Do Foreign Investors Underperform?

An Empirical Decomposition into Style and Flows

Alvaro Pedraza
Fredy Pulga
Jose Vasquez

World Bank Group
Development Research Group
Finance and Private Sector Development Team
March 2017
Abstract

This paper studies the trading behavior and performance of foreign investors with different management styles. The analysis uses a comprehensive Colombian data with complete transaction records and unique investor identification, and finds that the aggregate under-performance of foreign investors is attributable to foreign passive funds, that is, those that replicate a benchmark index. These funds pay higher prices to increase the speed of their trades to accommodate daily flows proportionally to their index before market closing. Passive funds face higher transaction costs on days when they trade multiple stocks in the same direction, buy (sell) the same stock multiple times, and make large trades near the daily closing time. Meanwhile, foreign active funds trade at more favorable prices and display higher risk-adjusted returns than any other investor group, including domestic funds with similar active management. The findings highlight the potential costs of index investing in developing countries or in securities with low trading activity (small stocks).
DO FOREIGN INVESTORS UNDERPERFORM? AN EMPIRICAL DECOMPOSITION INTO STYLE AND FLOWS

Alvaro Pedraza* Fredy Pulga† Jose Vasquez‡§

JEL Classification: G12, G14, G23

Keywords: Foreign investors, index funds, performance, transactional data.

*Corresponding author: World Bank Group, 1818 H Street NW, Washington D.C. 20433, USA. Tel: +1 202 779 4158. E-mail address: apedrazamorales@worldbank.org.
†Universidad de la Sabana, Km 7 Autopista Norte, Bogota, Colombia.
‡World Bank and School of Economics, Navarra University, Garcia de Paredes 55 28023, Madrid, Spain.
§We have benefited from the comments of Sushant Acharya, Pablo Cuba, Aart Kraay, Pete Kyle, Soledad Martinez, Claudia Ruiz, and Giorgo Sertsios. We thank Adriana Cardenas and other members of the Colombian Stock Exchange Research Committee for providing the data and for multiple discussions. We are also grateful for funding received for this project from the Strategic Research Program. The views expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.
1 Introduction

“Passive investing has become investors default, driving billions into funds that track indexes. It’s transforming Wall Street, corporate boardrooms and the life of the neighborhood broker.” (Wall Street Journal, October 17, 2016)

The relative performance of foreign versus domestic investors has been of long-standing interest to financial economists. Whether foreign individuals or more sophisticated foreign money managers under-perform local investors is often attributed to an information advantage of one group over the other. For instance, domestic investors might have an edge due to cultural affinity and familiarity with local conditions (e.g. Chan et al., 2005; Portes and Rey, 2005; Leuz et al., 2010). In fact, the international finance literature has often used the view that distance reduces the quality of information to explain home bias, the volatility of capital flows, and herding (Brennan and Cao, 1997; Lewis, 1999; Karolyi and Stulz, 2003). Conversely, foreign investors might have an advantage if they are more experienced or if they acquire private information from their presence in multiple markets (Froot and Ramadorai, 2008; Albuquerque et al., 2009). Average performance, however, does not only depend on skills in identifying investment opportunities, but also on various constraints faced by fund managers. For example, on the manager’s discretion to accommodate flows if the fund is actively or passively managed (index funds).

In this paper we study an issue that is fundamental to understanding the behavior of global investors in equity markets —the effects of management style on performance. Namely, how do trading strategies and portfolio returns of foreign funds differ from domestic funds with similar style of active management? Answering this question would be naturally useful to individual and institutional investors with international portfolios. Moreover, the issue is particularly relevant for at least two reasons. First, cross-border portfolio investments are increasingly important in global markets. Since 2001, the share of equity holdings by foreign investors grew from 19 percent of the world’s stock market capitalization to more than 35 percent by the end of 2015 (IMF, 2016). Second, much of this recent growth has been in explicit index funds (Cremers et al., 2016). Notwithstanding their popularity among investors, little is known about how managers of these funds trade to accommodate net flows, and how their performance compares to local funds with
passive management.

While the effect of distance on performance has been extensively studied in the literature, the role that active management plays on the investment strategies of foreign asset managers has received little attention. A growing number of empirical studies use complete transaction records within a country, and compare foreign-managed versus domestic-managed funds. Some of these studies provide support in favor of the superior skills of domestic investors (Hau, 2001; Choe et al., 2005; Dvořák, 2005), others document that foreign investors outperform locals (Grinblatt and Keloharju, 2000; Seasholes, 2004; Barber et al., 2009), and some find no differences in performance (Seasholes and Zhu, 2010). Despite using comprehensive transaction level data, most of these studies do not distinguish within each group (foreign or domestic), whether one investor is making all the poorly-performing trades or if the trades are performed by different investors.\(^1\) In other words, these studies do not account for within group heterogeneity that might explain portfolio returns, and what they estimate is an average performance gap between locals and foreigners.

We investigate the issue of style and distance using a unique transaction data set from the Colombian Stock Exchange. The advantage and novel aspect of the data is that for all the transactions in the market between January 2, 2006, and January 29, 2016, we have an investor identifier on both sides of the transaction which allows us to track each fund or individual over time. Given the panel structure of the data, we are not only able to compare average performance between foreign and domestic investors, but we can also study the extent to which performance is related to investor/fund characteristics, such as style and fund flows. Despite the vast segment of the literature that focuses on investors who are separated by borders, to the best of our knowledge, we are the first to use information on active management together with complete transaction history to analyze the relative skill and performance of foreign versus local investors.

We find that on average, foreign investors trade at unfavorable prices relative to domestic investors. The average disadvantage relative to domestic institutions is 8 basis points for stock purchases and 7 basis points for sales. These estimates are quantitatively similar to those reported by Agarwal et al. (2009) in Indonesia over an 8 year period, and smaller but in the same order of

\(^1\)This is typically a consequence of data restrictions in order to guarantee the anonymity of each trader. The exceptions are Hau (2001) and Seasholes and Zhu (2010). Hau (2001) uses data on a group of professional traders but does not study the role of active versus passive management. Seasholes and Zhu (2010) on the other hand focuses on individual investors.
magnitude to the findings of Choe et al. (2005) for the Republic of Korea between 1996 and 1998.

The comprehensiveness of our data set allows us to go beyond just the documentation of aggregate trading losses and make several contributions relative to prior research. We begin by documenting that the disadvantage of foreign investors in our sample is attributed to passively-managed foreign funds, that is, those whose strategy consist of replicating the return on an index by buying and holding all (or almost all) index stocks in the official index proportions. In addition to paying higher prices for stock purchases and receiving less when they sell, these funds display inferior risk-adjusted returns than foreign active funds. Our evidence suggests that managers of foreign passive funds are paying a price for a trading style that differs from the trading style of other investors. In particular, worst trades are on days when they are trying to accommodate large flows in similar proportions to their benchmark index by (i) trading multiple stocks in the same direction, (ii) buying (selling) the same stock multiple times, and (iii) making large trades at the end of the trading session.

In addition to comparing performance across foreign investors with different styles of management, we also compare the performance of foreign versus local investors by level of active management. We find that the yearly returns of passive foreign funds are between 1.19 to 1.90 percentage points smaller than domestic funds with similar passive strategies. This suggests that index investing by itself cannot explain the under-performance of foreign investors.

In order to understand outstanding characteristics which may be driving performance, we analyze the timing of flows across funds. The key finding is that daily net flows of passive funds are strongly correlated in the cross-section. Specifically, we show that managers of passive funds trade more intensively on days when other passive funds are trading in the same direction. Furthermore, the large imbalance of daily flows by foreign passive funds appears to be generating a significant price pressure on the stocks that they trade. We show that trades by this group are correlated with same-day returns, which suggests that foreign passive funds are paying a price for accommodating their daily flows.

Importantly, both components —passive portfolio management and correlated flows – are necessary conditions to explain the magnitude of the under-performance of foreign investors. If flow imbalances by passive funds are large enough, in order to trade stocks in similar index proportions, managers pay higher transaction costs to cling to their benchmark before the end of the trading
session, that is, they pay a price to increase the speed of their trades to comply with their investment style. Meanwhile, other investors with more discretion over their flows appear to time their transactions to take advantage of the common order flow by passive funds.

Our results need to be interpreted in the context of the market microstructure of the Colombian stock market. For example, average trade size, market impact, and bid-ask spreads constraint the speed at which managers can execute their trades. Depending on the liquidity of the underlying asset, managers with private information would optimally split their trades in multiple transactions, perhaps even across several days (Kyle, 1985; Kyle and Obizhaeva, 2016). Passive fund managers with little discretion over flows, however, have a natural time limit to execute their trades, namely, the end of the day. Consequently, managers end up paying higher transaction costs in order to meet their “deadline” and generate lower returns.

Our evidence is related to an extensive empirical literature that studies the relative value of active versus passive management. Numerous papers document a poor track record for active funds, with average returns for investors significantly below those of passive benchmarks (e.g. Wermers, 2000; Bollen and Busse, 2001; Pástor and Stambaugh, 2002; Avramov and Wermers, 2006). More recently, Cremers and Petajisto (2009), using a new measure of active management (Active Share), find that managers with more active trading strategies exhibit relatively more skill than less active managers. We also use Active Share to assess the level of active management of the funds in our sample. We find that Active Share predicts fund performance among foreign funds. More importantly, we contribute to the literature by examining in intra-day trading patterns by level of active management and by documenting the potential costs of passive investing.

In our paper, instead of trying to identify informational advantages of local versus foreign investors,\(^2\) we document a particular type of disadvantage — the cost of index investing in a small equity market. We would expect for similar findings in other developing countries, or in small (illiquid) stocks in developed countries. Overall, our results challenge the conventional wisdom that passive funds are, unconditionally, the best alternative for investors. While this could be the case for U.S. households investing in their home country (French, 2008), it is possible that for global strategies, index investing might deliver disappointing results.

\(^2\)Other examples in this literature rely on lower frequency data, e.g. monthly or quarterly holdings. Most recently, Ferreira et al. (2015) use a sample of 32 countries to compare the performance of institutional investors in stocks of their home country to the performance of money managers located in other countries.
Finally, we should point out that our decomposition of performance in terms of style and flows does not rule out informational advantages across investors. For instance, unsophisticated individual investors seeking exposure to global markets might optimally self-select into index funds. In fact, the positive relation between flows across passive funds suggests that investors of these funds might be less informed, and perhaps more likely to purchase or redeem shares in their index funds at the same time. On the other hand, active foreign investors in our sample generate yearly returns that are 3.66 to 4.28 percentage points greater than active funds managed domestically. These results are consistent with an advantage for this group, perhaps because they are more skilled or have access to valuable information form their presence in several markets (Albuquerque et al., 2009).

The rest of the paper is organized as follows. In section 2 we provide some background on the Colombian institutional setting and describe the data. In section 3 we document the general trading patterns across different investor types and styles. We study the relation between distance, style, and performance in Section 4 and analyze the role of flows on performance in Section 5. We conclude in Section 6.

2 Background and Data

2.1 The Colombian Stock Exchange (CSE)

Our data span the time between January 2, 2006, and January 29, 2016. During this period, the CSE implemented several changes in order to meet international standards. Before February, 2009, the market operated as a continuous trading system from 8:00 to 13:00 (local time) on weekdays where participants were only allowed to place limit orders. After February 9, 2009, a new trading platform was launched, allowing market and stop orders. In addition, a batch auction was introduced during the last five minutes of each trading day. During this interval, trades are collected and the system estimates an adjudication price at the maximum volume allocated among the tenders, with the auction closing randomly in +/- 60 seconds around the daily closing time. The auction price is also the daily closing price for each stock. Starting January 3, 2011, the trading session was extended to run from 8:30 to 15:00 with other rules remaining the same. Finally, on February 6, 2012, the market synchronized its daily trading session with the New York Stock Exchange, from 9:30 NYT
to 16:00 NYT.\textsuperscript{3}

Trades are submitted via authorized brokers registered at the exchange and buy and sell orders meet via the Automated Trading System. Short-sells were allowed during our entire period of study, however, investors were required to close any short position by the end of each trading day.\textsuperscript{4} There are no individual or aggregate ownership limits on foreign investors, and they are allowed to either reinvest or transfer earnings such as dividends, coupons or capital gains with little restrictions. Since the Central Bank has discretionary control on net currency flows, including those to equity instruments, foreign investors are required to report their initial investments and any subsequent transactions that involve any currency exchange.

\textbf{2.2 Data}

The database, which includes all transactions in the period, was provided by the CSE. The data disclose the date and time of each transaction, a stock identifier, order type (buy or sell), transaction price, number of shares, and broker ID. The key novel aspect of the data, and most importantly for our analysis, is that every transaction record has a unique investor ID number that allows us to track all the transactions for each investor throughout the entire sample period. In addition, the transaction records also disclose whether an investor is foreign or domestic. Domestic investors are further classified into individuals or institutions. Institutions can be broadly categorized into corporations, pension funds, mutual funds, banks, insurance companies, and brokerage firms trading on their own accounts. It is important to point out that our database does not allow us to distinguish whether a foreign investor is an individual or an institutional investor. Based on this, for the rest of the paper we sometimes refer to foreign investors interchangeably as funds.\textsuperscript{5}

There were over 13 million transactions during the 10-year period. Table 1-Panel A presents the share of trading volume attributable to different investor types and the number of investors by type over two sub-samples: 2006-2010 and 2011-2016. Domestic institutions dominate the Colombian

\textsuperscript{3}For non-liquid stocks, an opening auction starts 15 minutes earlier, but trading at this time represents less than 0.01 percent of the daily traded value.

\textsuperscript{4}Other rules include a suspension mechanism on each stock based on volatility relative to a “base price” published on a daily basis. When a stock price changes more than 10% relative to its reference price, the exchange suspends trading in that stock temporarily for 30 minutes. In addition, when the representative stock index (C OLCAP) decreases more than 10% during a trading session, all transactions are suspended until the next trading day.

\textsuperscript{5}Informal conversations with registered brokers suggest that most (and in several cases all) of their foreign clients are institutions.
stock market accounting for just over half of the total value traded in both periods. Corporations,
pension funds, mutual funds, and brokerage firms account for 98 percent of this volume over the
entire sample, with banks, insurance companies and other institutions representing a small fraction
of the trading activity of domestic institutions. Consistent with international trends, there is a
growing presence of foreign investors over time. The number of foreign investors nearly doubled
from 1,440 to 2,830, and the share of total traded value by these group increased from 3.8% in the
first half of the sample to 19.1% in the second half. Figures 1 and 2 plot the time series of the share
of traded value and share of market capitalization respectively by investor type. These figures also
highlight the increasing importance of foreign investors in recent years.

According to Table 1-Panel B, the average number of trades by domestic institutions and foreign
investors are 317 and 316 respectively. The distribution of trades amongst different institutions,
however, is quite heterogeneous, with brokerage firms and mutual funds performing the largest
number of trades on average. We restrict our analysis by considering only those investors who
traded at least a 100 times over the 10 year period.

We collect stock and market data from Bloomberg, Datastream and the Superintendencia Fi-
nanciera de Colombia (Colombian Financial Superintendency, SFC). We obtain stocks returns,
share price, trading volume, and bid-ask spread from Bloomberg and book value of equity, shares
outstanding, and aggregate institutional ownership from Datastream and the SFC. The number of
traded stocks fluctuated between 62 and 71 during our sample period.

In Table 2, we present basic descriptive statistics relating to the stock market during our sample
period. According to the table, the performance of the Colombian market closely mimicked that
of the Latin American region. The table is also indicative of increased participation by foreign
investors in the CSE. Despite the large amount of outflows by foreigners during 2014 and 2015,
accumulated foreign net flows are positive over the entire sample period.

---

6 The corresponding numbers for domestic institutions were 6,834 and 10,344 respectively.
7 We are aware that this cut might bias the sample to those investors who have been active in the market for a
longer period. We performed our analysis by alternatively reducing the threshold to 50 trades and also for a higher
threshold of 200 trades. These changes do not affect any our findings.
8 In calculating these numbers, we treat ordinary and preferred shares issued by the same firm as different stocks.
2.3 Portfolio Construction

In order to construct our preferred measures of investor characteristics and styles, we use information on portfolio holdings of market participants over the sample. A limitation of our data set is that we do not directly observe these portfolios. However, we can build a proxy for actual holdings since we observe all transactions that were undertaken by each investor over the entire sample. Notice that if we were to observe portfolios at the beginning of the sample period, then our proxy would be exactly equal to the portfolios at each point in time for each investor. We begin by imposing a zero initial holding condition for each investor the first date that she appears in the data set. We accumulate daily stock holdings by investor over time. In order to account for the short-sell ban, we take the investor-stock most negative daily position in the entire time series and add that value to the zero initial holdings. This adjustment ensures that no investor holds a negative position in any stock at the end of any trading day. We make appropriate adjustments for stock splits and initial public offering dates.

Despite our portfolio measure being a proxy, we are confident that it captures a significant amount of actual holdings. This is especially true for those investors who first entered the Colombian stock market after January 2, 2006, since the assumption that these investors had zero holdings at the start of the sample is exact. Since many of the foreign investors entered the Colombian stock market during our sample period, the portfolios of these investors are likely to be more accurate. Furthermore, since we have 10 years of data, provided that portfolio turnover is large enough, errors in our measure from differences in initial conditions would diminish very quickly over time in the sample.\(^9\)

3 Investor/Fund Style

3.1 Active versus passive management

Our data set does not allow us to observe investor/fund names or funds’ prospectus, i.e. we do not have information on a fund self-declared investment strategy, and thus, we cannot distinguish directly between index funds and active funds. In broad terms, passive management of a portfolio

\(^9\)For instance, Cremers and Pareek (2015) find that the average turnover for an all-equity U.S. mutual funds is 85 percent annually. This would imply that the average fund would trade their entire portfolio in 1.2 years.
consists of replicating the return on an index with a strategy of buying and holding all (or almost all) index stocks in the official index proportions. Active management, in turn, can be defined as deviations from passive management.

We infer active or passive management strategies by computing the Active Share (Cremers and Petajisto, 2009) for each investor or fund. The measure represents the share of portfolio holdings that differs from a benchmark index holdings and is calculated as:

$$\text{Active Share}_{i,t} = \frac{1}{2} \sum_{s=1}^{N} |w_{i,s,t} - w_{index,s,t}|$$ (1)

where $w_{i,s,t}$ and $w_{index,s,t}$ are the portfolio weights of stock $s$ in fund $i$ and the benchmark index at time $t$, respectively, and the sum is taken over the universe of stocks. We compute this measure by investor/fund at a daily frequency. For the benchmark index, we use the two most popular Colombian equity indices that track the overall market performance - COLCAP, which is a value weighted index, and IGBC, which is a liquidity and value weighted index. For each investor, we compute (1) using each of these indices separately and then set the investor’s Active Share to be the minimum of the two values.

Using Active Share to characterize management style has an advantage over using self-declared fund style which may not accurately reflect actual investment behavior. For example, Cremers et al. (2016) find that 20% of worldwide mutual fund assets are managed by “closet indexers” - investors who declared themselves as active, but in reality, tracked their respective benchmarks closely as passive investors would have.

Table 3 reports the share of assets under management (AUM) by investors with an Active Share below 60 percent. We call this group passive investors.\footnote{This 60 percent threshold has been commonly used in the literature to classify portfolio management as active or passive (see for example Cremers et al. (2016)). While we use this threshold in this section to present descriptive statistics, throughout the paper we sort foreign investors by quartile of Active Share or use the continuous measure.} Consistent with global trends on institutional money management, the share of total assets managed by passive domestic institutions and passive foreign investors increased in the second half of the sample period, from 53.5 percent to 71.7 percent for domestic institutions and from 29.4 percent to 64.8 percent for foreign investors. Among domestic institutions, mutual funds and in particular pension funds largely fall under the category of passively managed. According to Pedraza (2015), Colombian pension funds face a
financial penalty if they fail to generate a minimum return relative to a peer- and market-based benchmark. Hence, it is not surprising that the portfolios of these funds replicate to a large extent the market index. Figure 3 shows the monthly time series of the share of AUM by investor type. The figure displays the upward trend of passively managed funds by domestic institutions and the sharp rise of foreign passive funds after 2008.\textsuperscript{11}

Given the unique nature of our transaction database with investor ID, we document how passive and active investors trade during the day. Table 4 summarizes the intra-day profile of traded value when we divide the day into eight time intervals.\textsuperscript{12} Panel A in the table reports the proportion of the traded value by each group relative to the total traded value in the interval. Excluding the closing batch, domestic institutions account for more than half of the value traded during each period, with foreign investors increasing their relative importance in the afternoons. In the closing batch, foreign investors represent 39.9 percent of the interval, with passive funds accounting for most of those trades (30.9 percent of the interval). Panel B in the table reports the proportion of traded value in each interval relative to the total daily value traded by investor group. Domestic institutions and individuals execute most of their trades in the early hours of the day. On the contrary, passive foreign funds trade on average 39.8 percent of their daily traded value in the closing batch. While this behavior is more pronounced for the latter years in the sample, passively-managed foreign funds were consistently very active in the last five minutes of the trading session since the closing batch auction was introduced in 2009 (Table 4-Panel C).

Trading at or near closing prices might be an efficient strategy for open-end funds. For example, mutual funds are “forwarded priced,” which means that while investors can place orders to buy or sell shares throughout the day, these orders will be executed at the same price, i.e. the end-of-day net asset value of the fund. A fund manager that trades at closing prices mitigates the timing risk due to non-simultaneous purchases or sales of the fund shares and the underlying portfolio. In this scenario, the price that new shareholders pay for shares that are created coincides with the value of the underlying securities of the fund. Conversely, the price that old shareholders receive for their

\textsuperscript{11}According to Factset Institutional Equity Ownership Database, the percentage of assets managed by foreign owned self-declared index funds grew from 0.1 percent in the first quarter of 2006 percent to 33.6 percent in the last quarter of 2015. Our time series should capture “closet-indexers” as well as self-declared index funds.

\textsuperscript{12}The sample includes the period between February 6, 2012, and January 29, 2016 when the CSE synchronized its operations with the NYSE. The table is quantitatively similar if we include the period from February 9, 2011, to February 6, 2012, when the market traded from 8:30 to 15:00 hours and if we match the trading session.
redemptions matches the value of the underlying securities in the fund. Interestingly, only foreign passive funds display such intensive trading at the end of the trading session. For example, foreign active funds only trade 13 percent of their daily traded value in the closing batch and domestic mutual funds with passive management style (i.e. those with Active Share below 60) trade only 14 percent of their daily traded value at the closing batch (Figure 4).

3.2 Measures of trading activity

In addition to measuring the investor/fund management style with Active Share, we employ other common proxies of trading activity. We measure the Fund Turnover Ratio as the minimum of aggregate sales and aggregate purchases of stocks, divided by the average of the net asset value of the fund. We calculate the Fund Turnover Ratio at yearly frequencies for each investor/fund in the database. We also use equity flows normalized by the total AUM at the beginning of each month. For each investor/fund we report the different number of stocks held in the portfolio and the different number of stocks traded during each period.

Table 5 reports mean and median values for our variables of interest by investor group. The average foreign investor manages a portfolio of 20.7 billion pesos (6.5 million USD) with yearly turnover of 0.9, has monthly net flows of 2.8 percent relative to the AUM (0.14 percent at daily frequency), holds 9.3 different stocks, and trades more than 3 stocks every month. Among domestic institutions, pension funds manage the largest equity portfolios, have the lowest turnover ratio and hold more than 24 different stocks.

Table 6 reports mean values of the relevant variables by investor type and sorted by Active Share. Groups are constructed using the 25th, 50th, and 75th percentile from the distribution of Active Share among foreign investors. We then use these cuts to sort domestic individuals and institutions. According to the table, investors in the lowest group of Active Share, manage more assets on average, display the lowest turnover, and hold more stocks in their portfolios. In addition, investors and funds in the low Active Share group trade the most number of stocks on average. For example, foreign investors in the lowest group of Active Share trade over 5 stocks each month.
4 Investor Performance

In order to test whether foreign investors are at a disadvantage, we use two common measures of performance. In addition to documenting aggregate differences between local and foreign investors, we study differences by level of active management and other investor/fund characteristics that correlate with performance.

4.1 Average trading price

Our first measure of performance is the Value-Weighted-Average-Price (VWAP). The VWAP for each stock $s$, on day $d$ by investor $i$ is measured as:

$$VWAP_{i,s,d} = \frac{B_{i,s,d}}{A_{s,d}} \times 100$$  

(2)

where $B_{i,s,d}$ is the volume-weighted average price for all purchases and sales separately for each investor $i$, and $A_{s,d}$ is the volume-weighted average price for all trades. This price ratio is computed for buys and sells separately and captures how much more a particular investor paid (received) relative to the average price of the day when she buys (sells).

The VWAP measure offers at least two advantages. First, it captures short-term market timing ability and does not require the definition of an asset pricing model. Second, since the measure has been used by Choe et al. (2005) and Agarwal et al. (2009), we can directly compare our results to those in these studies and extend previous findings by decomposing performance into management styles and other investor/fund characteristics.\(^{13}\) One limitation to the VWAP, however, is that by comparing trading among investors at intra-day frequencies, the measure fails to capture performance at longer horizons. More precisely, the measure does not identify whether a purchase that was initially executed at a price above the average daily price turns out to be profitable during the investor’s holding period. Moreover, if a trade was part of a strategy by the investor which involves several stocks, the individual trade might be deemed as inferior but the overall strategy could be successful. In order to consider total portfolio performance, we also measure risk-adjusted

---

\(^{13}\)Most recently, Agudelo et al. (2015) use the VWAP measure to compare performance between different groups of investors in Colombia. The authors, however, do not have investor ID and thus cannot study performance by style which is the main focus of our paper.
returns by investor/fund in the following section.

Averages of VWAP by investor type are presented in Table 7-Panel A. Foreign investors pay 4 basis points (bp) more than the average daily price when they buy stocks, while domestic institutions and domestic individuals pay 4 and 8 bp less than the average price respectively. The 8 and 12 bp differences between foreign and both domestic institutions and individuals are statistically significant. For sells, foreign investors receive 7 bp less than domestic institutions and 8 bp relative to domestic individuals. These results indicate that on a round-trip trade, foreign investors face greater transactions costs on the order of 15 bp compared with domestic institutions and 20 bp with respect to domestic individuals. Furthermore, an investor who trades six times per year would contemplate a drag on performance in excess of 1 percent of her total traded value. Given the yearly average buying value of foreign investors of 4.3 trillion COP (1.4 billion USD) and their yearly selling value of 3.4 trillion COP (1.06 billion USD), their under-performance is equivalent to paying 6.2 billion COP (2.0 million USD) every year on transaction costs. The documented disadvantage is quantitatively similar to that reported by Agarwal et al. (2009) in Indonesia over an 8 year period, and smaller but in the same order of magnitude to the one reported by Choe et al. (2005) for Korea between 1996 and 1998.

In Panel B of Table 7, we report the average prices paid by foreigners sorted by level of Active Share. Foreign investors in the lowest quartile of Active Share pay the highest price for purchases while receiving the lowest price for their sells. On the contrary, foreign investors in the upper 50th percentile of the Active Share distribution do not trade at prices significantly different from the average price of the day, with daily purchases and sells insignificantly different from 100.

Given the distinct patterns of intra-day trading activity between passive and active foreign investors documented in the previous section, we report average transaction prices by trading interval. Table 7-Panel C reports the average trading price of passive and active foreigners based on the execution time of each trade. We distinguish between transactions executed in the closing batch and those that are executed during the continuous trading session. According to the table, foreign passive investors significantly trade at worst prices in both intervals. However, these investors

---

14 The results are similar if we disaggregate the sample into trades of different sizes (results not shown in the table). For smaller trades, foreign investors’ under-performance relative to individuals is smaller but still statistically significant.

15 Panel C only includes trades after February 9, 2009.
pay significantly higher prices during the closing batch (the difference is 9 bps with t-statistic of 11.68). In other words, passively-managed foreign funds pay more precisely when they trade more intensively.

Actively-managed foreign funds also pay higher prices for purchases at the closing batch. Conversely, these investors trade at *fair* prices during the continuous trading session when most of their operations are executed (VWAP for purchases and sells are indistinguishable from 100 during this time). It is possible that foreign passive funds trade after prices have move against them due to momentum strategies. Alternatively, the difference in transaction prices across groups might result from price pressure exerted by passively-managed foreign funds in the stocks that they trade. We come back to these explanations in Section 5 where we study the relation between market returns and flows disaggregated by investor type and by management style.

So far, we document that foreign investors trade at worse prices relative to both domestic institutions and domestic individuals. Among foreign investors, those with low Active Share and with more transactions later in the day trade at more unfavorable prices. One limitation to the non-parametric analysis above is that it does not account for differences in stock-firm characteristics. For example, whether greater transaction costs are concentrated in smaller and less liquid stocks. To account for these differences, we use linear regression analysis to further investigate the disadvantage of foreign institutions. We follow Choe et al. (2005) and control for firm size, book-to-market ratio, stock and market returns, and stock liquidity. More importantly for our analysis, since we track each investor throughout the sample, we introduce our measure of active management, Active Share, and include other controls for investor trading activity, i.e. Fund Turnover Ratio, daily net flows, and the number of different stocks traded in each day. To capture any residual differences resulting from trades coming later in the day, we control for the share of the traded value in each stock executed by the investor in the closing batch. Appendix A presents the list of variables used in the regression analysis with their corresponding definition and source. Table 8 reports the correlations between fund/investor variables.

Our dependent variable is $\Delta \text{VWAP}_{i,s,d}$, defined as the difference in the daily $(d)$ average price that foreign investor $i$ pays (for purchases) on stock $j$ (VWAP$_{i,d,j}$), relative to the average price paid by all domestic institutions (VWAP$_{d,j}$) in the same stock.\footnote{We also perform similar estimation relative to domestic individuals. The results are qualitatively similar and are}
purchases and sells separately using the following model:

\[
\Delta \text{VWAP}_{i,s,d} = \gamma Y_{s,d} + \delta M_{d} + \beta X_{i,s,d} + \varepsilon_{i,s,d}
\]  

(3)

\(Y_{s,d}\) is the vector of stock-firm characteristics, \(M_{d}\) contains market variables, and \(X_{i,s,d}\) is the vector with information on investor/fund style. Tables 9 and 10 present regression estimates. Table 9 includes stock fixed-effects and t-statistics are calculated from standard errors clustered at the fund level. Following Petersen (2009), Table 10 accounts for serial correlation parametrically by including time dummies, in addition to controlling for stock fixed-effects and cluster in the fund dimension.\(^{17}\) The disadvantage of this methodology is that it omits any variable with market information, e.g. market daily returns.

The first four regressions in Tables 9 and 10 (columns 1 to 4), compare average purchases between foreign and domestic institutions, and the last four regressions (columns 5 to 8) compare average sells. According to Table 9, foreign investors trade at more favorable prices on days of low market volatility. The coefficients for opening-to-close stock returns are positive and statistically significant in all specifications, which implies that foreign investors pay higher prices relative to domestic institutions on stocks with positive daily returns and receive less when they sell stocks with negative same-day returns. In regressions (5) through (8) the coefficient for stock price sensitivity, which proxies for stock liquidity, is negative and statistically significant. This finding suggests that foreign investors are at a disadvantage when selling stocks with lower liquidity. Also, the evidence indicates that foreign investors sell larger stocks at better prices (Table 10).

We now turn to the investor/fund variables. We find that the disadvantage of foreign investors is more pronounced for passively-managed funds and for those with low turnover. Coefficients for Active Share and turnover are negative for purchases and positive for sells in all the regressions. In columns (2) and (3) we include the number of different stocks that the fund is buying during the day, and columns (6) and (7) include the number of different stocks that the fund is selling. The results indicate that foreign funds trade at worse prices on days when they are trading multiple stocks in the same direction. Moreover, foreign investors make the worst trades on days in which a

\(^{17}\)Note that while the Fama-MacBeth approach (Fama and MacBeth, 1973) would efficiently correct for serial correlation in the error term, one would still need to account for the stock and fund cross-sectional correlation.
large portion of their traded value is executed at the closing batch.\(^{18}\)

While some of the results would suggest that foreign investors do worse on stocks with greater information asymmetries, we find strong evidence that style plays a key role in explaining performance. In particular, the disadvantage of foreign investors is concentrated among passive funds. It appears that these funds are paying a price for a trading style that differs from the trading style of other investors.

4.2 Risk-Adjusted Returns

We use our estimates of monthly equity holdings and the observed net flows to calculate the monthly gross rate of returns for each fund, i.e. \(1 + R_{i,t} = \frac{VF_{i,t} - NF_{i,t}}{VF_{i,t-1}}\). We use the cross-sectional variation to see how returns vary between domestic and foreign funds, and between actively-managed versus passively-managed funds. We adjust for heterogeneity in risk taking and in style by introducing various performance benchmarks that account for the possibility that funds load differently on small-cap stocks, value stock, and price momentum strategies. To be precise, we adjust monthly fund returns in three different ways: (i) We calculate market-adjusted returns by subtracting the returns of a market index, (ii) we adjust returns using the Capital Asset Pricing Model (CAPM) and (iii) the Carhart four-factor model (Carhart, 1997).

The portfolios that make up our performance benchmarks are the return on the market index in excess of the one-month Colombian T-bill rate (MARKET),\(^{19}\) the returns to the Fama and French (1993) SMB (small stocks minus large stocks) and HML (high book-to-market stocks minus low book-to-market stocks) portfolios, and the returns-to-price momentum portfolio WML (winners minus losers, constructed based on a twelve-month formation period and a one-month holding period).

Since we are interested in the relationship between management style and performance, we sort domestic and foreign funds at the beginning of each month into four groups of Active Share. We then track these eight portfolios for one month and use the entire time series of their monthly

---

\(^{18}\)In the estimation results in columns (4) and (8), we exclude the variable “Number of Stocks”. The correlation between the number of different stocks traded during a day and the proportion of the daily trades performed in the closing batch is 0.53 for purchases and 0.56 for sales. In other words, foreign investors trading multiple stocks in the same direction during a day are more likely to trade more intensively at the closing batch.

\(^{19}\)We use two other measures for the risk-free rate, the monthly return on US T-Bills in Colombian pesos and the Colombian deposit rate. Our results are unchanged when using these proxies for the risk-free rate. We omit these results for brevity.
returns to calculate the loadings to the various factors for each of these portfolios. For every month in the sample period, each fund inherits the loading of one of these eight portfolios that it belongs to. In other words, if a foreign fund stays in the same group of Active Share throughout its life, its loading remain the same, but if it moves from one Active Share group to another during a certain month, it inherits a new set of loadings which we use to adjust its next month’s performance.

Table 11 reports the average market-adjusted returns and the loadings of the domestic and foreign funds sorted by group of Active Share. We see that funds with higher Active Share tend to have lower loadings on MARKET. For instance, while both foreign and domestic funds in the lowest Active Share group have a market loading of 0.95 (according to the CAPM), the corresponding loadings in the highest group of Active Share are 0.66 for foreign funds and 0.45 for domestic funds. The negative relationship between Active Share and the market loading results almost by construction, since funds with low Active Share are precisely those with similar holdings relative to the market index.

According to Table 11-Panel A, passively-managed foreign funds display lower market-adjusted returns and smaller alphas than actively-managed foreign funds. For example, while foreign funds in Group 4 report an alpha of 0.69% in the four-factor model, the corresponding alpha of foreign funds in the lowest Active Share group is 0.21%. In other words, actively-managed foreign funds appear to deliver higher risk-adjusted returns relative to foreign funds with passive management strategies. For domestic investors (Table 11-Panel B), there is no apparent relation between performance and Active Share.

The lower risk-adjusted returns of passively-managed foreign funds complements our earlier finding that passively-managed foreign funds buy (sell) stocks at higher (lower) prices. The result is not straightforward since trading at unfavorable prices within a day is not necessarily equivalent to poor performance in longer horizons. For instance, while the Spearman correlation between market-adjusted returns and VWAP is negative for purchases and positive for sales suggesting that investors trading at better prices tend to deliver higher returns, the correlations are only -18% and 8% respectively.  

A potential concern to our current findings is that Active Share might be correlated with other

---

20To calculate this correlation, we construct a monthly measure of VWAP by investor taking the value-weighted average of the daily VWAP across stocks.
fund characteristics that are driving performance. For example, fund size might erode performance because of trading costs associated with liquidity and price impact (Chen et al., 2004). Since passive funds are larger (see Table 6), the reported under-performance of passively-managed foreign funds might be a consequence of their size rather than their management style. To deal with the correlation between Active Share with other fund characteristics, we analyze the effect of past Active Share on performance in a regression framework proposed by Fama and MacBeth (1973), where we control for the effects of other fund characteristics on performance. We use the following specification

$$ADJRET_{i,t} = \mu + \beta_{Foreign}i + \sum_{a=1}^{3} \phi_a Group^a_{i,t-1} + \sum_{a=1}^{3} \delta_a Group^a_{i,t-1} \times Foreign_i + \gamma X_{i,t-1} + \varepsilon_{i,t}$$

for $i = 1, ..., N$  \hspace{1cm} (4)

where $ADJRET_{i,t}$ is the return of fund $i$ in month $t$ adjusted by various performance benchmarks and $X_{i,t-1}$ is a set of control variables that includes fund size, turnover, and net flows. $Foreign$ is a dummy variable equal to 1 for foreign investors and zero otherwise. $Group^a_{i,t-1}$ is a dummy variable set to one if investor $i$ at time $t-1$ belongs to the Active Share group $Group^a$. We take the estimates from these cross-sectional monthly regression and follow Fama and MacBeth (1973) in taking their time series means and standard deviations to form our overall estimates. An advantage of equation (4) is that we can directly compare differences in performance within an investor type (domestic or foreign) and across levels of active management. Furthermore, we can test for a given level of active management, the differences in performance by investor location.

Table 12 presents the estimation results. Among foreign funds, those that are actively managed outperform funds with passive strategies. The difference in risk-adjusted returns is both statistically and economically significant. Using the most conservative estimates, namely, those from the four-factor model, actively-managed foreign funds outperform passive funds by 1.70 percent per year (0.14 percent per month). Although these are gross returns, i.e. they do not take into account management fees, the difference is above 0.8 percent, which is the average expense ratio that U.S. active funds charge in excess of passive funds.\textsuperscript{21} We do not find any differences in risk-adjusted returns between the top and bottom groups of Active Share for domestic institutional investors.

\textsuperscript{21}According to Thomson Reuters Lipper, the average expense ratio of actively managed equity funds in the U.S. is 1.4 percent, while the average expense ratio of passive funds is 0.6 percent.
Interestingly, when we compare foreign versus domestic funds within the same group of active management, we find that foreign funds in the highest level of Active Share display higher risk-adjusted returns relative to their domestic counterparts. More precisely, according to the four-factor model, foreign active funds’ rate of returns are greater than those of domestic active funds by 3.66 percent per year. While we do not test directly for stories of informational advantages, it is possible that the group of active foreign investors may be more experienced on average. On the contrary, we find that passively-managed foreign funds exhibit lower risk-adjusted returns than domestic passive funds (-1.19 percent per year).

To summarize, the under-performance of foreign investors in the Colombian stock market is attributable to passively-managed funds. These funds trade at worse prices and deliver lower risk-adjusted returns relative to active funds. While the under-performance can be explained in part by mechanical strategies such as buying and selling multiple stocks in the portfolio at the same time near closing prices, the fact that domestic passively-managed funds have superior performance suggests that there are other fund characteristics other than passive management that might explain the under-performance of foreign funds. In the next section we study outstanding differences among foreign and domestic institutions. In particular, we focus on fund flows and discuss evidence of feedback trading.

5 Correlated Flows and Momentum Trading

In this section, we document differences in net flows across investor types and across funds with different degrees of active management. We also study whether investors’ demands are correlated to contemporaneous returns, and whether investors display momentum behavior.

5.1 Cross-sectional Correlation in Equity Flows

We are interested in testing whether investors’ demands by management style are correlated in the cross-section. To examine this question we use the dollar ratio measure of excess demand calculated for each investor following Lakonishok et al. (1992). For a given day \( d \), \( Dratio_{i,d} \) is defined as:

\[
Dratio_{i,d} = \frac{\sum_{s=1}^{S} buys_{i,s,d} - sells_{i,s,d}}{\sum_{s=1}^{S} buys_{i,s,d} + sells_{i,s,d}}
\] (5)
where \(buys_{i,s,d}\) are total purchases on stock \(s\) by fund \(i\), and \(sells_{i,s,d}\) are total daily sells.

We begin the analysis by estimating, for each investor, a time-series regression of the investor daily excess demand \((Dratio_{i,d})\) on the excess demand by all investors in the same group of active management \((Dratio_{d}^{-i})\):\(^{22}\)

\[
Dratio_{i,d} = \alpha_i + \beta_i drift_d^{-i} + \varepsilon_{i,d} \quad \text{for } d = 1, \ldots, D
\]  

(6)

Estimation of equation (6) includes days in which fund \(i\) is active. The empirical strategy follows the same logic as the Fama-Macbeth methodology for each investor \(i\). Here we run \(N\) time series regressions and calculate the mean and standard error of the \(\beta\) coefficient for each group of Active Share, and separately for domestic and foreign investors. The average \(\beta\) captures the extent to which daily flows are correlated across investors in the same group. We standardized both the dependent and independent variable such that both have zero mean and unit variance.\(^{23}\)

The results are reported in the first column of Table 13. We find strong evidence that demands by passively-managed foreign funds are correlated in the cross-section. The coefficient associated with the contemporaneous demand of the foreign funds in the lowest Active Share group is 0.14 and differs significantly from zero at the 1 percent level. Because the data are standardized, this suggests that a one standard deviation increase in the same day demand by other passive funds is associated with a 14 percent standard deviation greater demand of a passive fund. Since the regression only has one independent variable, the coefficient can also be directly interpreted as the cross-sectional correlation between daily equity demands among passive foreign funds. For foreign investors in the highest group of Active Share, the cross-sectional correlation between daily demands is negative but indistinguishable from zero (-0.01 with a t-statistic of 0.71). For domestic passive funds, the daily correlation across demands is positive at 2 percent, but significantly smaller than for foreign investors in the same group of Active Share.

It is possible that the daily cross-sectional correlation across demands by passive funds may result from momentum strategies, if a large fraction of passive funds follow market returns.\(^{24}\) To evaluate

\(^{22}\)To avoid spurious correlation between the two variables, specially for large funds, we exclude fund \(i\) from the calculation of \(Dratio_{d}^{-i}\).

\(^{23}\)In our specifications with multiple independent variables this will allow us to directly compare estimated coefficients.

\(^{24}\)There is extensive empirical evidence suggesting that institutional investors are momentum traders (e.g. Grinblatt et al., 1995; Wermers, 2000; Sias, 2004). That is, institutional investors systematically sell stocks with negative returns
the role of momentum trading in the relation between investor demands, we add lag standardized market returns to equation (6).

Average coefficients for each group of active management are reported in model (2) of Table 13. We find that passively-managed foreign funds engage in momentum trading. For example, the coefficient associated with standardized lag market returns is 0.03 and is statistically significant at the 5 percent level. Momentum trading, however, accounts for little of the cross-sectional correlation in demands. That is, adding lag market returns to the regressions has only a small impact on the average coefficient associated with excess demand by the peer group of active management, e.g. the average coefficient reported in the first column changes from 0.14 to 0.13. Since all the variables are standardized, the coefficients associated with demand by the peer group and lag market returns are directly comparable —the average coefficient of contemporaneous demand by the peer group is over four times greater than the average coefficient associated with lag returns.

In addition to the lag returns of the Colombian stock market we add standardized lag U.S. market returns. This controls for the potential relation between market performance abroad and cross-border net flows at daily frequencies (Griffin et al. (2004) first documented this relation for a group of emerging markets). Our baseline findings are robust to including this control. Results are presented in models (3) and (4) of Table 13.

The main take away from models (2) to (4) in Table 13 is that the cross-sectional correlation between contemporaneous demands changes little after accounting for domestic lag market returns and U.S lag returns. In other words, momentum trading does not appear to be the primary source of the strong correlation across demands of passively-managed foreign funds.

5.2 Momentum Trading Using Stock-Level Information

The discussion of momentum investment strategies in the previous section relies on daily flows by investor and aggregate market returns. It is possible, however, that momentum strategies may be more pronounced when we disaggregate the data at the investor-stock daily level. For example, the estimated coefficients capturing momentum strategies reported earlier might be biased downwards for investors with stock holdings significantly different from the market index. For these investors, daily market returns could be very different from their own returns, and the resulting correlation and buy stocks with positive returns.
between lag returns and flows would be small.

In order to consider investor-stock information, we calculate the momentum measure of Grinblatt et al. (1995) using daily trades on individual stocks as follows:

\[
M_{i,k} = \frac{1}{T} \sum_{d=1}^{T} \sum_{s=1}^{S} \left( \frac{Q_{i,s,d} - (Q_{i,s,d-1})^2}{Q_{i,s,d}} \right) R_{s,d-k}
\]  

(7)

where \( Q_{i,s,d} \) are holdings by fund \( i \) of stock \( s \) at day \( d \), \( Q_{i,s,d} \) is defined as \((Q_{i,s,d} + Q_{i,s,d-1})/2\), and \( R_{s,d-k} \) is the return of stock \( s \) from \( d - k - 1 \) to \( d - k - 1 \). When \( k = 1 \), the measure captures the lagged response of trades to returns (“lag-1 momentum” or L1M). When \( k = 0 \), this measure captures the contemporaneous relation between trades and returns (“lag-0 momentum” or L0M). We calculate L1M and L0M by averaging across investors in the same group of Active Share.

Panel A of Table 14 documents the results for L1M. We find that the average one-day-lagged momentum measure for passively-managed foreign funds is 3 percent per day, which is consistent with the 3 percent estimate for the correlation of aggregate flows and lag market returns reported in the previous section. Since these funds hold similar stocks to the market index, estimates of momentum strategies using market returns are quite similar to the measure of momentum investing using stock-level data. This provides further validity to our finding that the cross-sectional correlation in flows among passively-managed foreign funds is not driven by momentum strategies, since we are controlling for the correct measure of momentum.

In the previous section we found no evidence of momentum trading by actively-managed foreign funds, however, Table 14-Panel A documents that funds in this group buy and sell in the direction of one-day lag returns. More precisely, the average of L1M for foreign active funds is 7 percent and statistically significant at the 5 percent level. The contrast in findings among the two methodologies (i.e., aggregate versus stock-level) is expected, since funds in this group are precisely those with holdings significantly different from the market index. For this group, using aggregate flows and market returns does not appear to be the appropriate strategy to capture momentum investing. The important finding here is that even if foreign active investors indeed follow momentum strategies, the coefficient for the cross-sectional correlation between daily equity demands estimated at -1 percent in Table 13 would be an upper-bound for the actual correlation between flows. In other words, the evidence indicates that while active foreign funds are momentum investors on the stocks that they
trade, daily fund demands are not positively correlated in the cross-section. This would be the case if active funds trade different stocks each day. Finally, Panel A shows that domestic institutions are *contrarians* regardless of their level of active management—they buy and sell stocks in the opposite direction of lag returns.

Table 14-Panel A presents the contemporaneous correlation between daily stock returns and flows. We find that purchases and sells by passively-managed foreign funds are systematically related to stock returns in the same day. The average of $L_0M$ for this group is 0.18 (t-statistic of 7.01), which is six times greater than the correlation between flows and lag returns. According to the table, about 77.8 percent of passive foreign funds buy and sell in the direction of the same-day returns. Active foreign funds, on the other hand, do not appear to trade in the direction of daily stock returns, while domestic institutions trade in the opposite direction of returns.

Overall, the evidence is consistent with flows by passively-managed foreign funds driving price changes. The two related stylized facts are that demands by these funds are positively related in the cross-section and their trades are largely correlated with same-day returns. This suggests that foreign passive funds are paying a price for accommodating their excess demands within a day.

6 Conclusions

In this paper, we examine the performance of investors separated by borders with different management styles. We find that the aggregate under-performance of foreign investors in the Colombian Stock Market is largely attributable to the behavior of foreign funds that replicate the market index, i.e. passively-managed funds. These funds pay higher prices for stocks purchases, receive less when they sell, and display inferior risk-adjusted returns relative to other investors. In particular, worse trades are on days when these funds are (i) trading multiple stocks in the same direction, (ii) buying (selling) the same stock multiple times, and (iii) making large trades at the end of the trading session. In other words, the worst trades by passive funds appear to be on days when managers are trying to accommodate large flows in similar proportions to their benchmark index.

Market microstructure characteristics—such as average trade size, market impact, and bid-ask spreads, constrain the speed at which managers can execute their trades. If flow imbalances by index funds are large enough, in order to trade stocks in similar index proportions, managers pay higher
transaction costs to meet the end-of-day “deadline,” that is, they pay a price to increase the speed of their trades to comply with their investment style. Meanwhile, other investors with more discretion over their flows appear to time their transactions to take advantage of the common order flow by passive funds. In our sample, even foreign active funds—which are known to under-perform passive strategies, execute better trades and display higher risk-adjusted returns than passive foreign funds.

We anticipate that similar findings are likely in other developing countries, or in small (illiquid) stocks in developed markets. In such cases, the costs of mechanical trading strategies to accommodate flows might outweigh the potential benefits of passive investing.

References

Agarwal, Sumit, Sheri Faircloth, Chunlin Liu, and S Ghon Rhee, “Why do foreign investors underperform domestic investors in trading activities? Evidence from Indonesia,” Journal of Financial Markets, 2009, 12 (1), 32–53.

Agudelo, Diego, James Byder, and Paula Yepes, “Who Knows Better in an Emerging Market? Performance of Institutions, Foreigners and Individuals.,” Center for Research in Economics and Finance (CIEF), Working Papers, 2015, (15-25).

Albuquerque, Rui, Gregory H Bauer, and Martin Schneider, “Global private information in international equity markets,” Journal of Financial Economics, 2009, 94 (1), 18–46.

Avramov, Doron and Russ Wermers, “Investing in mutual funds when returns are predictable,” Journal of Financial Economics, 2006, 81 (2), 339–377.

Barber, Brad M, Yi-Tsung Lee, Yu-Jane Liu, and Terrance Odean, “Just how much do individual investors lose by trading?,” Review of Financial studies, 2009, 22 (2), 609–632.

Bollen, Nicolas PB and Jeffrey A Busse, “On the timing ability of mutual fund managers,” The Journal of Finance, 2001, 56 (3), 1075–1094.

Brennan, Michael J and H Henry Cao, “International portfolio investment flows,” The Journal of Finance, 1997, 52 (5), 1851–1880.

Carhart, Mark M, “On persistence in mutual fund performance,” The Journal of Finance, 1997, 52 (1), 57–82.

Chalmers, John MR, Roger M Edelen, and Gregory B Kadlec, “On the perils of financial intermediaries setting security prices: the mutual fund wild card option,” The Journal of Finance, 2001, 56 (6), 2209–2236.

Chan, Kalok, Vicentiu Covrig, and Lilian Ng, “What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide,” The Journal of Finance, 2005, 60 (3), 1495–1534.

Chen, Joseph, Harrison Hong, Ming Huang, and Jeffrey D Kubik, “Does fund size erode mutual fund performance? The role of liquidity and organization,” The American Economic Review, 2004, 94 (5), 1276–1302.
Choe, Hyuk, Bong-Chan Kho, and René M Stulz, “Do domestic investors have an edge? The trading experience of foreign investors in Korea,” *Review of financial studies*, 2005, 18 (3), 795–829.

Cremers, KJ Martijn and Antti Petajisto, “How active is your fund manager? A new measure that predicts performance,” *Review of Financial Studies*, 2009, 22 (9), 3329–3365.

Cremers, Martijn and Ankur Pareek, “Patient capital outperformance: The investment skill of high active share managers who trade infrequently,” *Journal of Financial Economics (JFE)*, Forthcoming, 2015.

_ , Miguel A Ferreira, Pedro Matos, and Laura Starks, “Indexing and active fund management: International evidence,” *Journal of Financial Economics*, 2016, 120 (3), 539–560.

Dvořák, Tomáš, “Do domestic investors have an information advantage? Evidence from Indonesia,” *The Journal of Finance*, 2005, 60 (2), 817–839.

Fama, Eugene F and James D MacBeth, “Risk, return, and equilibrium: Empirical tests,” *Journal of political economy*, 1973, 81 (3), 607–636.

_ and Kenneth R French, “Common risk factors in the returns on stocks and bonds,” *Journal of financial economics*, 1993, 33 (1), 3–56.

Ferreira, Miguel A, Pedro P Matos, João Pedro Pereira, and Pedro Pires, “Do Locals Know Better? A Comparison of the Performance of Local and Foreign Institutional Investors,” *A Comparison of the Performance of Local and Foreign Institutional Investors (May 19, 2015)*, 2015.

French, Kenneth R, “Presidential address: The cost of active investing,” *The Journal of Finance*, 2008, 63 (4), 1537–1573.

Froot, Kenneth A and Tarun Ramadorai, “Institutional portfolio flows and international investments,” *Review of Financial Studies*, 2008, 21 (2), 937–971.

Greene, Jason T and Charles W Hodges, “The dilution impact of daily fund flows on open-end mutual funds,” *Journal of Financial Economics*, 2002, 65 (1), 131–158.

Griffin, John M, Federico Nardari, and Rene M Stulz, “Are daily cross-border equity flows pushed or pulled?,” *Review of Economics and Statistics*, 2004, 86 (3), 641–657.

Grinblatt, Mark and Matti Keloharju, “The investment behavior and performance of various investor types: a study of Finland’s unique data set,” *Journal of financial economics*, 2000, 55 (1), 43–67.

_ , Sheridan Titman, and Russ Wermers, “Momentum investment strategies, portfolio performance, and herding: A study of mutual fund behavior,” *The American economic review*, 1995, pp. 1088–1105.

Hau, Harald, “Location matters: An examination of trading profits,” *The Journal of Finance*, 2001, 56 (5), 1959–1983.

IMF, “Coordinated Portfolio Investment Survey,” http://cpis.imf.org, 2016.
Karolyi, G Andrew and René M Stulz, “Are financial assets priced locally or globally?,” *Handbook of the Economics of Finance*, 2003, 1, 975–1020.

Kyle, Albert S, “Continuous auctions and insider trading,” *Econometrica: Journal of the Econometric Society*, 1985, pp. 1315–1335.

_ and Anna A Obizhaeva, “Market microstructure invariance: Empirical hypotheses,” *Econometrica*, 2016, 84 (4), 1345–1404.

Lakonishok, Josef, Andrei Shleifer, and Robert W Vishny, “The impact of institutional trading on stock prices,” *Journal of financial economics*, 1992, 32 (1), 23–43.

Leuz, Christian, Karl V Lins, and Francis E Warnock, “Do foreigners invest less in poorly governed firms?,” *Review of Financial Studies*, 2010, 23 (3), 3245–3285.

Lewis, Karen K, “Trying to explain home bias in equities and consumption,” *Journal of economic literature*, 1999, 37 (2), 571–608.

Pástor, L’uboš and Robert F Stambaugh, “Mutual fund performance and seemingly unrelated assets,” *Journal of Financial Economics*, 2002, 63 (3), 315–349.

Pedraza, Alvaro, “Strategic interactions and portfolio choice in money management: Theory and evidence,” *Journal of Money, Credit and Banking*, 2015, 47 (8), 1531–1569.

Petersen, Mitchell A, “Estimating standard errors in finance panel data sets: Comparing approaches,” *Review of financial studies*, 2009, 22 (1), 435–480.

Portes, Richard and Helene Rey, “The determinants of cross-border equity flows,” *Journal of international Economics*, 2005, 65 (2), 269–296.

Seasholes, Mark S., “Re-examining information asymmetries in emerging stock markets,” Technical Report 2004.

Seasholes, Mark S and Ning Zhu, “Individual investors and local bias,” *The Journal of Finance*, 2010, 65 (5), 1987–2010.

Sias, Richard W, “Institutional herding,” *Review of financial studies*, 2004, 17 (1), 165–206.

Wermers, Russ, “Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses,” *The Journal of Finance*, 2000, 55 (4), 1655–1703.
## Appendix: Tables

### Table 1

**Traded Value and Number of Investors**

Panel A presents the share of total traded value and number of investors by each investor type in the database. Share of traded value is calculated relative to the total amount traded in the period. Number of investors which made at least one transaction during the period. Panel B displays distribution statistics of the number of trades by investor type.

| Investor Type          | % of Total Value | Number of Investors |
|------------------------|------------------|---------------------|
|                        | 2006-2010        | 2011-2016          | 2006-2010 | 2011-2016 |
| Domestic Individuals   | 46               | 27                 | 265,395   | 340,644   |
| Domestic Institutions  | 50               | 54                 | 6,823     | 10,339    |
| Corporations           | 16               | 13                 | 6,270     | 9,327     |
| Pension Funds          | 13               | 12                 | 32        | 50        |
| Mutual Funds           | 6                | 6                  | 268       | 421       |
| Brokerage Firms        | 14               | 21                 | 51        | 50        |
| Others                 | 2                | 2                  | 202       | 491       |
| Foreign                | 4                | 19                 | 1,440     | 2,830     |

### Panel B. Distribution of number of trades by investor type

| Investor Type          | Average | p5  | p25 | p50 | p75 | p95 | p99 | Max   |
|------------------------|---------|-----|-----|-----|-----|-----|-----|-------|
| Domestic Individuals   | 14      | 1   | 1   | 1   | 3   | 37  | 187 | 57,913|
| Domestic Institutions  | 317     | 1   | 2   | 3   | 8   | 536 | 421,236 | 421,236|
| Corporations           | 110     | 1   | 2   | 7   | 39  | 405 | 1,843 | 39,976|
| Pension Funds          | 8,320   | 8   | 313 | 1,839 | 8,986 | 44,119 | 51,056 | 51,056|
| Mutual Funds           | 1,048   | 1   | 3   | 15  | 216 | 4,233 | 62,654 | 15,256|
| Brokerage Firms        | 24,965  | 2   | 32  | 345 | 7,936 | 135,067 | 421,236 | 421,236|
| Others                 | 161     | 1   | 1   | 5   | 31  | 383 | 2,786 | 23,209|
| Foreign                | 316     | 1   | 2   | 11  | 81  | 1,090 | 4,922 | 92,774|
Table 2
Descriptive statistics for the Colombian Stock Exchange

The table displays yearly market stock returns. For Colombia, returns are calculated using the COLCAP, a value weighted index. The MSCI Latin America index captures large cap and mid cap firms across five countries: Brazil, Chile, Colombia, Mexico, and Peru. On December 2015, the country weight of Colombia in the index was 3.15%. Market capitalization (market cap) is the end-of-year total stock market value. Foreign flows and number of stocks are from the CSE dataset.

| Year | MSCI Latin America | Colombian Stock Market | Market Cap ($ billion cop) | Foreign Flows ($ billion cop) | Number of stocks |
|------|--------------------|------------------------|-----------------------------|-------------------------------|-----------------|
| 2006 | 43.2%              | 16.0%                  | 11,161                      | 642                           | 68              |
| 2007 | 50.4%              | -4.3%                  | 10,694                      | 275                           | 67              |
| 2008 | -51.4%             | -34.7%                 | 7,561                       | 631                           | 66              |
| 2009 | 103.8%             | 42.8%                  | 11,602                      | 943                           | 62              |
| 2010 | 14.7%              | 28.9%                  | 15,497                      | 122                           | 63              |
| 2011 | -19.4%             | -20.2%                 | 12,666                      | -13                           | 71              |
| 2012 | 8.7%               | 15.0%                  | 14,716                      | -44                           | 72              |
| 2013 | -13.4%             | -11.9%                 | 13,071                      | 479                           | 70              |
| 2014 | -12.3%             | -11.6%                 | 11,635                      | -370                          | 66              |
| 2015 | -31.0%             | -30.8%                 | 8,547                       | -1390                         | 65              |

Table 3
Passive investors

This table reports the share of assets under management and proportion of passive investors by investor type. Passive investors/funds are defined as those with an Active Share measure below 60 percent. Sample includes investors with at least 100 trades.

| Investor Type         | % assets managed by passive | % number of passive |
|-----------------------|-----------------------------|---------------------|
|                       | 2006-2010 | 2011-2016 | 2006-2010 | 2011-2016 |
| Domestic Individuals  | 35.1    | 21.9     | 25.8     | 12.2      |
| Domestic Institutions | 53.5    | 71.7     | 32.3     | 26.2      |
| Corporations          | 13.7    | 15.2     | 27.9     | 20.5      |
| Pension Funds         | 97.9    | 99.0     | 81.9     | 89.5      |
| Mutual Funds          | 92.7    | 80.7     | 70.3     | 49.7      |
| Brokerage Firms       | 45.7    | 74.0     | 31.2     | 40.2      |
| Others                | 15.8    | 28.3     | 31.4     | 30.1      |
| Foreign               | 29.4    | 64.8     | 29.4     | 37.8      |
Table 4
Average proportion (%) of intra-day trading volume for each type of investor

This table reports the average proportions (%) of intra-day traded values for each of three classes of investors and classified by level of Active Share. Passive (active) investors is defined as those with Active Share below (above) 60%. The proportions are relative to the total trading value for the interval (Panel A) and relative to the total traded value of the day by each group (Panel B). The sample in Panels A and B include the period from February 9, 2012, to January 30, 2016, when the Colombian Stock Exchange synchronized its trading session with the New York Stock Exchange.

| Trading intervals | Domestic Individuals | Domestic Institutions | Foreign | All |
|-------------------|----------------------|-----------------------|---------|-----|
|                   | Passive              | Active                | Passive | Active | Passive | Active |  |
| 9:30-10:30        | 6.3                  | 30.0                  | 29.9    | 20.9   | 5.3     | 7.5    | 100.0 |
| 10:30-11:30       | 6.0                  | 26.1                  | 32.8    | 19.5   | 6.9     | 8.8    | 100.0 |
| 11:30-12:30       | 5.8                  | 24.0                  | 34.0    | 19.5   | 7.7     | 8.9    | 100.0 |
| 12:30-13:30       | 5.6                  | 23.7                  | 33.6    | 19.4   | 8.4     | 9.2    | 100.0 |
| 13:30-14:30       | 4.9                  | 22.9                  | 31.4    | 19.6   | 10.3    | 10.8   | 100.0 |
| 14:30-15:30       | 5.5                  | 23.6                  | 29.8    | 18.6   | 12.0    | 10.6   | 100.0 |
| 15:30-15:55       | 6.0                  | 24.8                  | 30.2    | 19.0   | 10.7    | 9.2    | 100.0 |
| Closing batch     | 5.4                  | 20.9                  | 23.2    | 10.7   | 30.9    | 9.0    | 100.0 |

Panel B. Relative to the traded value of the day by investor group

| 9:30-10:30        | 21.6                 | 22.5                 | 17.8    | 21.5   | 9.7     | 15.3   | 18.2 |
| 10:30-11:30       | 17.2                 | 17.0                 | 18.6    | 16.9   | 10.5    | 17.6   | 16.9 |
| 11:30-12:30       | 14.8                 | 14.5                 | 17.9    | 15.7   | 9.6     | 15.9   | 15.6 |
| 12:30-13:30       | 11.3                 | 11.4                 | 13.8    | 12.6   | 8.9     | 12.0   | 12.3 |
| 13:30-14:30       | 6.7                  | 7.1                  | 7.8     | 8.1    | 6.2     | 9.0    | 7.6  |
| 14:30-15:30       | 9.1                  | 9.0                  | 8.1     | 9.3    | 8.6     | 9.8    | 8.8  |
| 15:30-15:55       | 7.9                  | 7.5                  | 7.1     | 7.5    | 6.7     | 7.4    | 7.3  |
| Closing batch     | 11.4                 | 11.0                 | 9.0     | 8.4    | 39.8    | 13.0   | 13.3 |

Panel C. Foreign passive funds traded value in the closing batch

| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|
| Relative to interval | 7.7  | 12.8 | 22.1 | 27.7 | 34.5 | 41.3 | 39.6 |
| Relative to day       | 28.2 | 32.5 | 36.3 | 34.9 | 43.0 | 39.3 | 41.2 |
Table 5  
Descriptive statistics by investor type

This table reports mean and median values for the variables by each investor group. Assets are in billion pesos. Number of stocks denotes the different number of stocks held by each investor/fund by month. Stocks traded are the different number of stocks traded by each investor/fund during a month. Daily net flows are normalized by the value of the investor’s portfolio at the beginning of the month.

| Investor Type       | Active Share | Assets | Turnover | No. stocks | Stocks traded | Net flows |
|---------------------|--------------|--------|----------|------------|---------------|-----------|
| Panel A. Mean values|              |        |          |            |               |           |
| Domestic Individuals| 76.2         | 0.9    | 2.1      | 10.4       | 2.1           | -0.09     |
| Domestic Institutions| 71.3        | 22.3   | 1.3      | 12.1       | 2.9           | -0.06     |
| Corporations       | 73.6         | 7.4    | 1.3      | 10.9       | 2.4           | -0.06     |
| Pension Funds      | 44.1         | 480.6  | 0.5      | 24.2       | 6.5           | 0.16      |
| Mutual Funds       | 57.8         | 12.3   | 1.7      | 16.0       | 5.1           | -0.04     |
| Brokerage Firms    | 68.8         | 69.1   | 2.7      | 22.1       | 6.9           | -0.08     |
| Others             | 70.2         | 25.1   | 1.1      | 13.4       | 2.8           | -0.06     |
| Foreign            | 68.7         | 20.7   | 0.9      | 9.3        | 3.2           | 0.14      |
| Total              | 75.2         | 4.9    | 1.9      | 10.6       | 2.2           | -0.07     |
| Panel B. Median values |            |        |          |            |               |           |
| Domestic Individuals| 77.8         | 0.1    | 0.6      | 10.0       | 2.0           | -0.10     |
| Domestic Institutions| 72.5        | 0.9    | 0.3      | 11.0       | 2.0           | -0.08     |
| Corporations       | 74.7         | 0.7    | 0.3      | 10.0       | 2.0           | -0.08     |
| Pension Funds      | 41.0         | 81.5   | 0.3      | 25.0       | 5.0           | 0.02      |
| Mutual Funds       | 54.9         | 2.1    | 0.6      | 17.0       | 3.0           | -0.12     |
| Brokerage Firms    | 70.5         | 5.3    | 0.8      | 23.8       | 4.0           | -0.03     |
| Others             | 71.4         | 2.9    | 0.2      | 14.0       | 2.0           | -0.09     |
| Foreign            | 72.9         | 2.6    | 0.2      | 9.0        | 2.0           | -0.02     |
| Total              | 77.0         | 0.2    | 0.5      | 10.0       | 2.0           | -0.09     |
This table reports mean values for the variables by each investor and grouped by four intervals of Active Share. The intervals are defined based on the 25th, 50th, and 75th percentile of Active Share of foreign investors. Number of stocks denotes the different number of stocks held by each investor/fund by month. Stocks traded are the different number of stocks traded by each investor/fund during a month. Monthly net flows are normalized by the value of the investor’s portfolio in the previous month. Percentage of investors in groups is the proportion of each investor type in the interval relative to the total number of investors in each type.

| Active Share Range | Group 1 [0 - 52.4] | Group 2 (52.4 - 76.6] | Group 3 (76.6 - 91.9] | Group 4 (91.9 - 100.0] |
|--------------------|---------------------|-----------------------|-----------------------|-----------------------|
| Foreign            |                     |                       |                       |                       |
| Assets ($ billion cop) | 44.8                | 11.8                  | 7.4                   | 16.0                  |
| Fund turnover ratio     | 0.4                 | 0.9                   | 1.3                   | 1.2                   |
| Number of Stocks      | 15.0                | 9.8                   | 6.7                   | 4.2                   |
| Stocks traded         | 5.9                 | 3.1                   | 1.9                   | 1.5                   |
| Net flows             | 0.3                 | 0.1                   | 0.0                   | 0.0                   |
| % of investors in the group | 25.1              | 24.9                  | 25.1                  | 24.9                  |
| % of total number of trades | 48.1              | 18.2                  | 21.2                  | 12.4                  |
| Domestic Institutions |                     |                       |                       |                       |
| Assets ($ billion cop) | 97.8                | 7.6                   | 16.2                  | 12.6                  |
| Fund turnover ratio     | 1.1                 | 1.2                   | 1.6                   | 1.4                   |
| Number of Stocks      | 20.0                | 13.3                  | 9.1                   | 6.0                   |
| Stocks traded         | 5.6                 | 2.9                   | 2.1                   | 1.7                   |
| Net flows             | 0.0                 | 0.0                   | -0.1                  | -0.1                  |
| % of investors in the group | 11.9              | 39.3                  | 29.2                  | 19.6                  |
| % of total number of trades | 37.2              | 40.7                  | 16.3                  | 5.8                   |
| Domestic Individuals  |                     |                       |                       |                       |
| Assets ($ billion cop) | 1.8                 | 1.0                   | 1.0                   | 0.3                   |
| Fund turnover ratio     | 0.7                 | 1.4                   | 2.6                   | 3.5                   |
| Number of Stocks      | 16.1                | 11.6                  | 9.5                   | 8.3                   |
| Stocks traded         | 3.1                 | 2.1                   | 1.9                   | 1.9                   |
| Net flows             | 0.0                 | -0.1                  | -0.1                  | -0.1                  |
| % of investors in the group | 3.7               | 37.8                  | 35.8                  | 22.7                  |
| % of total number of trades | 8.2               | 41.8                  | 33.3                  | 16.8                  |
Table 7

Value-Weighted-Average-Price (VWAP) by investor type, by Active Share, and for different time intervals

| Panel A. VWAP by investor type | Individuals (1) | Corporations (2) | Pension Funds (3) | Mutual Funds (4) | Brokerage Firms (5) | All Institutions (6) | Foreign (7) |
|-------------------------------|-----------------|------------------|-------------------|------------------|---------------------|----------------------|------------|
| **Buy: All trades**           |                 |                  |                   |                  |                     |                      |            |
| Average of mean VWAP          | 99.92           | 99.95            | 99.90             | 99.98            | 99.99               | 99.96                | 100.04     |
| t-statistics: $H_0 = 100$    | (39.96)         | (14.82)          | (12.38)           | (3.75)           | (2.81)              | (13.03)              | (9.22)     |
| Difference: Foreign - (i)    | 0.11            | 0.08             | 0.14              | 0.06             | 0.05                | 0.08                 |            |
| t-statistics: $H_0 = 0$      | (13.54)         | (13.82)          | (17.27)           | (8.26)           | (7.94)              | (10.27)              |            |
| **Sell: All trades**          |                 |                  |                   |                  |                     |                      |            |
| Average of mean VWAP          | 100.06          | 100.05           | 100.08            | 100.06           | 100.04              | 100.05               | 99.98      |
| t-statistics: $H_0 = 100$    | (50.04)         | (8.74)           | (13.50)           | (12.49)          | (8.40)              | (15.06)              | (3.97)     |
| Difference: Foreign - (i)    | -0.08           | -0.07            | -0.09             | -0.07            | -0.06               | -0.07                |            |
| t-statistics: $H_0 = 0$      | (13.24)         | (5.86)           | (12.93)           | (11.91)          | (8.89)              | (7.69)               |            |

| Panel B. VWAP of foreign investors sorted by level of Active Share |
|---------------------------------------------------------------|
|                  Q1          | Q2          | Q3          | Q4          | Q1-Q4        |
| Buy               |              |             |             |              |
| Average of mean VWAP | 100.09      | 100.02      | 99.99       | 100.01       | 0.09          |
| t-statistics       | (20.78)      | (3.05)      | (0.57)      | (0.45)       | (7.869)       |
| Sell               |              |             |             |              |
| Average of mean VWAP | 99.94       | 99.99       | 100.00      | 100.01       | -0.06         |
| t-statistics       | (10.13)      | (0.97)      | (0.37)      | (0.64)       | (6.22)        |

| Panel C. VWAP of passive and active foreign investors by trading interval |
|---------------------------------------------------------------------|
| Passive | Active |                  |
|---------|--------|------------------|
| (1) Continuous trading     | (2) Closing batch | (2) - (1) | (3) Continuous trading | (4) Closing batch | (4) - (3) |
| Buy           |                |                  |
| Average of mean VWAP | 100.02      | 100.16       | 0.15        | 99.99        | 100.11        | 0.12          |
| t-statistics  | (2.998)      | (21.782)     | (15.503)    | (2.334)      | (9.772)       | (10.966)      |
| Sell          |                |                  |
| Average of mean VWAP | 99.97       | 99.91        | -0.06       | 100.00       | 99.95         | -0.06         |
| t-statistics  | (3.991)      | (9.018)      | (5.053)     | (0.541)      | (4.076)       | (4.479)       |
|                  | Active Share | Diff. Stocks (buys) | Diff. Stocks (sells) | Trading Int. (buys) | Trading Int. (sells) | Fund Turnover | Net Flows |
|------------------|--------------|---------------------|---------------------|--------------------|---------------------|---------------|-----------|
| Active Share     | 1.00         | -0.40               | -0.44               | -0.48              | -0.47               | 0.32          | 0.05      |
| Different Stocks (buys) | 1.00         | 0.54                | 0.38                | 0.17               | -0.30               | -0.30         | 0.07      |
| Different Stocks (sells) | 1.00         | 0.25                | 0.35                |                    | -0.29               | -0.29         | 0.03      |
| Trading Interval (buys) | 1.00         | 1.00                | 0.43                |                    | -0.30               | -0.30         | -0.08     |
| Trading Interval (sells) | 1.00         | 1.00                | 1.00                |                    | -0.30               | -0.30         | -0.12     |
| Fund Turnover    | 1.00         | 1.00                | 1.00                |                    |                     |               | -0.09     |
| Net Flows        | 1.00         |                     |                     |                    |                     |               | 1.00      |
Table 9
VWAP spreads between foreign and domestic institutions: Investor style correlates

This table reports the estimates of daily Value-Weighted-Average-Price (VWAP) of foreign investors relative to domestic institutions. The dependent variable in columns (1)-(4) is the VWAP for purchases. VWAP for sells is reported in columns (5)-(8). Each model include stock fixed-effects and t-statistics, presented in parenthesis, are calculated from standard errors clustered at the fund level. Note: ***/**/*/ indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

| Variables | Buys | Sells |
|-----------|------|-------|
|           | (1)  | (2)   | (3)  | (4)  | (5)  | (6)  | (7)  | (8)  |
| **Firm-stock variables** |      |       |      |      |      |      |      |      |
| lsize     | 0.052*** | 0.038** | 0.031* | 0.016 | 0.001 | 0.014 | 0.029** | 0.026 |
|           | (2.996) | (2.291) | (1.813) | (0.787) | (0.595) | (1.009) | (2.102) | (1.498) |
| BMratio   | 0.019 | 0.005 | 0.004 | 0.015 | -0.013 | 0.003 | 0.002 | -0.026 |
|           | (1.072) | (0.253) | (0.211) | (0.682) | (-0.722) | (0.166) | (0.079) | (-1.122) |
| ctc5      | -0.387*** | -0.380*** | -0.419*** | -0.482*** | -0.084 | -0.118 | -0.132 | -0.162* |
|           | (-4.528) | (-4.390) | (-4.619) | (-4.924) | (-1.049) | (-1.469) | (-1.568) | (-1.914) |
| cto       | 0.323 | 0.372 | 0.404 | 0.658* | 0.685* | 0.688* | 0.837* | 0.381 |
|           | (0.861) | (0.993) | (1.026) | (1.716) | (1.655) | (1.654) | (1.863) | (0.874) |
| otc       | 8.235*** | 8.273*** | 8.675*** | 9.493*** | 8.375*** | 8.368*** | 8.820*** | 9.454*** |
|           | (8.257) | (8.271) | (8.223) | (8.390) | (7.301) | (7.268) | (7.278) | (7.250) |
| avgps     | -8.298 | -8.193 | -7.710 | 3.779 | -18.254*** | -16.429*** | -15.701*** | -19.274*** |
|           | (-0.725) | (-0.734) | (-0.698) | (1.157) | (-3.634) | (-3.817) | (-3.686) | (-6.213) |
| **Market variables** |      |       |      |      |      |      |      |      |
| colret    | -0.442 | -0.528 | -0.575 | -0.217 | -1.392** | -1.555*** | -1.686*** | -1.447** |
|           | (-1.334) | (-1.551) | (-1.614) | (-0.548) | (-2.453) | (-2.861) | (-2.930) | (-2.220) |
| mkt25     | -0.031*** | -0.034*** | -0.034*** | -0.032*** | 0.030*** | 0.029*** | 0.029*** | 0.031*** |
|           | (-5.476) | (-5.891) | (-5.798) | (-5.721) | (4.376) | (4.387) | (4.277) | (4.497) |
| **Investor variables** |      |       |      |      |      |      |      |      |
| Active Share | -0.185*** | -0.116*** | -0.108*** | -0.095*** | 0.112*** | 0.112*** | 0.112*** | 0.112*** |
|           | (-6.727) | (-3.558) | (-3.618) | (-3.871) | (4.796) | (2.300) | (2.205) | (5.430) |
| Different Stocks | 0.006*** | 0.006*** | 0.006*** | -0.006*** | -0.005*** | -0.006*** | -0.005*** | -0.005*** |
|           | (4.726) | (4.877) | (4.877) | (-4.781) | (-4.649) | (-4.649) | (-4.649) | (-4.649) |
| Turnover  | -0.010*** | -0.010** | -0.010** | -0.012** | 0.007** | 0.009** | 0.009** | 0.009** |
|           | (-3.060) | (-2.557) | (-2.557) | (-2.557) | (2.505) | (2.213) | (2.213) | (2.213) |
| Net Flows | 0.015*** | 0.018*** | 0.018*** | 0.018*** | -0.004** | -0.004** | -0.004** | -0.004** |
|           | (-2.624) | (-2.597) | (-2.597) | (-2.597) | (2.175) | (1.978) | (1.978) | (1.978) |
| Trading Interval | 0.099*** | 0.099*** | 0.099*** | 0.099*** | 0.099*** | 0.099*** | 0.099*** | 0.099*** |
|           | (10.907) | (10.907) | (10.907) | (10.907) | (10.907) | (10.907) | (10.907) | (10.907) |
| Constant  | -1.378** | -1.014** | -0.786 | -0.359 | -0.190 | -0.519 | -0.969** | -0.967* |
|           | (-2.560) | (-1.985) | (-1.507) | (-0.570) | (-0.434) | (-1.237) | (-2.312) | (-1.826) |

Observations 104,321 104,321 101,178 95,873 71,471 71,471 71,471 64,906
R-squared 0.051 0.053 0.057 0.067 0.052 0.054 0.058 0.064
FE stock stock stock stock stock stock stock stock
Cluster Investor Investor Investor Investor Investor Investor Investor Investor
This table reports the estimates of daily Value-Weighted-Average-Price (VWAP) of foreign investors relative to domestic institutions. The dependent variable in columns (1)-(4) is the VWAP for purchases. VWAP for sells is reported in columns (5)-(8). Each model include time and stock fixed-effects and t-statistics, presented in parenthesis, are calculated from standard errors clustered at the fund level. Note: ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

| Variables          | Buys          | Sells         |
|--------------------|---------------|---------------|
|                    | (1)           | (2)           | (3)           | (4)           | (5)           | (6)           | (7)           | (8)           |
| Firm-stock variables |               |               |               |               |               |               |               |               |
| lsize              | 0.010         | 0.016         | 0.014         | 0.010         | 0.050***      | 0.045***      | 0.045***      | 0.044**       |
| (0.459)            | (0.718)       | (0.657)       | (0.466)       | (3.045)       | (2.834)       | (2.810)       | (2.477)       |
| BMratio            | -0.020        | -0.020        | -0.016        | -0.013        | 0.044**       | 0.043**       | 0.038*        | 0.024         |
| (-1.019)           | (-0.980)      | (-0.757)      | (-0.661)      | (2.401)       | (2.367)       | (1.913)       | (1.111)       |
| ctc5               | -0.516***     | -0.494***     | -0.543***     | -0.551***     | -0.384***     | -0.380***     | -0.383***     | -0.388***     |
| (-4.915)           | (-4.872)      | (-5.123)      | (-5.025)      | (4.342)       | (4.297)       | (4.129)       | (4.022)       |
| cto                | 1.312***      | 1.352***      | 1.441***      | 1.460***      | 1.354***      | 1.347***      | 1.541***      | 1.324**       |
| (2.940)            | (3.021)       | (3.071)       | (3.121)       | (2.678)       | (2.663)       | (2.834)       | (2.454)       |
| otc                | 8.127***      | 8.159***      | 8.525***      | 8.487***      | 8.266***      | 8.275***      | 8.727***      | 9.107***      |
| (8.304)            | (8.307)       | (8.189)       | (8.165)       | (7.182)       | (7.169)       | (7.136)       | (7.098)       |
| avgps              | -10.197       | -10.363       | -10.153       | -9.536        | -19.286***    | -18.294***    | -18.037***    | -20.192***    |
| (-1.151)           | (-1.180)      | (-1.164)      | (-1.059)      | (-4.299)      | (-4.155)      | (-4.124)      | (-4.124)      |
| Investor variables |               |               |               |               |               |               |               |               |
| ActiveShare        | -0.173***     | -0.105***     | -0.093***     | -0.121***     | 0.097***      | 0.055***      | 0.043**       | 0.108***      |
| (-7.509)           | (-3.647)      | (-3.556)      | (-5.892)      | (4.730)       | (2.666)       | (2.029)       | (5.260)       |
| Different Stocks   | 0.006***      | 0.006***      | 0.006***      | 0.006***      | -0.004***     | -0.004***     | -0.004***     | -0.004***     |
| (4.979)            | (3.543)       | (3.543)       | (3.543)       | (3.543)       | (-3.698)      | (-3.698)      | (-3.698)      |
| Turnover           | -0.009***     | -0.009***     | -0.009***     | -0.009***     | 0.007**       | 0.010**       | 0.010**       | 0.010**       |
| (-2.974)           | (-2.950)      | (-2.950)      | (-2.950)      | (2.347)       | (2.463)       | (2.463)       | (2.463)       |
| Net Flows          | 0.013**       | 0.014*        | 0.014*        | -0.003*       | -0.001*       | 0.010**       | 0.010**       | 0.010**       |
| (-2.282)           | (-1.962)      | (-1.962)      | (-1.962)      | (-1.819)      | (1.772)       | (1.772)       | (1.772)       |
| Trading Interval   | 0.079***      | 0.079***      | 0.079***      | 0.079***      | -0.030***     | -0.030***     | -0.030***     | -0.030***     |
| (8.659)            | (8.659)       | (8.659)       | (8.659)       | (8.659)       | (2.793)       | (2.793)       | (2.793)       |
| Constant           | -0.100        | -0.331        | -0.299        | -0.229        | -1.658***     | -1.507***     | -1.485***     | -1.487***     |
| (-0.153)           | (-0.508)      | (-0.464)      | (-0.359)      | (-3.435)      | (-3.226)      | (-3.186)      | (-3.186)      |
| Observations       | 104,321       | 104,321       | 101,178       | 101,178       | 71,471        | 71,471        | 69,034        | 64,906        |
| R-squared          | 0.126         | 0.127         | 0.133         | 0.133         | 0.137         | 0.138         | 0.144         | 0.137         |
| FE                 | day           | day           | day           | day           | day           | day           | day           | day           |
| stock              | stock         | stock         | stock         | stock         | stock         | stock         | stock         | stock         |
| Cluster            | Investor      | Investor      | Investor      | Investor      | Investor      | Investor      | Investor      | Investor      |
Table 11
Performance benchmarks

This table reports the loadings of the portfolios sorted by Active Share an investor type on various factors. Panel A reports loadings for domestic institutional investors and Panel B for foreign investors. MARKET is the return of the Colombian market index in excess of the one-month Colombian T-bill rate. SMB is the return on a portfolio of small stocks minus large stocks. HML is the return on a portfolio long on high book-to-market stocks and short low book-to-market stocks. WML is the return on a portfolio long on stocks that are past-12-month winners and short on those that are past-12-month losers.

| Active Share | Market-adj (average) | CAPM alpha | MARKET alpha | Carhart 4-Factor MARKET | SMB | HML | WML |
|--------------|----------------------|-------------|--------------|-------------------------|-----|-----|-----|
| Group 1 (low) | 0.23%                | 0.23%       | 0.95         | 0.21%                   | 0.92| -0.07| -0.10| 0.02 |
| Group 2      | 0.30%                | 0.40%       | 0.92         | 0.38%                   | 0.88| -0.13| -0.05| -0.01|
| Group 3      | 0.33%                | 0.69%       | 0.85         | 0.61%                   | 0.76| -0.34| 0.03 | 0.01 |
| Group 4 (high)| 0.64%                | 0.80%       | 0.66         | 0.69%                   | 0.52| -0.50| 0.00 | 0.00 |

Panel A. Foreign Investors

| Group 1 (low) | 0.38%                | 0.50%       | 0.95         | 0.45%                   | 0.90| -0.18| 0.01 | 0.02 |
| Group 2      | 0.33%                | 0.32%       | 0.88         | 0.26%                   | 0.82| -0.20| -0.05| 0.05 |
| Group 3      | 0.31%                | 0.90%       | 0.87         | 0.85%                   | 0.79| -0.26| 0.02 | -0.04|
| Group 4 (high)| 0.34%                | 0.53%       | 0.45         | 0.49%                   | 0.46| 0.03 | -0.07| 0.17 |
Table 12
Regression of fund performance on lagged Active Share

This table reports the estimates of monthly fund returns regressed on fund characteristics lagged one month. Monthly returns are adjusted using the market model, the CAPM, and the 4-factor model. The dependent variable is \( \text{ADJRET} \). Foreign is a dummy variable equal to one for foreign investors. Group \( i \) is a dummy variable equal to one if the fund is in Group \( i \) of Active Share in \( t-1 \). All specifications include year-fixed effects. The t-statistics, presented in parenthesis, are calculated from standard errors clustered at the fund level. Note: ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

|                          | Market-adj | CAPM  | 4-Factor |
|--------------------------|------------|-------|----------|
| **Panel A. Regression Results** |            |       |          |
| Foreign                  | 0.347***   | 0.338*** | 0.295*** |
|                          | (3.784)    | (3.805) | (3.381)  |
| Group 1                  | 0.008      | 0.149** | 0.131**  |
|                          | (0.130)    | (2.546) | (2.233)  |
| Group 2                  | -0.017     | 0.127** | 0.110*   |
|                          | (-0.295)   | (2.227) | (1.935)  |
| Group 3                  | -0.051     | 0.093   | 0.099    |
|                          | (-0.819)   | (1.519) | (1.606)  |
| Foreign x Group 1        | -0.425***  | -0.347*** | -0.273*** |
|                          | (-4.448)   | (-3.728) | (-2.985) |
| Foreign x Group 2        | -0.323***  | -0.282*** | -0.208**  |
|                          | (-3.188)   | (-2.848) | (-2.141) |
| Foreign x Group 3        | -0.236**   | -0.213*  | -0.215*  |
|                          | (-2.052)   | (-1.891) | (-1.932) |
| Fund Size                | 0.019***   | 0.017**  | 0.019***  |
|                          | (2.870)    | (2.677)  | (3.056)  |
| Fund Turnover            | 0.019**    | 0.017**  | 0.018**  |
|                          | (2.499)    | (2.264)  | (2.348)  |
| Net Flows                | -0.033*    | -0.037** | -0.037**  |
|                          | (-1.776)   | (-1.981) | (-1.992) |
| Constant                 | -0.082     | -0.230*  | -0.329**  |
|                          | (-0.596)   | (-1.700) | (-2.432) |
| No. of Observations      | 159,357    | 159,357  | 159,357  |

| **Panel B. Differences in performance by Active Share and type** |          |       |          |
| Foreign Group 4 - Foreign Group 1 | 0.42***   | 0.20*** | 0.14**   |
|                          | (5.44)    | (2.65)  | (2.02)   |
| Domestic Group 4 - Domestic Group 1 | 0.02      | 0.01    | 0.01     |
|                          | (0.44)    | (0.65)  | (0.96)   |
| Foreign Group 4 - Domestic Group 4 | 0.35***   | 0.34*** | 0.30***   |
|                          | (3.78)    | (3.80)  | (3.38)   |
| Foreign Group 1 - Domestic Group 1 | -0.14***  | -0.16*** | -0.10***  |
|                          | (5.60)    | (6.34)  | (4.13)   |
### Table 13
Correlated demands by investor style

The table presents estimated coefficients of the linear regression $Dratio_{i,d} = \alpha_i + \beta_i Dratio_{d}^{-i} + \varepsilon_{i,d}$ (model 1), where $Dratio_{i,d}$ is excess demand of fund $i$ on each day defined as $Dratio_{i,d} = \sum_{s=1}^{S} buys_{i,s,d} - sells_{i,s,d} \sum_{s=1}^{S} buys_{i,s,d} + sells_{i,s,d}$ and $Dratio_d^{-i}$ is the excess demand by all investors in the same group of active management. Coefficients are averaged across investor time series regressions for each group of Active Share. Models 2, 3, and 4 include lag market returns for the Colombian stock market and lag U.S. stock returns (calculated from the S&P500 index).

|                | (1) $Dratio^{-i}$ | (2) Lag Returns | (3) Lag U.S. returns | (4) $Dratio^{-i}$ | Lag Returns | Lag U.S. returns | Number of Funds | Number of Observations |
|----------------|-------------------|-----------------|---------------------|-------------------|-------------|------------------|-----------------|-----------------------|
| **Foreign Investors** |                   |                 |                     |                   |             |                  |                 |                       |
| Group 1        | 0.14***           | 0.13***         | 0.03**              | 0.13***           | 0.00        | 0.13***          | 0.04**          | -0.02                 | 190                   | 20,863                 |
|                | (7.87)            | (7.02)          | (2.17)              | (7.22)            | (0.03)      | (6.61)           | (2.05)          | (0.9)                 |                        |                       |
| Group 2        | 0.03*             | 0.03***         | 0.02                | 0.04**            | 0.03        | 0.05***          | 0.03            | 0.01                  | 185                   | 18,108                 |
|                | (1.9)             | (2.62)          | (1.24)              | (2.19)            | (1.17)      | (2.78)           | (1.52)          | (0.43)                |                        |                       |
| Group 3        | 0.04***           | 0.04***         | 0.04**              | 0.04***           | 0.01        | 0.04***          | 0.04***         | -0.01                 | 198                   | 15,105                 |
|                | (2.89)            | (2.7)           | (2.27)              | (2.77)            | -0.7        | (2.82)           | (2.2)           | (0.65)                |                        |                       |
| Group 4        | -0.01             | -0.01           | 0.00                | -0.01             | 0.03        | -0.01            | -0.02           | 0.03                  | 185                   | 11,768                 |
|                | (0.71)            | (0.56)          | (0.19)              | (0.82)            | (1.52)      | (0.81)           | (0.82)          | (1.58)                |                        |                       |
| **Domestic Investors** |               |                 |                     |                   |             |                  |                 |                       |
| Group 1        | 0.02**            | 0.02***         | -0.03***            | 0.02***           | -0.02**     | 0.02***          | -0.02**         | -0.01                 | 247                   | 107,748                |
|                | (2.46)            | (2.9)           | (2.86)              | (2.84)            | (2.47)      | (3.23)           | (2.2)           | (1.23)                |                        |                       |
| Group 2        | -0.03***          | -0.03***        | -0.04***            | -0.03***          | -0.02**     | -0.03***         | -0.04***        | -0.01                 | 813                   | 135,573                |
|                | (4.99)            | (5.04)          | (6.37)              | (5.05)            | (3.51)      | (5.34)           | (5.25)          | (1.51)                |                        |                       |
| Group 3        | 0.02**            | 0.01*           | -0.04***            | 0.01*             | -0.03***    | 0.01             | -0.04***        | -0.01                 | 591                   | 62,024                 |
|                | (2.55)            | (1.68)          | (5.24)              | (1.93)            | (3.48)      | (1.6)            | (3.81)          | (1.22)                |                        |                       |
| Group 4        | 0.00              | 0.00            | -0.03***            | 0.00              | -0.02      | 0.00             | -0.02**         | -0.01                 | 357                   | 29,780                 |
|                | (0.31)            | (0.25)          | (2.68)              | (0.5)             | (1.44)      | (0.38)           | (2.05)          | (1.15)                |                        |                       |
Table 14
Momentum trading

The $L0M$ is the contemporaneous correlation between trades and stock returns. The $L1M$ measure momentum investing based based on lag-daily stock returns.

| Sorted by Active Share | Group 1 | Group 2 | Group 3 | Group 4 | G1 - G4 |
|------------------------|---------|---------|---------|---------|---------|
| **Panel A. Lag-1 Momentum ($L1M$)** |         |         |         |         |         |
| Foreign Investors      |         |         |         |         |         |
| Average (3)            | 0.03    | 0.03    | 0.08    | 0.07    | -0.03   |
| (t-statistics: $H_0 = 0$) | (1.99) | (1.23) | (2.86) | (2.51) | (1.05) |
| Percentage positive    | 62.8    | 60.2    | 64.3    | 57.3    |         |
| Number of Funds        | 207     | 206     | 207     | 206     |         |
| Domestic Institutions  |         |         |         |         |         |
| Average (4)            | -0.05   | -0.17   | -0.20   | -0.12   | 0.07    |
| (t-statistics: $H_0 = 0$) | (3.25) | (12.32) | (8.69) | (4.42) | (1.98) |
| Percentage positive    | 38.9    | 32.3    | 31.8    | 39.8    |         |
| Number of Funds        | 247     | 818     | 600     | 394     |         |
| Average (3) - (4)      | 0.08    | 0.20    | 0.28    | 0.19    |         |
| (t-statistics: $H_0 = 0$) | (3.66) | (6.65) | (6.59) | (4.42) |         |
| **Panel B. Lag-0 Momentum ($L0M$)** |         |         |         |         |         |
| Foreign Investors      |         |         |         |         |         |
| Average (1)            | 0.18    | 0.03    | 0.02    | 0.03    | 0.15    |
| (t-statistics: $H_0 = 0$) | (7.01) | (0.97) | (0.59) | (0.89) | (3.81) |
| Percentage positive    | 77.8    | 56.3    | 65.7    | 58.3    |         |
| Number of Funds        | 207     | 206     | 207     | 206     |         |
| Domestic Institutions  |         |         |         |         |         |
| Average (2)            | -0.12   | -0.36   | -0.46   | -0.35   | 0.23    |
| (t-statistics: $H_0 = 0$) | (6.04) | (16.82) | (14.6) | (8.35) | (4.13) |
| Percentage positive    | 36.8    | 27.3    | 23.8    | 34      |         |
| Number of Funds        | 247     | 818     | 600     | 394     |         |
| Average (1) - (2)      | 0.30    | 0.40    | 0.48    | 0.37    |         |
| (t-statistics: $H_0 = 0$) | (9.37) | (8.54) | (8.24) | (6.08) |         |
Figure 1. Percentage of monthly traded value by investor type relative to the total traded value of the month.

Figure 2. Percentage of stock ownership by investor type. Foreign (solid line) and domestic individual (light solid) ownership in the left axis. Domestic institutions in the right axis (dashed line).
Figure 3. Proportion (%) of assets under management by passive investors in each type. Passive investors are defined as those with Active Share below 60%.

Figure 4. Proportion (%) of traded value in the interval relative to the trading value of the day. Investors are foreign, domestic pension funds and mutual funds with Active Share below 60% (passive).
## A Variable Definitions

| Variable | Definition | Source |
|----------|------------|--------|
| **Investor/Fund information** | | |
| Active Share<sub>i,t</sub> | As defined by Cremers and Petajisto (2009). | CSE |
| Trading Interval<sub>i,s,t</sub> | Proportion of trades in stock s executed in the closing batch. | CSE |
| Different Stocks<sub>i,s,t</sub> | Number of stocks traded during the day in the same direction of s. | CSE |
| Fund Turnover Ratio<sub>i,t</sub> | Minimum between yearly purchases and sells normalized by the average of the fund’s assets. | CSE |
| Net Flows<sub>i,t</sub> | Daily fund net flows normalized by assets managed in t-1. | CSE |
| **Stock-Firm Characteristics** | | |
| lsize<sub>s,t</sub> | Firm size computed as the log of total assets at the end of the quarter. | SFC, Datastream |
| B/M<sub>s,t</sub> | Book-to-market ratio, computed as the total net assets, divided by the total market value of equity at the end of the quarter. | SFC, Datastream |
| ctc5<sub>s,t</sub> | Close to close return of last five trading days. | Bloomberg |
| ot<sub>c,s,t</sub> | Open to close daily return. | Bloomberg |
| cto<sub>s,t</sub> | Overnight returns between t-1 and t. | Bloomberg |
| PS<sub>s,t</sub> | Price sensitivity, defined as ln(p<sub>h</sub>/p<sub<l</sub>)/Volume where p<sub>h</sub> and p<sub<l</sub> are the highest and lowest price in each trading day. | Datastream |
| **Market data** | | |
| mkt25<sub>t</sub> | Indicator variable equal to one if the daily volatility of the COLCAP is under the percentile 25 for the whole sample. | Bloomberg |
| colret<sub>t</sub> | Daily market returns. | Bloomberg |