics are in parentheses. Reported returns are expressed in annual percentage rates.

who obtain access to quarterly fund holdings data within three (and possibly up to six) months from the end of the previous quarter. If the SEC filings used in constructing the portfolio weights of this study are consistently available to the public within three months of the end of the quarter, the returns in table 2 might represent a violation of semistrong form market efficiency. Of course, the size of these returns decreases with the length of the lag between the reported holdings and the strategy's implementation. In addition, our calculated returns do *not* account for trading costs, which might nullify these profits, and therefore may still be consistent with a semistrong efficient market.

F. Local Performance and the Degree of Local Bias

The significant abnormal performance exhibited by mutual fund managers in their local holdings and changes in local holdings is surprising given the paucity of evidence on overall fund performance. Daniel et al. (1997) document a mere 50 basis points per year for their sample of funds. Both Carhart (1997) and Chevalier and Ellison (1999*a*) find that their samples of funds underperform passive benchmarks. Our results, on the other hand, indicate that active managers exhibit significant stock-picking ability in geographically proximate firms. However, as table 1 documents, less than 7 percent of fund assets are actually invested locally. Hence, significant mutual fund performance is not detected when their entire holdings are examined. This raises some interesting questions. First, if funds have greater ability to select local stocks, why don't they bias their portfolios more aggressively toward such stocks? Table 1 documents that the average fund biases its holdings by only about 1 percent toward local securities. This appears to be too small given the reported return gain from local investments. Related to the first question, are there funds that do indeed bias their portfolios

significantly homeward, and do such funds exhibit superior ability to select nearby investments? We investigate these issues below.

Given the magnitude of the abnormal performance of local holdings, what is the optimal amount of local investment or bias fund managers should exhibit? Moreover, is the reported 1 percent shift in portfolio weight toward local stocks too small given the strong performance of local investments? To address this issue, we must consider the objectives of the manager. If the manager is interested in maximizing her fund's risk-adjusted return (e.g., Jensen's α or Daniel et al.'s [1997] performance measure), then it seems that she should concentrate all her holdings locally. However, if she also cares about the volatility of her fund, then perhaps she will scale back her local investment for better diversification.

As a simple "back of the envelope" calculation, assume that the manager's objective is to maximize the Sharpe ratio of the fund. If we take the average manager in table 1, the annual mean excess return for her local stocks is 8.71 percent and for distant stocks is 6.04 percent. Their respective standard deviations are 24.19 percent and 14.38 percent. The average fund manager's correlation between her local and distant holdings is around .65. With these parameters, the optimal (tangency) portfolio to maximize the average fund's Sharpe ratio would place 28 percent of fund assets in local stocks and 72 percent in distant stocks. This is considerably more than the average fund actually allocates to local firms. Moreover, even though risk aversion will scale back the demand for local stocks, fund managers should simply hold a riskless asset in combination with the above-optimal local-distant allocation that suits its risk appetite. However, if fund managers do not invest in a riskless asset, for whatever reasons, and maintain mean-variance preferences, the coefficient of risk aversion consistent with a 1 percent allocation to local equities is close to 6.[7] This seems unreasonably high. For instance, on the basis of historical estimates of the mean and variance of the equity premium, this degree of risk aversion would imply a less than 25 percent allocation to equities in the first place. Thus, if equity fund managers were truly this risk-averse, they would likely have chosen another profession. Therefore, it is unlikely that risk aversion can explain the relatively small allocation to local stocks. Given the local performance findings, it remains a puzzle as to why fund managers do not devote a greater fraction of their assets toward local stocks.

While the average fund appears to underweight local stocks, given

[7] Assuming a mean-variance utility function of $E[\tilde{R}_p] - \alpha\sigma_p^2$, where $E[\tilde{R}_p]$ and σ_p^2 are the mean return and variance of the fund's portfolio, composed of an allocation between local and distant stocks (i.e., $\tilde{R}_p = w\tilde{r}_L + [1 - w]\tilde{r}_D$), we can back out the implied coefficient of risk aversion of the fund manager, α, consistent with a 1 percent additional bias toward local stocks.

TABLE 3
LOCAL FUND PERFORMANCE FOR VARIOUS DEGREES OF LOCAL BIAS (Percentage Annualized Returns)

	Fraction of Fund Local Ownership Quintiles							
	Assets Residing Locally			Risk-Adjusted Returns				
Quintile	% Held	%Market	Difference	$\tilde{R}^{L}$	$\tilde{R}^{D}$	$\tilde{R}^{L}-\tilde{R}^{D}$	$\tilde{R}^{LN}$	$\tilde{R}^{L}-\tilde{R}^{LN}$
Q1	1.69	10.47	−8.78	1.07	.98	.09	−1.23	2.29
			(−64.74)	[.15]	[.17]	(.02)	[−.27]	(3.99)
Q2	1.33	4.09	−2.76	−.28	1.23	−1.50	−.01	−.27
			(−65.48)	[−.06]	[.25]	(−3.53)	[−.00]	(−.57)
Q3	1.83	3.13	−1.30	.92	.65	.27	.11	.81
			(−56.10)	[.13]	[.14]	(.53)	[.02]	(1.35)
Q4	5.81	4.62	1.19	3.54	.36	3.18	−1.87	5.41
			(14.71)	[.40]	[.10]	(5.71)	[−.27]	(8.49)
Q5	22.54	8.67	13.86	1.66	.37	1.28	−2.48	4.14
			(53.81)	[.19]	[.09]	(2.27)	[−.26]	(5.26)
Q5−Q1	20.85	−1.79	22.64	.59	−.61	1.19	−1.26	1.85
			(77.98)	[.05]	[−.08]	(2.16)	[−.14]	(1.86)

NOTE.—The local performance measures of active mutual funds are reported over the January 1975 to December 1994 time period for various funds exhibiting different degrees of local bias. The table reports the local and distant risk-adjusted fund performance measures for quintiles of funds sorted by their fraction of local ownership in excess of the market. This measure is defined as the fraction of fund assets devoted to stocks within 100 kilometers of the fund minus the fraction of total market capitalization that exists within 100 kilometers of the fund. We report these measures along with their difference for comparison across the quintiles. Also reported are the risk-adjusted returns of local stocks *not being held* by local funds as well as the difference between local stocks not held and local stocks actually held. *t*-statistics are in parentheses and Sharpe ratios are in brackets. Reported returns are expressed in annual percentage rates.

their high returns, there may be funds that invest considerably in local equities and earn even higher returns from doing so. To investigate this, we separate our funds into quintiles according to the degree of local bias exhibited in their holdings. This measure is the fraction of fund assets invested in equities located within 100 kilometers of the fund manager minus the fraction of total market capitalization that resides within 100 kilometers. Table 3 reports these measures across the fund quintiles. For the first three quintiles, the average fraction of funds placed in local holdings is 1.69, 1.33, and 1.83 percent, respectively. For quintiles 4 and 5, however, the fraction of local holdings jumps to 5.81 and 22.54 percent, respectively. Funds in the first three quintiles essentially place the same fraction of their portfolios in local stocks but differ only in the fraction of total market capitalization that exists in their local area. Only quintiles 4 and 5 exhibit a significant local bias. The question is, Are these funds also better able to select local stocks?

We report the risk-adjusted returns of local holdings, distant holdings, and the difference between them. Also reported are the risk-adjusted returns of local stocks not held by the funds as well as the difference between local stocks actually held and not held by the funds. The average returns of local selections in the first three quintiles are unimpressive. None of the three lowest local bias quintiles selects local stocks that

outperform their distant holdings, and only the first quintile selects local stocks that outperform the local stocks they ignore. Quintiles 4 and 5, however, clearly excel in selecting high-performing nearby stocks. Relative to distant holdings, local selections of funds in quintiles 4 and 5 deliver 3.18 and 1.28 percent, respectively, of additional risk-adjusted returns per year. Relative to local stocks not held, their local positions earn excess returns of 5.41 and 4.14 percent per year, respectively. Thus, certain funds do indeed bias their holdings strongly locally and earn substantial returns from doing so. Moreover, only those funds that exhibit a significant local bias generate abnormal performance from local investments. This is consistent with an information story for local investment. Fund managers with superior ability to identify promising local stocks focus their investments locally. Funds with no such abilities, on the other hand, choose to hold a more geographically diverse portfolio.

G. Local Performance and Other Fund Attributes

To gain further insights into the types of funds that have superior local stock selection abilities, and in which such abilities may be most valuable, we examine the degree of local bias and local performance across a variety of fund characteristics. Fund managers are sorted into quintiles according to size (total asset value), number of holdings, and age. For each fund characteristic, we compute the average local bias and the average risk-adjusted returns to local holdings, distant holdings, and local stocks not held across fund quintiles and report these measures for the highest (quintile 5) and lowest (quintile 1) quintiles in table 4. We also classify funds by metropolitan location, separating funds into three categories: large cities (defined as funds located in any of the 20 most populated cities at each point in time), small cities (defined as funds not located in any of the 20 most populated cities), and remote cities (defined as funds located at least 250 kilometers away from any of the 20 most populated cities). The 20 largest populated cities are those defined by the U.S. Census Bureau at the beginning of the year. We report the local bias and local performance measures of these funds in table 4.

As the table shows, large mutual funds exhibit less local bias than small funds and, unlike small funds, do not exhibit significant local performance. The funds in the smallest quintile, on the other hand, select local stocks that earn 1.41 percent more than distant holdings and 3.28 percent more than local stocks not held. When we sort funds according to number of holdings, similar results emerge. The funds that invest in the greatest number of stocks exhibit a slightly negative local bias in their holdings and select local holdings that do no better than

TABLE 4
LOCAL FUND PERFORMANCE ACROSS OTHER FUND ATTRIBUTES (Percentage Annualized Returns)

	Assets Residing Locally			Risk-Adjusted Returns				
	% Held	% Market	Difference	$\tilde{R}^L$	$\tilde{R}^D$	$\tilde{R}^L - \tilde{R}^D$	$\tilde{R}^{LN}$	$\tilde{R}^L - \tilde{R}^{LN}$
			Fund Size (Total Asset Value)					
Q5	6.82	6.34	.48	.24	.85	−.61	−.15	.39
(highest)			(3.63)	[.07]	[.26]	(−2.35)	[−.03]	(1.20)
Q1	6.90	6.00	.90	1.99	.59	1.41	−1.29	3.28
(lowest)			(9.03)	[.31]	[.18]	(3.46)	[−.29]	(7.09)
			Number of Holdings					
Q5	5.86	6.57	−.71	−.30	.56	−.86	−.89	.59
			(−2.97)	[−.07]	[.10]	(−2.03)	[−.17]	(1.43)
Q1	7.37	6.06	1.31	3.08	.92	2.16	−1.64	4.72
			(11.33)	[.32]	[.22]	(3.48)	[−.19]	(6.11)
			Age of Fund					
Q5	7.69	5.93	1.76	2.20	.82	1.38	−1.03	3.22
			(16.51)	[.31]	[.26]	(3.21)	[−.23]	(6.24)
Q1	6.64	6.93	−.29	1.35	.54	.81	−.77	2.12
			(−1.63)	[.24]	[.14]	(1.81)	[−.13]	(4.74)
			Metropolitan Area					
Remote	5.91	4.25	1.67	2.28	1.04	1.25	−1.09	3.37
			(15.00)	[.26]	[.23]	(2.24)	[−.18]	(5.29)
Small	7.33	6.56	.77	1.95	.82	1.12	−1.10	3.05
			(7.58)	[.31]	[.24]	(2.69)	[−.23]	(6.84)
Large	10.14	9.24	.90	1.24	.28	.97	−1.03	2.28
			(5.57)	[.21]	[.07]	(2.12)	[−.18]	(4.91)

NOTE.—The local performance measures of active mutual funds are reported over the January 1975 to December 1994 time period for various types of funds. Risk-adjusted returns are reported for the top (Q5) and bottom (Q1) quintiles of funds on the basis of several fund attributes: size (total asset value), number of holdings, and age. In addition, we report returns for funds located in large, small, and remote cities. Also reported are the fraction of fund assets devoted to stocks within 100 kilometers and the fraction of total market capitalization that exists within 100 kilometers of the fund. We report these measures along with their difference for comparison across fund attributes. Finally, the risk-adjusted returns of local stocks *not being held* by local funds as well as the difference between local stocks not being held and local stocks actually held are reported for each fund group. t-statistics are in parentheses and Sharpe ratios are in brackets. Reported returns are expressed in annual percentage rates.

local stocks not selected and slightly underperform distant selections. The quintile focusing on the fewest number of holdings places 1.31 percent more in local than in distant stocks and earns returns on local holdings that are 2.16 percent in excess of distant holdings and 4.72 percent in excess of local stocks not held. This supports an information story since small funds with few holdings are likely better able to monitor local information and pursue active trading strategies. In addition, the funds in the oldest quintile place 1.76 percent more of their assets in local stocks and select local companies that outperform distant firms by 1.38 percent per year and outperform local stocks not held by 3.22 percent. The funds in the youngest quintile exhibit no bias, however, and demonstrate less ability to select well-performing local companies.

This result is also consistent with an information story since older funds may have more established community ties and relationships that provide them a local information advantage. In addition, as Chevalier and Ellison (1999*b*) demonstrate, better-established managers are not as averse to deviating from the market portfolio and therefore may be better able to pursue local strategies. Overall, these findings help begin to paint a picture of the manager with a superior ability to select local stocks—a manager who is free to deviate from the market, focus attention on a few holdings, and trade into and out of local companies easily.

We also divide our sample of funds by metropolitan location. If the propensity to invest locally is generated by fund managers having an informational advantage in nearby stocks, then we suspect this advantage to be greatest in regions in which there are few competitors and investment community ties are likely to be strongest. Table 4 presents evidence consistent with this as funds from large cities (where the distribution of funds is dense) exhibit a modest amount of local bias in their holdings. On the other hand, funds from small cities exhibit a larger local equity bias, and funds from remote cities exhibit an even greater bias in local stocks. Note that from a diversification standpoint, one might expect the local bias to be *weakest* in small, remote cities since firms in these areas constitute a significantly smaller fraction of the market and tend to be dominated by particular sectors. Furthermore, clients of mutual funds may hold a diversified set of funds. Hence, it may be optimal for fund managers to concentrate investment locally and allow their clients to diversify across managers. However, Coval and Moskowitz (1999*b*) find that institutional clients of investment managers tend to be local and tend not to invest with a broad set of management firms. Thus the clients of mutual fund managers are also geographically localized, making the need for diversification greater.

From a performance standpoint, funds from small and remote metropolitan areas exhibit larger abnormal performance in their local investments than funds from large cities. One might wonder why managers do not simply locate in remote areas and reap the gains from a local information advantage. However, the fixed costs of relocating and establishing community ties (which could take years) may prohibit such activity. In addition, fund managers may be more concerned with fund flows and other attributes (see Chevalier and Ellison 1997, 1999*b*) that, while related to performance, may also be affected by location. For instance, it may be desirable to reside in large metropolitan areas for career concerns (e.g., Chevalier and Ellison 1999*b*) since these markets are more visible and harbor a larger fraction of institutional clients. Furthermore, since the most talented managers likely reside in large metropolitan areas, this result is not likely driven by a selection bias of better managers (e.g., Chevalier and Ellison 1999*a*). However, even

among large-city funds, returns of local holdings significantly outpace those of distant holdings and local stocks not held.

IV. Local Ownership and the Cross Section of Expected Stock Returns

Across a wide array of fund characteristics and through various local performance measures, mutual fund managers appear to have substantial ability in selecting local stocks. In this section, we shift the focus of analysis from the fund manager to the stock. Since fund managers appear to have some incremental ability to select local stocks, the degree to which a stock is owned by local, rather than distant, funds might provide information about the stock's future expected returns. Additionally, since we know from Coval and Moskowitz (1999*a*) that managers' nearby investments tend to be in small, highly levered, growth companies, any premium associated with a stock's local ownership may also be related to the anomalous returns associated with these firm characteristics.[8] Finally, since Wermers (1999) demonstrates that mutual fund trades affect stock returns, it is interesting to examine how these investors affect proximate firms, given their apparent ability and preference to invest locally.

We begin by identifying stocks held predominantly by local investors, defining the local ownership of stock j as the fraction of total mutual fund dollars devoted to stock j that are provided by local mutual fund managers. This measure is calculated by summing the total dollars invested in stock j from funds located within 100 kilometers of stock j's headquarters, divided by the total dollar amount of stock j held by all funds in our sample. To control for the fact that not all stocks have similar geographic proximity to the mutual funds in our sample, we then subtract off the fraction of our sample's total mutual fund assets that are within 100 kilometers of stock j's headquarters. Specifically, the local ownership measure for stock j is

$$\mathrm{LO}_j = \frac{\sum_{i \in N^j} \$D_{i,j}}{\sum_{i \in M} \$D_{i,j}} - \frac{\sum_{i \in N^j} \$V_i}{\sum_{i \in M} \$V_i}, \tag{2}$$

where N^j is the number of funds within 100 kilometers of stock j's headquarters, M is the total number of mutual funds in our sample, $\$D_{i,j}$ is the dollar value of fund i's stake in stock j, and $\$V_i$ is the total asset value of fund i. Thus, if a stock is held by the market of funds, it

[8] Anomalous returns have been associated with a firm's size (Banz 1981), leverage (Bhandari 1988), and BE/ME (Stattman 1980; Rosenberg, Reid, and Lanstein 1985). For a detailed discussion of the relation between these firm characteristics and the cross section of expected returns, see Fama and French (1992).

will have a local ownership measure of zero; if it is held predominantly by local funds, then the local ownership measure will be significantly positive.

A. *Fama-MacBeth Regressions*

Using this local ownership variable, we conduct Fama and MacBeth (1973) cross-sectional regressions on the universe of stocks being held by at least one of our mutual funds. The cross sections of stock returns are regressed on local ownership and a number of variables known to account for cross-sectional variation in expected returns. Specifically, at time t, excess stock returns are regressed on a constant, size (the log of market capitalization from the prior month), BE/ME, past one-month firm return ($\text{ret}_{-1:-1}$), cumulative return on the stock from $t-12$ to $t-2$ ($\text{ret}_{-12:-2}$), cumulative return on the stock from $t-36$ to $t-13$ ($\text{ret}_{-36:-13}$), past year's industry return ($\text{ind}_{-12:-1}$), past year's regional return ($\text{reg}_{-12:-1}$),[9] a remote city dummy variable indicating if the firm's headquarters resides in a city at least 250 kilometers away from any of the 20 largest populated cities, and the local ownership measure. These regressions are conducted each month using the entire sample of firms held by at least one mutual fund. We also conduct separate regressions each month that consist of only the smallest and largest quintiles of firms. The coefficients from these cross-sectional regressions are averaged over time in the style of Fama and MacBeth (1973) and reported in table 5 along with their time-series t-statistics. The Fama-MacBeth procedure accounts for cross-correlations in the residuals by simply using the time-series standard deviation of the coefficient estimates to compute standard errors. This conservative approach has been shown to produce robust standard errors (e.g., Fama and MacBeth 1973; Vuolteenaho 2000). It can be noted that our results are qualitatively the same when we use a pooled cross-sectional time-series panel with various standard error corrections. However, since the Fama-MacBeth regressions produce reliable and conservative statistical estimates, we only report them for brevity.

Table 5 reports the regression estimates with and without the local ownership variable. The regressions that do not include local ownership confirm the stylized facts documented in the literature: small, high-BE/ME firms earn high returns (e.g., Stattman 1980; Banz 1981; Rosenberg et al. 1985; Fama and French 1992); return reversals are strong at the one-month horizon (e.g., Jegadeesh 1990); return momentum at the

[9] Industry returns are value-weighted portfolio returns of stocks belonging to two-digit standard industrial classification code groupings defined in Moskowitz and Grinblatt (1999). The regional portfolio return for each stock j is the value-weighted average return of stocks within a 500-kilometer radius of firm j.

TABLE 5
IMPACT OF LOCAL INVESTMENT ON THE CROSS SECTION OF EXPECTED RETURNS
Dependent Variable: Cross Section of Stock Returns

	All Stocks Held by Funds		Smallest-Size Quintile		Largest-Size Quintile	
Log(size)	−.0004	−.0009	.0017	−.0013	−.0008	−.0012
	(−1.94)	(−2.78)	(5.15)	(−1.57)	(−1.15)	(−1.67)
BE/ME	.0019	.0025	−.0030	.0012	.0009	.0006
	(2.13)	(2.47)	(−2.02)	(.66)	(.81)	(.45)
$ret_{-1:-1}$	−.0595	−.0599	−.0699	−.0581	−.0390	−.0386
	(−10.57)	(−8.47)	(−8.51)	(−5.43)	(−3.90)	(−3.40)
$ret_{-12:-2}$	.0081	.0090	.0047	.0067	.0018	.0026
	(4.19)	(3.78)	(1.86)	(2.16)	(.59)	(.77)
$ret_{-13:-36}$	−.0013	−.0014	−.0031	−.0046	.0012	.0009
	(−1.47)	(−1.46)	(−1.40)	(−1.88)	(.70)	(.51)
$ind_{-12:-1}$	.0130	.0094	.0135	.0029	.0149	.0142
	(2.35)	(1.55)	(1.36)	(.30)	(2.14)	(1.75)
$region_{-12:-1}$	.0076	.0177	.0028	−.0006	.0360	.0320
	(.89)	(1.72)	(.12)	(−.02)	(2.03)	(1.50)
Remote city	−.0007	.0000	.0033	.0004	−.0004	−.0016
	(−1.26)	(.01)	(1.22)	(.22)	(−.43)	(−1.60)
LO		.0016		.0036		.0006
		(2.78)		(3.30)		(.18)

NOTE.—Cross-sectional regressions of stock returns on local ownership and a host of firm characteristics are run every month on the universe of individual stocks held by at least one mutual fund in our sample over the period January 1975 to December 1994. The cross sections of stock returns at time t are regressed on a constant (not reported), log of size (market capitalization at $t-1$), BE/ME, several individual and industry past return variables, the past-year return of the region in which each stock is headquartered, a remote city dummy (indicating whether the stock's headquarters is outside of 250 kilometers of any of the 20 largest populated cities), and the local ownership variable. The local ownership measure, LO, is the difference between the percentage of mutual fund dollars devoted to stock j that are provided by local mutual fund managers (within 100 kilometers) and the percentage of total mutual fund assets that resides within 100 kilometers of stock j's headquarters. These regressions are repeated for the smallest and largest quintiles of stocks. The time-series average of the coefficient estimates and their associated time-series t-statistics (in parentheses) are reported in the style of Fama and MacBeth (1973).

firm (e.g., Jegadeesh and Titman 1993) and industry levels (e.g., Moskowitz and Grinblatt 1999) is important at the one-year horizon; and return reversals are present over a longer three-year horizon (e.g., DeBondt and Thaler 1985). The past regional return and the remote city dummy do not have a significant impact on returns. The addition of the local ownership variable to the regressors, however, adds significant explanatory power for capturing the cross section of expected returns. Local ownership is positively related to expected returns, when we control for known determinants of cross-sectional expected return variation. However, when the regression coefficients on the other characteristics are compared to those run without the local ownership measure, negligible differences are detected. The other characteristics continue to account for cross-sectional variation in returns and do not appear to be subsumed by the local ownership variable. Repeating the regressions for the smallest- and largest-size quintiles reveals that local ownership is particularly strong among small stocks and is unrelated to average returns among large stocks.

The Fama-MacBeth regressions provide a robust estimation of the relation between local ownership and average returns. However, it is difficult to gauge the economic significance of local ownership from table 5. Furthermore, the Fama-MacBeth regressions place greater weight on firms exhibiting extreme returns, many of which are small companies. To verify robustness and to examine the economic return premium associated with local ownership, we form value-weighted, zero-cost portfolios based on firm local ownership.

B. Local Ownership Trading Strategies

We form an investment strategy that buys stocks in the top quintile of local ownership and shorts those in the bottom quintile; firms are value-weighted within the quintiles. This strategy exploits the information contained in local selections of mutual fund managers without acquiring or monitoring that information and generates a geographically diversified portfolio. This analysis also provides a robustness check on our previous results and provides a measure of the economic return premium to firm local ownership.

The value-weighted average return of the quintile portfolios and t-statistics are reported for the highest and lowest quintiles (LO Q5 and LO Q1, respectively), as well as the difference in returns between them (Q5 − Q1), in table 6. The raw returns of the quintile with the highest local ownership outperform firms in the lowest local ownership quintile by 2.56 percent per year over our sample period. This return premium for local ownership is statistically and economically significant. When we adjust for risk factors related to expected returns (notably size, BE/ME, and momentum), the local ownership return premium drops to 1.10 percent per year, still economically large, but with only marginal statistical significance. We employ two risk adjustment procedures. The first is the Daniel et al. (1997) matched portfolio method discussed in Section III, and the second is similar to that in Carhart (1997). The latter method regresses the time series of the LO Q5 − Q1 portfolio returns on the Carhart (1997) four-factor model, consisting of the three Fama and French (1993) factors—excess return on the market (CRSP value-weighted index minus one-month Treasury bill rate), a zero-cost portfolio long small stocks and short large stocks, and a zero-cost portfolio long high BE/ME firms and short low BE/ME firms—plus a momentum benchmark—a portfolio that is long high past-year return stocks and short low past-year return stocks. The intercept from this regression (e.g., Jensen's α) represents the abnormal return to our strategy. We employ the Carhart (1997) risk adjustment for robustness since Daniel and Titman (1997) and Davis, Fama, and French (2000) have debated whether firm characteristics or factor loadings are em-

TABLE 6

Local Ownership Sorted Portfolios (Percentage Annualized Returns)

	Raw Returns			Risk-Adjusted Returns	
				Daniel et al.	Four-Factor α
	LO Q1	LO Q5	Q5−Q1	Q5−Q1	Q5−Q1
Unconditional	7.03	9.59	2.56	1.10	1.12
	(3.43)	(4.52)	(2.24)	(1.74)	(1.86)
	Size (Market Capitalization)				
Small	13.62	17.80	4.18	3.00	3.56
	(3.77)	(4.59)	(2.22)	(2.18)	(3.23)
Medium	10.57	12.86	2.29	−1.14	1.90
	(3.46)	(4.05)	(1.74)	(−1.05)	(1.32)
Large	8.22	8.25	.03	−.58	−.61
	(3.56)	(4.06)	(.09)	(−1.09)	(−1.11)
	Fraction of Equity Held by Mutual Funds				
Low	12.20	11.63	−.57	.19	−.81
	(3.74)	(3.95)	(−.25)	(.10)	(−.33)
Middle	8.98	8.52	−.47	.39	1.21
	(3.91)	(3.71)	(−.29)	(.30)	(.70)
High	4.29	8.98	4.68	2.68	3.09
	(2.14)	(3.88)	(2.90)	(2.35)	(1.81)
	Book-to-Market Equity				
Low	3.54	7.69	4.16	1.08	1.93
	(1.38)	(2.83)	(2.58)	(.81)	(.81)
Middle	8.59	9.78	1.19	.56	1.44
	(3.34)	(3.88)	(.67)	(.37)	(.74)
High	11.01	12.28	1.27	−.12	−1.72
	(4.73)	(4.64)	(.72)	(−.08)	(−.90)
	Book-to-Market Equity, Smallest Half of Firms				
Low	1.53	7.05	5.52	1.57	2.47
	(.60)	(2.66)	(3.41)	(1.14)	(1.58)
Middle	7.25	6.06	−1.19	2.76	2.89
	(3.03)	(2.45)	(−.65)	(1.68)	(1.72)
High	10.73	12.70	1.97	−.18	−.25
	(4.85)	(5.22)	(1.19)	(−.14)	(−.36)

Note.—Every month stocks are sorted into quintiles on the basis of LO from the previous quarter, which is the difference between the percentage of mutual fund dollars devoted to stock j that are provided by local mutual fund managers (within 100 kilometers) and the percentage of total mutual fund assets that resides within 100 kilometers of stock j's headquarters. Value-weighted returns of the quintile portfolios are computed every month, and time-series averages and t-statistics (in parentheses) are reported for the highest- and lowest-LO quintile portfolios (LO Q5 and LO Q1, respectively), as well as the difference between them (Q5−Q1) over the period January 1975 to December 1994. Also reported is the risk-adjusted return of the highest- minus lowest-LO quintile portfolio (Q5−Q1) using both the Daniel et al. (1997) characteristic adjustment and Jensen's α from a regression of this portfolio return on the Carhart (1997) four-factor model. These returns are also reported for double sorts on size (market capitalization), fraction of outstanding shares held by mutual funds, and BE/ME, where stocks are first sorted into size (mutual fund ownership or BE/ME) tretiles and then sorted within each tretile into quintiles on the basis of LO. The BE/ME sort is also repeated for only the smallest half of firms. Returns are reported as annual percentages with time-series t-statistics in parentheses.

pirically better able to capture returns. We note that both the Carhart (1997) and Daniel et al. (1997) risk adjustments produce nearly identical results both in table 6 and in unreported results throughout the paper.

We may be able to reduce the noise of our local ownership measure by examining its relation to expected returns within subsets of firms. For instance, among small firms, local mutual fund managers may constitute a significant fraction of share ownership. On the other hand, among the largest firms, the mutual funds in our sample likely constitute a very small fraction of share ownership. In addition, small firms are likely more neglected by distant investors and, as shown by Coval and Moskowitz (1999*a*), are preferred by local investors. Table 6 displays the average monthly returns of portfolios first sorted according to firm size into tretiles and then sorted by our local ownership measure into quintiles. Stocks are value-weighted within these 15 portfolios, and raw and risk-adjusted returns are reported for the highest and lowest quintiles as well as the difference between them within each size category. The difference in returns between the highest and lowest locally owned firms is a substantial 4.18 percent per year among the smallest firms and is a significant 3–3.5 percent per year even when we account for size, BE/ME, and momentum premia. However, among the largest firms, no detectable difference between LO Q5 and LO Q1 exists.

We also first sort stocks by their fraction of equity held by mutual funds—defined for firm j as the number of shares of stock j held by all mutual funds divided by the number of shares outstanding of firm j. We expect our LO measure to be more meaningful among firms for which mutual funds constitute a greater fraction of ownership. The results confirm our intuition, since the LO Q5 − Q1 spread among firms with the highest mutual fund ownership is 4.68 percent per year and between 2.68 and 3.09 percent per year after we adjust for risk. Finally, we also first sort stocks by BE/ME to see if fund managers are better able to detect attractive local growth (low-BE/ME) or value (high-BE/ME) stocks. The local ownership premium is stronger among low-BE/ME firms. However, this spread largely disappears once we adjust returns for risk. Since BE/ME is negatively correlated with firm size by construction, we also perform the BE/ME, LO sort excluding the largest half of firms in our sample. Mutual fund local investment has a greater impact on small firms. Therefore, it is interesting to examine whether their influence is greatest among value or growth firms within the smallest half of companies. The local ownership premium is indeed higher for growth firms among the smallest companies, but again, when we account for risk, there appears to be only a small difference between growth and value that is not statistically significant.

Overall, the abnormal returns on the zero-cost local ownership strategies are striking given the fact that we adjust for factors known to

explain a sizable portion of the cross-sectional variation in returns. In addition, unlike other variables shown to predict returns (e.g., size, BE/ME, and past returns), our measure is not based on market valuation. Hence, our results are free from the criticism of Ball (1978) and Berk (1995).[10]

V. The Trading Behavior of Local Investors

Finally, we investigate the trading behavior of local investors more closely. By examining local investor behavior, we may learn what kinds of factors provide them with their advantage in selecting nearby investments. In addition, we provide additional tests of whether local investors are indeed trading on superior information.

We analyze the relation between local investment and trading activity by regressing the abnormal turnover of a fund in a particular stock on the local bias of that holding as well as a variety of firm and fund characteristics. The dependent variable is the cross section of each fund's abnormal turnover in a given stock. For fund i holding stock j, abnormal turnover is defined as fund i's turnover in firm j minus the expected level of turnover in stock j. We define turnover as the number of shares of firm j bought or sold divided by the number of shares held in firm j in the previous period. For fund i, the abnormal turnover in stock j is

$$\tau_{ij,t}^{ab} = \frac{|H_{ij,t} - H_{ij,t-1}|}{H_{ij,t-1}} - E\left[\frac{|H_{ij,t} - H_{ij,t-1}|}{H_{ij,t-1}}\right], \tag{3}$$

where $H_{ij,t}$ is the number of shares fund i holds in stock j at time t. The expected value of turnover in firm j is approximated by taking the average over the prior year of daily trading volume in firm j divided by the number of shares outstanding. We employ abnormal turnover to control for general trading activity in a stock that is unrelated to geography. The mean abnormal turnover measure across all funds is statistically negligible from zero in every quarter. In addition, there is not a significant fraction of observations at zero or one; therefore, censored or truncated regression estimators are not necessary.[11]

As noted in Coval and Moskowitz (1999*a*), local bias is related to a variety of fund and firm characteristics, many of which may also be

[10] Both Ball (1978) and Berk (1995) point out that as a result of any misspecification of the asset pricing model, variables that include a market-based measure such as price will have explanatory power for average returns. Consequently, it is difficult to distinguish how such variables are economically related to returns.

[11] In addition, we scaled the turnover measures in eq. (3) by the number of shares outstanding rather than the previous quarter's holdings ($H_{ij,t-1}$). Finding no qualitative difference in the results, we omit these regressions from table 7 below for brevity.

related to turnover. In addition, Falkenstein (1996) documents that mutual funds have preferences for large, liquid, and visible firms. In order to eliminate confounding factors influencing the frequency of trade in a stock, as well as its relation to geographic proximity, we include these variables in our regression. The independent variables include a variety of fund and stock attributes, plus the local ownership of each fund holding, defined in equation (2). In addition to local ownership, the regressors include a constant (not reported), a set of fund attributes—the log of fund assets under management, log of the number of fund holdings, the age of the fund, a remote city indicator for the fund manager's location, and the past three-year return of the fund—and a set of firm (holding) characteristics—log of market capitalization (size); BE/ME; past one-month, one-year, and two- to three-year returns; past year's industry and regional returns; an IPO dummy (for firms newly issued within the last five years); a NASDAQ dummy for firms traded on the NASDAQ-NMS, which reports different volume measures because of differences in the dealer market versus a specialist market such as the New York Stock Exchange or the American Stock Exchange; the standard deviation of the firm's monthly return over the past 12 months; and a remote city indicator for the firm's headquarters. Again, cross-sectional regressions are conducted each quarter, and the time-series average of the coefficient estimates and their corresponding *t*-statistics are calculated in the style of Fama and MacBeth (1973) and reported in columns 1–3 of table 7.

Column 1 reports the turnover regressions on local ownership including only fund attributes, column 2 employs only stock characteristics, and column 3 includes both. Controlling for nongeographic factors influencing trade, columns 1–3 of table 7 indicate that turnover is highly negatively related to local bias. Managers appear to trade far more frequently in their distant holdings than in their local holdings. This result suggests that managers adopt relatively longer-term strategies in their nearby investments and have more volatile views on distant holdings. The results are consistent with international evidence documenting higher turnover of international investors in overseas investments than in domestic holdings (see Tesar and Werner 1995). Both Brennan and Cao (1997) and Coval (1998) offer asymmetric information models that generate these results.

In addition to examining trading activity from a turnover perspective, we also analyze mutual fund trades from a herding perspective. Lakonishok et al. (1992*a*), Grinblatt, Titman, and Wermers (1995), and Wermers (1999) document herding behavior among mutual fund managers (i.e., the tendency of funds to buy and sell the same stocks). We consider whether herding activity differs across stocks according to their degree of local ownership. As in Section IV, we run Fama-MacBeth cross-

TABLE 7
Trading Activity and Local Ownership

	Abnormal Turnover in Holdings $\tau^{ab}_{ij,t}$			Herding in Stocks: $HM_{j,t}$
	Only Fund Attributes (1)	Only Stock Characteristics (2)	Fund Attributes and Stock Characteristics (3)	(4)
Local ownership	−.2899	−1.1930	−1.2670	−.0183
	(−2.50)	(−3.22)	(−3.35)	(−4.98)
Log(fund assets)	.0001		.0001	
	(3.93)		(3.57)	
Log(#holdings)	.0073		.0077	
	(2.59)		(2.62)	
Age	.0168		.0143	
	(2.04)		(2.15)	
Remote city (fund)	.0778		.0685	
	(2.72)		(2.56)	
Fund $ret_{-36:-1}$	.1822		.3059	
	(1.84)		(3.56)	
Log(size)		.0839	.0831	−.0083
		(9.23)	(8.93)	(−11.75)
BE/ME		.0377	.0450	.0001
		(1.15)	(1.30)	(.10)
$ret_{-1:-1}$		.1383	.1334	−.0255
		(.98)	(.96)	(−2.80)
$ret_{-12:-2}$		−.0819	−.1027	−.0061
		(−1.63)	(−2.03)	(−1.88)
$ret_{-36:-13}$		.0447	.0433	.0010
		(1.50)	(1.39)	(1.03)
$ind_{-12:-1}$		.0451	.0264	.0166
		(.38)	(.23)	(1.93)
$region_{-12:-1}$		1.1410	1.0820	.0073
		(5.78)	(5.60)	(.30)
IPO		.4466	.3988	−.0050
		(6.88)	(7.26)	(−.95)
NASDAQ		−.4598	−.4634	.0188
		(−11.72)	(−11.86)	(7.39)
Standard deviation		−.2155	−.3907	.2480
		(−.67)	(−1.29)	(6.84)
Remote city (stock)		.04269	.0382	−.0060
		(1.51)	(1.43)	(−4.62)

Note.—Cross-sectional regressions of fund trading activity on a host of fund and stock attributes plus the local ownership variable are reported over the period January 1975 to December 1994. The dependent variable in cols. 1–3 is the abnormal turnover of each holding, $\tau^{ab}_{ij,t}$. For fund i holding firm j, this is defined as the number of shares bought or sold in firm j divided by the number of shares held in the previous quarter by fund i in firm j, minus the *expected* value of turnover in firm j. The expected value of turnover in firm j is approximated by the average daily trading volume in firm j over the prior year. The dependent variable in col. 4 is the cross section of firm herding measures, $HM_{j,t}$, defined for stock j as the absolute value of the proportion of funds trading stock j that are buyers minus the proportion of total buys to total trades in all stocks across all funds at time t. The time-series averages of the coefficient estimates are reported along with their time-series t-statistics (in parentheses) in the style of Fama and MacBeth (1973). The constant is not reported for brevity.

sectional regressions of a measure of herding for each stock on several firm characteristics plus the local ownership measure from equation (2). The herding measure for stock j is similar to that of Lakonishok et al. (1992*a*) and Wermers (1999). We compute the absolute value of the fraction of funds trading in stock j that are buyers less the fraction of trades in all stocks that are buys during time t. Specifically, our herding measure for stock j at time t is

$$\mathrm{HM}_{j,t} = \left| \frac{\#\mathrm{buyers}_{j,t}}{\#\mathrm{traders}_{j,t}} - \frac{\#\mathrm{buys}_t}{\#\mathrm{trades}_t} \right|, \tag{4}$$

where $\#\mathrm{buyers}_{j,t}$ reflects the number of funds that increased their holdings of firm j in period t, $\#\mathrm{traders}_{j,t}$ measures the number of funds that changed their holdings of firm j in period t, $\#\mathrm{buys}_t$ is the total number of purchases made by all mutual funds in period t, and $\#\mathrm{trades}_t$ is the total number of trades in period t. In addition to the firm's local ownership measure, the explanatory variables in our regression are the firm characteristics from the turnover regressions in table 7.

As column 4 of table 7 indicates, local ownership is highly significant in explaining mutual fund herd behavior. There is a strong inverse relationship between herding activity and geographic proximity. Fund managers appear to herd most strongly in distant firms—breaking away from the herd in their local investments. This is consistent with local fund managers' having an information advantage in local firms and attempting to "free-ride" on the information of others by following the herd in stocks located at a significant distance from them. This provides further evidence that local investors are better able to assess the future prospects of local firms.

VI. Conclusion

Despite a collection of papers documenting poor mutual fund performance, we find substantial positive performance in the local positions of active managers. Fund managers appear to earn significant abnormal returns in their local holdings, which are greatest in small stocks and among older, smaller funds from remote areas. Furthermore, funds exhibiting the greatest ability to select local stocks bias their holdings most strongly toward nearby firms. Finally, the trading activity of funds is also consistent with fund managers' having superior information about local stocks.

The evidence suggests that managers earn abnormal returns as compensation for information they acquire about local companies. This information may be the result of improved monitoring capabilities or access to private information of geographically proximate firms. Inves-

tors located near a firm can visit the firm's operations, talk to suppliers and employees, and assess the local market conditions in which the firm operates. In addition to the lower travel, time, and research costs associated with obtaining such information, local investors may also gain access to private information. Mutual fund managers and local corporate executives may run in the same circles, belong to the same country club, and so forth. Our finding of stronger local profits among smaller, older, and remotely located funds is consistent with this.

Our results provide new insights into the mutual fund industry, offering rare evidence of mutual funds' ability to select stocks. In addition, our findings contribute to a growing literature on the economic importance of geography, shedding light on the propensity to invest locally, documented by Coval and Moskowitz (1999*a*) and Huberman (in press), and perhaps the international home bias puzzle. However, despite the fact that these papers document a local bias in investor equity holdings, given the local performance results, it remains a puzzle as to why funds do not hold even more local stocks. In equilibrium, it seems that fund managers should focus exclusively on local assets, specializing in their immediate area and minimizing monitoring and search costs. Investors can then hold a diversified set of these localized funds. This, of course, is not the current state of the mutual fund industry. As Coval and Moskowitz (1999*b*) show, the clients of mutual funds tend to be geographically localized as well and concentrated in a small number of funds. Thus they may prefer a more diversified portfolio. This may be an interesting avenue for further inquiry.

Finally, the role of asymmetric information in determining equilibrium asset prices has been addressed in several models (e.g., Merton 1987; Wang 1993, 1994; Jones and Slezak 1999) yet has proved difficult to assess empirically. Theory offers little guidance in distinguishing between securities with scarce information from those with widely available information, and it does not identify informed investors in the investor population. This paper may offer a unique method of identifying firms held by asymmetrically informed investors. Investors located near potential investments may have significant information advantages relative to the rest of the market. By documenting the relationship between local bias and trading activity, we offer potential insights into the behavior of informed investors, identifying perhaps the first set of seemingly informed traders.

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