

# DO FOREIGN INVESTORS UNDERPERFORM? AN EMPIRICAL DECOMPOSITION INTO STYLE AND FLOWS

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## Abstract

We study trading behavior and performance of foreign investors by management style. Using a comprehensive Colombian data with complete transaction records and unique investor identification, we find that aggregate underperformance of foreign investors is attributable to foreign-passive funds. These funds pay higher prices to increase the speed of their trades to accommodate daily flows proportionally to their benchmark index. Higher transaction costs are on days when they trade multiple stocks in the same direction and make large trades near market closing. The findings highlight the potential costs of index investing in developing countries or in securities with low trading activity.

**JEL Classification:** G12, G14, G23

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

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<sup>§</sup>We have benefited from the comments of Sushant Acharya, Pablo Cuba, Aart Kraay, Pete Kyle, Soledad Martinez, Claudia Ruiz, and Giorgio 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*. A previous version of this paper was circulated under the title “Do foreign investors underperform? An empirical decomposition into style and flows.” 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.<sup>1</sup> 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.<sup>2</sup> 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 largely 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. In particular, worst trades are on days when they 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 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 relative to domestic passive funds, foreign passive funds purchase and sell stocks at unfavorable prices even after controlling for several measures of daily trading intensity. Moreover, we find that the yearly returns of passive foreign funds are between 1.2 to 1.9 percentage points smaller than domestic funds with similar passive strategies. These findings sug-

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<sup>1</sup>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.

<sup>2</sup>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 magnitude to the findings of [Choe et al. \(2005\)](#) for the Republic of Korea between 1996 and 1998.

gest that index investing is not a sufficient condition to 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. This behavior is more pronounced for foreign passive funds and cannot be explained by momentum strategies (i.e, buying and selling stocks in the direction of lag returns). 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 and same-interval returns, which suggests that foreign passive funds are paying a price for accommodating their 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.

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 intra-day trading patterns by level of active management for foreign and domestic funds.

In our paper, instead of trying to identify informational advantages of local versus foreign

investors,<sup>3</sup> 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.

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 individuals seeking to invest in global markets might self-select into index funds with low fees. Correlated purchases or redemptions in international index funds might be the optimal response of uninformed individuals to news coming from these markets. Correlated flows in turn, forces managers to trade the underlying securities at worse prices in order to provide liquidity to their clients (Edelen, 1999; Greene and Hodges, 2002) while staying close to their benchmark index. Meanwhile, other foreign investors with more discretion over their flows appear to time their transactions to take advantage of the common order flow by passive funds. For example, foreign managers of active funds in our sample generate yearly returns that are 3.7 to 4.3 percentage points greater than active funds managed domestically. These results are consistent with an advantage for this group, perhaps because these managers are more skilled and benefit from their experience in several countries.

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

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<sup>3</sup>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.

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.<sup>4</sup>

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.<sup>5</sup> There are no individual or aggregate ownership limits on foreign investors, and they are allowed to either reinvest or transfer earnings such as dividends 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.

## 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.<sup>6</sup>

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 stock market accounting for just over half of the total value traded in both periods. Corporations,

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<sup>4</sup>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.

<sup>5</sup>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 (COLCAP) decreases more than 10% during a trading session, all transactions are suspended until the next trading day.

<sup>6</sup>Informal conversations with registered brokers suggest that most (and in several cases all) of their foreign clients are institutions.

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,<sup>7</sup> 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. Figure 1 plots the time series of the share of traded value by investor type. The figure highlights 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 among 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.<sup>8</sup>

We collect stock and market data from Bloomberg, Datastream and the *Superintendencia Financiera 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 and shares outstanding from Datastream and the SFC. The number of traded stocks fluctuated between 62 and 71 during our sample period.<sup>9</sup>

In Table 2, for every year in the sample, we report market rate of return, end-of-year market capitalization, total flows by foreign investors, and number of stocks. 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.

## 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

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<sup>7</sup>The corresponding numbers for domestic institutions were 6,834 and 10,344 respectively.

<sup>8</sup>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.

<sup>9</sup>In calculating these numbers, we treat ordinary and preferred shares issued by the same firm as different stocks.

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.<sup>10</sup>

### 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 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:

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

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 monthly 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

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<sup>10</sup>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.



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.<sup>11</sup> 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 2 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.<sup>12</sup>

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.<sup>13</sup> 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

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<sup>11</sup>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, we also sort foreign investors by quartile of Active Share to analyze performance by active management.

<sup>12</sup>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.

<sup>13</sup>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.

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 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 3).

## 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 day. 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 day.

## 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.

### 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:

$$VWAP_{i,s,d} = \frac{B_{i,s,d}}{A_{s,d}} \times 100 \quad (2)$$

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 while controlling for other investor/fund characteristics.<sup>14</sup> One limitation to the VWAP, however, is that by comparing trading among investors at daily frequency, 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 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

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<sup>14</sup>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.

and 20 bp with respect to domestic individuals.<sup>15</sup> 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 billion 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.<sup>16</sup> According to the table, foreign passive investors buy (sell) stocks above (below) the daily average price in both intervals. However, these investors trade at significantly worst prices during the closing batch—the difference is 15 bps for stock purchases and 6bps with for sells. In other words, passively-managed foreign funds pay more precisely when they trade more intensively. Actively-managed foreign funds also trade at unfavorable prices at the closing batch, while trading at *fair* prices during the continuous trading session—purchases are 1 bp below the daily average price and sells are indistinguishable from 100 during this time.

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 across investors or in the stocks that they trade. For example, whether greater transaction costs are concentrated in smaller and less liquid stocks, or among funds with larger AUM. We use linear regression analysis to further investigate the disadvantage of foreign funds. We restrict our analysis to domestic institutions and foreign investors and estimate the VWAP<sub>*i,s,d*</sub> for purchases and sells separately using the following

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<sup>15</sup>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.

<sup>16</sup>Consistent with the introduction of the closing batch auction, Panel C only includes trades after February 9, 2009.

model:

$$VWAP_{i,s,d} = \alpha_s + \mu_d + \beta \text{Foreign}_i + \phi \text{Passive}_{i,d} + \delta \text{Foreign}_i \times \text{Passive}_{i,d} + \gamma X_{i,s,d} + \nu Y_{s,d} + \varepsilon_{i,s,d} \quad (3)$$

$\text{Foreign}_i$  is a dummy variable equal to one for foreign investors and zero otherwise. We analyze the role of active management by introducing  $\text{Passive}_{i,d}$ , which is equal to one for funds with level of Active Share below 60 percent at the beginning of each month and zero otherwise.  $X_{i,s,d}$  contains fund-level information. In addition to controlling for fund size and turnover ratio, we are interested in analyzing whether fund managers are subject to higher transaction costs on days when they are trading more intensively or in trades executed later in the day. To be precise, we use the following variables to study timing, trading intensity, and speed of transactions:

- (1)  $\text{interval}_{i,s,d}$  = dummy variable equal to one for trades executed during the closing batch auction
- (2)  $\text{stocks}_{i,s,d}$  = log number of different stocks purchased (or sold) by investor  $i$  on the day in the same direction of stock  $s$
- (3)  $\text{trades}_{i,s,d}$  = log number of trades of investor  $i$  for a stock-day
- (4)  $\text{intensity}_{i,s,d}$  = buy (or sell) trade value of investor  $i$  for a stock-day / total trade value for the stock-day (%)

Equation (3) includes stock-firm controls,  $Y_{s,d}$ . We follow [Choe et al. \(2005\)](#) and control for firm size, book-to-market ratio, stock returns, and stock liquidity. 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 variables. In addition to controlling for stock fixed-effects ( $\alpha_s$ ), we correct for serial correlation parametrically by including time dummies ( $\mu_d$ ) as in [Petersen \(2009\)](#), and calculate standard errors clustered at the fund level.<sup>17</sup>

Columns (1) to (5) of Table 9 estimate the average price of daily purchases. According to regression (1), among foreign funds, those that are passively managed pay 6.6 bps more for stock purchases than actively-managed funds (row ‘ii+iii’). Foreign passive funds also pay 12.8 bps more for purchases than domestic passive funds (row ‘i+iii’). These differences are present after controlling for stock-firm characteristics, fund size, and fund turnover. In other words, the type of stocks that foreign passive funds trade, their size, or turnover ratio do not explain the documented disadvantage in daily purchases across groups. Although we reported earlier that actively-managed foreign funds purchase stocks at *fair* prices, with *VWAP* indistinguishable from 100 (panel B of Table 7), according to model (1), these funds pay 7.1 bps more for purchases than domestic funds

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<sup>17</sup>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.

with similar management style. In other words, while foreign active funds buy stocks at the average daily price, relative to domestic active funds they appear to be at a disadvantage.

In model (2) we estimate *VWAP* by splitting the sample according to the time interval of the trades — continuous trading session and closing batch auction. Consistent with the aggregate differences reported in Table 7-Panel C, foreign funds buy stocks at unfavorable prices at the closing batch. The economic significant of the estimated coefficients can be read as follows. Passively-managed foreign funds pay 6.2 bps and 13 bps more for purchases than their domestic counterparts in the continuous trading session and the closing batch respectively. That is, more than half of the disadvantage of foreign passive funds can be explained by trades executed in the last five minutes of market hours. Foreign active funds also trade at unfavorable prices at end of the day (18.6 bps relative to domestic active funds), but they only trade a small fraction of their daily volume during this interval.

In regressions (3) through (5) we control for the speed of transactions and trading intensity across funds, and include the triple interaction between *stocks*, *trades*, and *intensity* with the level of active management and fund domicile (foreign vs. domestic). The coefficients for the number of transactions, different stocks purchased, and intensity, are all positive and highly significant. Conversely, the coefficients of the triple interaction ( $Foreign \times Passive \times X$ ) and the sum with  $Foreign \times X$  (row ‘iv+v’ in the table) are all indistinguishable from zero. This suggests that fund managers, independently on their domicile and level of active management, pay higher prices on days when they buy the same stock in multiple transactions (e.g. iceberg trades), purchase several stocks during the same day, and represent a large share of the total traded value in each stock. This is consistent with the idea that funds pay more to liquidity providers when they are trading more intensively.<sup>18</sup>

Columns (6) through (10) of Table 9 investigate the determinants of average sell prices. As expected, most of the coefficients have the opposite sign from the coefficients in the estimations for average buy price. For example, foreign passive funds receive 10.2 bps less for stock sales than domestic passive funds. This difference can be decomposed into the average disadvantage for sales in the continuous trading session (6.7 bps) and the disadvantage for sales executed in the closing batch (15.8 bps). Domestic active and passive funds on the contrary, are selling at favorable prices in the closing batch. It appears that domestic funds are being compensated for providing liquidity to foreign investors.

According to columns (8) through (10), both domestic and foreign managers sell stocks at lower prices on days when they are trading more intensively —sell several stocks, sell the same stock

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<sup>18</sup>Although not reported in the table, we confirm these results by estimating model (3) including fund fixed effects and find that the coefficients of *trades*, *stocks*, and *trades* are all positive and statistically significant. The advantage of this specification is that the estimated coefficients can be directly interpreted as the additional price that a fund manager would pay on days when she is trading more intensively. We do not use this model in our general analysis because we cannot combine the Foreign and Passive dummies with fund-fixed effects. For example, Active Share is very persistent, i.e. 94% of funds that are classified as passive would remain passive in the following month.

multiple times, and represent a larger fraction of the total traded value in the stock. Interestingly, foreign passive funds receive lower prices for sells conditional on the number of trades and the proportion of traded value relative to the traded value during the day. That is, coefficients ‘(iv)+(v)’ are negative for *trades* and *intensity*. In other words, in addition to the average costs that investors pay for trading intensively, managers of foreign passive funds receive less for stock sales than domestic passive funds when they are executing the same number of transactions and trading similar fractions of the daily traded value in the stock.

In summary, the average disadvantage of foreign investors is more pronounced among passive funds. It appears that these funds are paying a price for a trading style that differs from the style of other funds. In particular, managers of foreign passive funds trade at worse prices at the end of the day and when they are trading more intensively. However, even after controlling for trading interval and including measures of intensity and speed, there are some remaining differences in average prices between foreign and domestic funds by level of active management. In other words, our measures of trading activity cannot fully explain the observed disadvantage of foreign funds, specially for those that are passive. For instance, while the difference in transaction prices across groups might result from price pressure exerted by passively-managed foreign funds, it is possible that these funds trade after prices have move against them due to intra-day momentum strategies. We come back to these explanations in Section 5 where we study the relation between market returns and flows disaggregated by investor domicile and by management style.

## 4.2 Risk-Adjusted Returns

Our findings suggest that domestic institutions trade at more favorable prices at daily and intra-day frequencies. In order to investigate differences in performance at longer horizons, we study total portfolio returns of foreign and domestic funds by level of active management.

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),<sup>19</sup> the returns to the Fama and French

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<sup>19</sup>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.

(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 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 10 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 10-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 10-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.<sup>20</sup>

A potential concern to our current findings is that Active Share might be correlated with other fund characteristics that are driving performance. For example, fund size might erode

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<sup>20</sup>To calculate this correlation, we construct a monthly measure of VWAP by investor taking the value-weighted average of the daily VWAP across stocks.



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

$$ADJRET_{i,t} = \mu + \beta Foreign_i + \sum_{a=1}^3 \phi_a Group_{i,t-1}^a + \sum_{a=1}^3 \delta_a Group_{i,t-1}^a \times Foreign_i + \gamma X_{i,t-1} + \varepsilon_{i,t} \quad \text{for } i = 1, \dots, N \quad (4)$$

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 defined in the previous section.  $Group_{i,t-1}^a$  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 11 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 percentage points per year (0.14 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.<sup>21</sup> We do not find any differences in risk-adjusted returns between the top and bottom groups of Active Share for domestic institutional investors.

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 percentage points 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

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<sup>21</sup>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.

average. On the contrary, we find that passively-managed foreign funds exhibit lower risk-adjusted returns than domestic passive funds (-1.19 percentage points 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 besides 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 foreign and domestic investors 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:

$$Dratio_{i,d} = \frac{\sum_{s=1}^S buys_{i,s,d} - sells_{i,s,d}}{\sum_{s=1}^S buys_{i,s,d} + sells_{i,s,d}} \quad (5)$$

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 ( $Dratio_d^{-i}$ ):<sup>22</sup>

$$Dratio_{i,d} = \alpha_i + \beta_i Dratio_d^{-i} + \varepsilon_{i,d} \quad \text{for } d = 1, \dots, D \quad (6)$$

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

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<sup>22</sup>To avoid spurious correlation between the two variables, we exclude fund  $i$  from the calculation of  $Dratio_d^{-i}$ .

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.<sup>23</sup>

The results are reported in the first column of Table 12. 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.<sup>24</sup> To evaluate 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 12. 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 group of active management 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

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<sup>23</sup>In our specifications with multiple independent variables this will allow us to directly compare estimated coefficients.

<sup>24</sup>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 and buy stocks with positive returns.

are presented in models (3) and (4) of Table 12.

The main take away from models (2) to (4) in Table 12 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 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:

$$M_{i,k} = \frac{1}{T} \sum_{d=1}^D \sum_{s=1}^S \left( \frac{Q_{i,s,d} - Q_{i,s,d-1}}{\bar{Q}_{i,s,d}} \right) R_{s,d-k} \quad (7)$$

where  $Q_{i,s,d}$  are holdings by fund  $i$  of stock  $s$  at day  $d$ ,  $\bar{Q}_{i,s,d}$  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  $d - k$ . 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 13 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 13-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 12 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. 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 13-Panel B 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 *L0M* 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.

It is possible that passively-managed foreign funds are following intra-day momentum strategies. For example, managers of these funds might buy (sell) intensively at the closing batch after prices have already gone up (down) during the continuous trading session. In this scenario, the contemporaneous correlation between daily returns and demands would not result from price pressure, but from intra-day momentum behavior that is not captured in the estimates using daily data. To account for this possibility, we calculate the measure of momentum by fund and trading interval. To be precise, we split the daily trading session in two subperiods — the continuous trading session and the closing batch auction. Returns in the closing batch auction are calculated using the adjudication price (which is also the closing price of the day) and the price of the last trade in each stock before the start of the auction. Returns during the continuous trading session are based on the price before the start of the closing batch auction and the closing price of the previous day.

Table 14 presents the average measure of momentum for foreign funds and domestic institutions by level of active management and by interval.<sup>25</sup> The *L1M* measure is indistinguishable from zero in the closing batch for passively-managed foreign funds. This implies that trades in the closing batch auction of foreign passive funds are not correlated with returns in the continuous trading session during the same day. Meanwhile, we find that trades in the closing batch by this group are correlated with the contemporaneous-interval returns (*L0M* is 4 percent with t-statistic of 4.02). According to the table, 74.5 percent of passive foreign funds buy and sell in the direction of the closing batch auction returns. Consistent with our findings at daily frequencies, demands of

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<sup>25</sup>The table includes information after February 9, 2009.

foreign passive funds are correlated with contemporaneous returns during the daily trading session while domestic institutions trade in the opposite direction of returns in both intervals. We also find some evidence that foreign active funds — groups 3 and 4 of Active Share — trade in the opposite direction of returns during the closing batch auction.

Overall, our findings are consistent with flows by passively-managed foreign funds driving price changes. The two related stylized facts are that demands by these funds are positively correlated in the cross-section and their trades are largely correlated with contemporaneous returns, both at daily and intra-day frequencies. 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 underperform 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.

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## 7 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.

Panel A. Traded value and number of investors

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	8	42	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 are 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. Panel C presents the traded value of foreign passive funds in the closing batch auction.

Trading intervals	Domestic Individuals		Domestic Institutions		Foreign		All
	Passive	Active	Passive	Active	Passive	Active	
Panel A. Relative to the trade value of the interval							
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 day. 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

**Table 6**  
**Fund characteristics by level of Active Share**

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)
<b>Buy: All trades</b>							
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)	
<b>Sell: All trades</b>							
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		
<b>Buy</b>							
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)		
<b>Sell</b>							
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)	
<b>Buy</b>							
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)	
<b>Sell</b>							
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)	

**Table 8**  
**Correlation matrix between fund-level variables**

	Active Share		Interval		Intensity		Stocks		Trades		Fund Size	Turnover	Net Flows
	buys	sells	buys	sells	buys	sells	buys	sells	buys	sells			
Active Share	1.00												
Interval (buys)		-0.08											
Interval (sells)		1.00	0.16	-0.05	0.00	-0.04	0.06	0.03	-0.06	-0.03	0.03	-0.11	0.03
Intensity (buys)				1.00	-0.05	-0.01	-0.01	0.02	-0.08	-0.12	-0.09	0.01	0.02
Intensity (sells)					1.00	0.49	0.20	0.16	0.38	0.18	0.26	-0.07	0.05
Stocks (buys)						1.00	0.18	0.16	0.19	0.34	0.25	-0.07	0.01
Stocks (sells)							1.00	0.84	0.24	0.20	0.61	0.10	0.06
Trades (buys)								1.00	0.20	0.21	0.61	0.11	-0.02
Trades (sells)									1.00	0.53	0.33	-0.01	0.01
Fund Size										1.00	0.33	-0.01	-0.05
Fund Turnover											1.00	-0.36	-0.01
Net Flows												1.00	-0.12
													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). The dependent variable in columns (1)-(5) is the VWAP for purchases. VWAP for sells is reported in columns (6)-(10). Each model includes controls for stock-firm characteristics (complete list in Appendix A), time and stock fixed-effects. 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.

X =	buys					sells				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Interval	Interval	Trades	Intensity	Stocks	Interval	Interval	Trades	Intensity	Stocks
Foreign (i)	0.071*** (5.577)	0.038*** (3.575)	0.075*** (3.540)	0.073*** (4.781)	0.050*** (4.523)	-0.071*** (-7.016)	-0.047*** (-4.904)	-0.065*** (-4.038)	-0.065*** (-5.791)	-0.081*** (-7.907)
Passive (ii)	0.009 (1.085)	0.001 (0.159)	0.028*** (3.169)	0.011 (1.327)	0.016* (1.657)	-0.017** (-2.175)	-0.012* (-1.700)	-0.038*** (-4.050)	-0.017** (-2.145)	-0.025*** (-2.683)
Foreign x Passive (iii)	0.057*** (3.890)	0.023* (1.794)	0.048** (2.195)	0.055*** (3.402)	0.048*** (2.973)	-0.031** (-2.008)	-0.021 (-1.466)	-0.002 (-0.119)	-0.027* (-1.728)	0.016 (0.988)
X		-0.072*** (-4.411)	0.039*** (9.125)	0.099*** (6.434)	0.037*** (5.807)		0.170*** (10.138)	-0.046*** (-9.706)	-0.042*** (-3.445)	-0.056*** (-8.108)
Foreign x X (iv)		0.186*** (8.882)	-0.014* (-1.711)	-0.027 (-0.745)	0.020 (1.346)		-0.182*** (-8.940)	0.009 (1.178)	-0.021 (-0.753)	0.010 (1.131)
Passive x X		0.073** (2.275)	-0.016*** (-2.974)	0.001 (0.034)	-0.014 (-1.608)		-0.042 (-1.645)	0.016*** (2.818)	-0.012 (-0.984)	0.019* (1.756)
Foreign x Passive x X (v)		-0.056 (-1.586)	0.016 (1.487)	0.026 (0.526)	-0.010 (-0.602)		0.025 (0.785)	-0.042*** (-3.759)	-0.068 (-1.603)	-0.019 (-1.235)
(i) + (iii)	0.128*** (10.694)	0.062*** (5.935)	0.124*** (10.618)	0.128*** (10.849)	0.098*** (7.605)	-0.102*** (-6.613)	-0.067*** (-4.993)	-0.067*** (-5.148)	-0.092*** (-6.384)	-0.065*** (-4.825)
(ii) + (iii)	0.066*** (5.118)	0.025** (2.2)	0.077*** (3.573)	0.066*** (4.464)	0.064*** (4.914)	-0.048*** (-3.579)	-0.033** (2.611)	-0.04** (2.421)	-0.044*** (-3.187)	-0.008 (0.624)
(iv) + (v)		0.13*** (4.361)	0.002 (0.226)	-0.001 (0.044)	0.01 (1.037)		-0.158*** (-5.34)	-0.033*** (-3.347)	-0.089*** (-2.785)	-0.009 (0.637)
Observations	464,038	501,605	464,038	464,038	464,038	430,355	465,901	430,355	430,355	430,355
R-squared	0.025	0.029	0.027	0.026	0.027	0.024	0.030	0.027	0.024	0.027
FE	stock+day	stock+day	stock+day	stock+day	stock+day	stock+day	stock+day	stock+day	stock+day	stock+day
Cluster	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Table 10**  
**Performance benchmarks**

This table reports the loadings of the portfolios sorted by Active Share an investor type on various factors. Panel A reports loadings of foreign investors and Panel B for domestic institutions. 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	CAPM		Carhart 4-Factor				
	(average)	alpha	MARKET	alpha	MARKET	SMB	HML	WML
Panel A. Foreign Investors								
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 B. Domestic Institutional 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 11**  
**Regression of fund performance on lagged Active Share**

This table reports the [Fama and MacBeth \(1973\)](#) 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 *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  $t - 1$ . The t-statistics are adjusted for serial correlation using the [Newey and West \(1987\)](#) lags of order three and are shown in parenthesis. 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*** (3.784)	0.338*** (3.805)	0.295*** (3.381)
Group 1	0.008 (0.130)	0.149** (2.546)	0.131** (2.233)
Group 2	-0.017 (-0.295)	0.127** (2.227)	0.110* (1.935)
Group 3	-0.051 (-0.819)	0.093 (1.519)	0.099 (1.606)
Foreign x Group 1	-0.425*** (-4.448)	-0.347*** (-3.728)	-0.273*** (-2.985)
Foreign x Group 2	-0.323*** (-3.188)	-0.282*** (-2.848)	-0.208** (-2.141)
Foreign x Group 3	-0.236** (-2.052)	-0.213* (-1.891)	-0.215* (-1.932)
Fund Size	0.019*** (2.870)	0.017*** (2.677)	0.019*** (3.056)
Fund Turnover	0.019** (2.499)	0.017** (2.264)	0.018** (2.348)
Net Flows	-0.033* (-1.776)	-0.037** (-1.981)	-0.037** (-1.992)
Constant	-0.082 (-0.596)	-0.230* (-1.700)	-0.329** (-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*** (5.44)	0.20*** (2.65)	0.14** (2.02)
Domestic Group 4 - Domestic Group 1	0.02 (0.44)	0.01 (0.65)	0.01 (0.96)
Foreign Group 4 - Domestic Group 4	0.35*** (3.78)	0.34*** (3.80)	0.30*** (3.38)
Foreign Group 1 - Domestic Group 1	-0.14*** (5.60)	-0.16*** (6.34)	-0.10*** (4.13)

**Table 12**  
**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  $Dratio_{i,d} = \frac{\sum_{s=1}^S buy_{i,s,d} - sell_{i,s,d}}{\sum_{s=1}^S buy_{i,s,d} + sell_{i,s,d}}$  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). Note: \*\*\*/\*\*/\* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

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

**Table 13**  
**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. Note: \*\*\*/\*\*/\* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

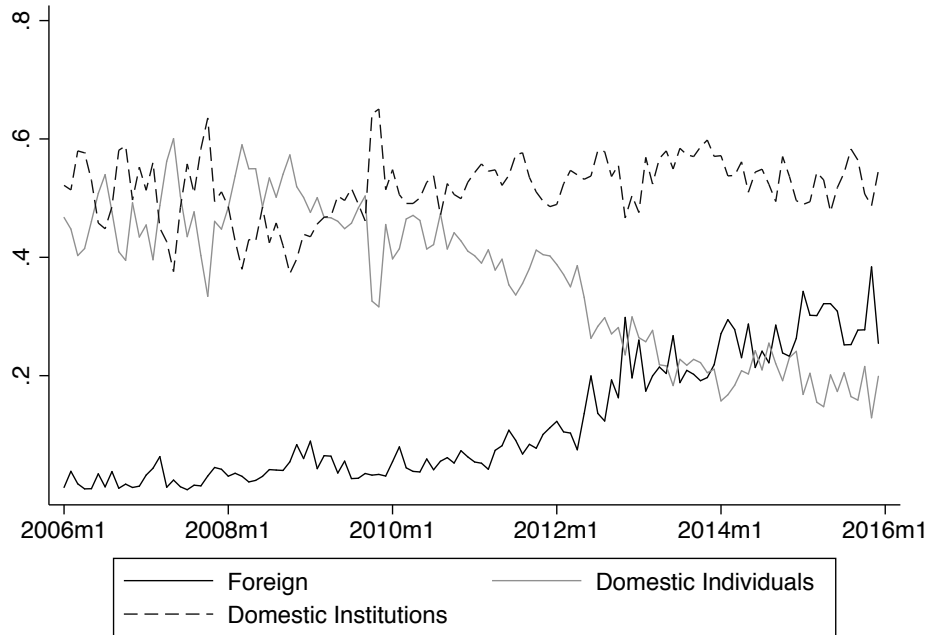
Sorted by Active Share	Group 1	Group 2	Group 3	Group 4	G1 - G4
Panel A. Lag-1 Momentum (L1M)					
Foreign Investors					
Average (1)	0.03**	0.03	0.08***	0.07**	-0.03
(t-statistics: $H_0 = 0$ )	(1.99)	(1.23)	(2.86)	(2.51)	(1.05)
Percentage positive	62.8	60.2	64.3	57.3	
Number of Funds	207	206	207	206	
Domestic Institutions					
Average (2)	-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 (1) - (2)	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 (3)	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 (4)	-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 (3) - (4)	0.30***	0.40***	0.48***	0.37***	
(t-statistics: $H_0 = 0$ )	(9.37)	(8.54)	(8.24)	(6.08)	

**Table 14**  
**Momentum trading by interval**

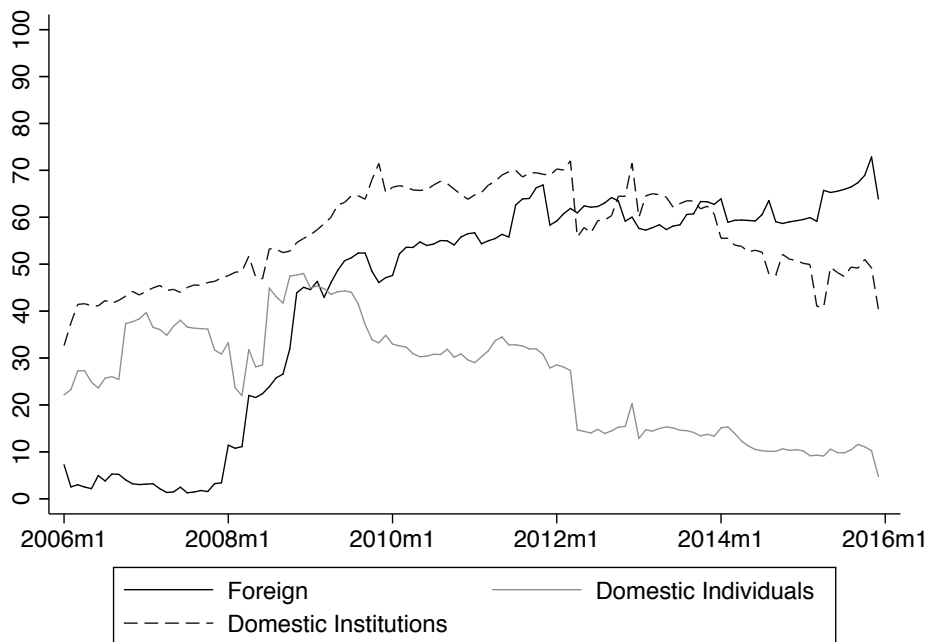
$L0M$  and  $L1M$  are calculated based on trades and returns during the continuous trading session and the closing batch auction separately. The  $L0M$  is the contemporaneous correlation between trades and stock returns during the interval. The  $L1M$  measure of momentum investing is based on the stock returns in the previous interval. Note: \*\*\*/\*\*/\* indicate that the coefficient estimates are significantly different from zero at the 1%/5%/10% level.

Sorted by Active Share	Continuous trading				Closing batch auction			
	Group 1	Group 2	Group 3	Group 4	Group 1	Group 2	Group 3	Group 4
<b>Foreign</b>								
L1M Average	0.05** (2.29)	0.05 (1.03)	0.11* (1.94)	0.07** (2.05)	0.01 (0.55)	0.01 (1.07)	-0.00 (0.25)	-0.01 (0.85)
Percentage positive	67.5	58.90	66.5	57.90	55.90	54.5	54.0	44.40
<b>L0M</b>								
Average	0.17*** (3.02)	0.02 (0.34)	-0.08 (1.33)	0.00 (0.02)	0.04*** (4.02)	-0.01 (0.98)	-0.06** (2.55)	-0.03** (2.2)
Percentage positive	69	51.8	58	53.5	74.5	48.1	48.1	38.8
<b>Domestic Institutions</b>								
L1M Average	-0.11*** (2.86)	-0.31*** (11.61)	-0.41*** (9.48)	-0.42*** (4.71)	-0.01 (1.62)	0.00 (0.36)	-0.01 (0.81)	-0.00 (0.1)
Percentage positive	38.40	29.9	27.3	34	44.7	39.6	37.5	41.90
<b>L0M</b>								
Average	-0.25*** (7.27)	-0.58*** (16.43)	-0.74*** (12.6)	-0.57*** (7.57)	-0.10*** (4.84)	-0.21*** (9.82)	-0.21*** (8.64)	-0.12*** (4.01)
Percentage positive	22.7	23.5	24.5	34	23.2	19.7	18.1	28.5

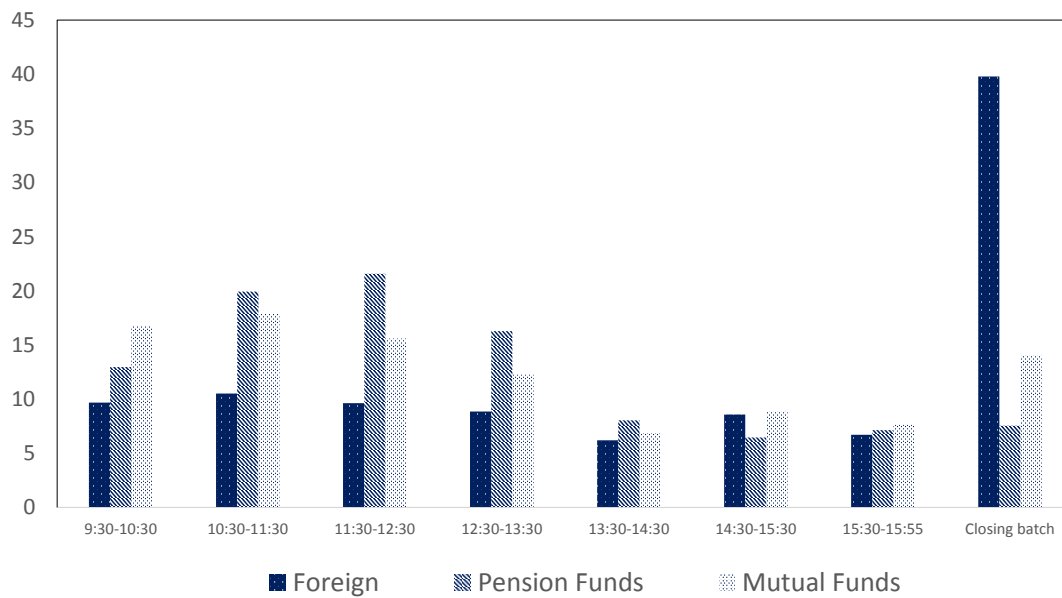
## 8 Appendix B: Figures



**Figure 1.** Percentage of monthly traded value by investor type relative to the total traded value of the month.



**Figure 2.** Proportion (%) of assets under management by passive investors in each type. Passive investors are defined as those with Active Share below 60%



**Figure 3.** 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
<b>Investor/Fund information</b>		
Active Share $_{i,d}$	As defined by <a href="#">Cremers and Petajisto (2009)</a> . Calculated for each fund at the beginning of the month.	CSE
Fund Size $_{i,d}$	Log of assets under management at the beginning of the month.	CSE
Fund Turnover Ratio $_{i,d}$	Minimum between yearly purchases and sells normalized by the average of the fund's assets.	CSE
$intensity_{i,s,d}$	Trade value by investor $i$ on stock $s$ over total trade value of stock $s$ on day $d$	CSE
$interval_{i,s,d}$	Dummy variable equal to one for trades executed in the closing batch.	CSE
Net Flows $_{i,d}$	Daily fund net flows normalized by assets managed at the beginning of the month.	CSE
$stocks_{i,s,d}$	Log number of stocks traded during the day in the same direction of $s$ .	CSE
$trades_{i,s,d}$	Log number of trades during the day in stock $s$ .	CSE
<b>Stock-Firm Characteristics</b>		
$B/M_{s,d}$	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
$lsize_{s,d}$	Firm size computed as the log of total assets at the end of the quarter.	SFC, Datastream
$ctc5_{s,d}$	Close to close return of last five trading days.	Bloomberg
$cto_{s,d}$	Overnight returns between d-1 and d.	Bloomberg
$otc_{s,d}$	Open to close daily return.	Bloomberg
$PS_{s,d}$	Price sensitivity, defined as $\ln(p_h/p_l)/Volume$ where $p_h$ and $p_l$ are the highest and lowest price in each trading day.	Datastream