

Informed Trading in Business Groups

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Abstract

Business groups, which are collections of legally independent companies with a significant amount of common ownership, dominate private sector activity in developing countries. This paper studies information flows within these groups by examining the trading performance of institutional investors in firms that belong to the same group. Using a novel dataset with complete transaction records in Colombia, this paper estimates the difference in returns between trades of asset managers in group-affiliated companies and trades of non-affiliated managers in the same stocks during the same period. The data show that affiliated managers display superior timing ability and that their trades outperform those of non-affiliated managers by 0.85 percent per month. The evidence suggests that institutional investors with group affiliation access information that is only available to members of the group. In order to limit the use of private information, financial authorities might need to expand their disclosure rules to monitor the trades of group-affiliated investors.

JEL classification: G12, G14, G23

Keywords: insider trading, institutional investors, business groups

1. Introduction

The literature on informed trading by institutional investors often tries to identify channels whereby private information might flow from firms to asset managers. For instance, a portfolio manager might make profitable trades using private information obtained from corporate insiders—via educational networks (Cohen, Frazzini, and Malloy 2008) or by informal acquaintances in cases where corporate headquarters are located within a close distance (Coval and Moskowitz 2001). Alternatively, an institutional investor might trade on information acquired via investment bank links, if the lending division of its financial conglomerate passes on information about the borrowing firms (Massa and Rehman 2008; Bodnaruk, Massa, and Simonov 2009; Ivashina and Sun 2011).

A direct, yet unexplored connection between firms and institutional investors are business group affiliations. Business groups, which are collections of legally independent companies with a significant amount of common ownership, dominate private sector activity in developing countries (e.g.,

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Claessens et al. 2002; Faccio and Lang 2002). In Latin America, listed firms that are part of a business group account for more than 80 percent of market capitalization (OECD 2015).¹ In many cases, these corporate networks encompass hundreds of companies in a wide range of industries and the control of the group can be traced to a single individual or a family. In such organizations, an institutional investor that belongs to the group might gain access to private information that is useful to identify the precise time to trade the stocks of affiliated companies. For example, relative to independent firms, group structures are associated with greater use of internal financial markets, often reallocating capital across firms within the group in order to undertake strategic investments (Claessens, Fan, and Lang 2006; Almeida, Kim, and Kim 2015). In this setting, top executives of the companies in the group are likely to be informed about the group's business plans and have access to private information about merger and acquisition (M&A) activity and other corporate news of affiliated companies.² Given the importance and ubiquity of groups in developing countries, there is surprisingly no evidence of informed trading by affiliated institutional investors.³

This paper studies informed trading in business groups. In particular, the paper examines, in the context of a developing country, whether institutional investors exhibit superior trading performance and skill in stocks of group-affiliated companies.

Uncovering the extent to which institutional investors access and profit from information produced inside their business group would be naturally useful for both policy makers and academic observers. Insider trading is commonly associated with lower participation by outside investors, lower liquidity, and higher costs of capital for security issuers, thus decreasing overall economic growth.⁴ For these reasons, trading on non-public information is banned in many jurisdictions, and while financial authorities often require corporate insiders to report their transactions within days of their trade, this type of monitoring typically focuses on a company's officers, directors, and large shareholders. In business groups, where complex use of pyramids and cross-ownership structures are the norm, private information might be easily accessible to multiple group members, and authorities might need to monitor trading activity outside the firm and within the business group network.

The analysis is based on a novel database that reports the complete transaction records of Colombian pension funds between 2006 and 2011. The data and institutional setup in Colombia are uniquely suited for the study of informed trading in business groups for at least three reasons. First, business groups in the country have extensive presence in all sectors of economic activity, similar to business groups in India, *chaebols* in South Korea, or *keiretsus* in Japan. In a recent comparative review of 45 countries by Masulis, Pham, and Zein (2011), Colombia ranked third in terms of the proportion of companies with aggregate market capitalization led by family groups. Second, pension funds are managed by private asset management companies known as Administradoras de Fondos de Pensiones (AFPs, for their Spanish acronym). Some of these AFPs are owned by the largest business groups in the country and public information of group ownership structure can be used to determine the cases when a domestic stock and an AFP belong to the same group. Third, the transaction records identify the exact date and execution price of every trade during the sample period, distinguishing the trades of each AFP both in the cross-section and over time. As a result, the paper can directly measure trading performance and avoid common measure-

- 1 In Mexico and Brazil more than 97 percent of listed companies are part of a group. The widespread presence of this type of group is commonly explained by market failures and a lack of access to finance (e.g., Khanna and Palepu 2000; Claessens, Fan, and Lang 2006; Masulis, Pham, and Zein 2011).
- 2 Sharing information about the performance of affiliated companies might help other group members make better forecasts of economic activity. For example, private information on the quarterly performance of a large-scale retail business might be useful to measure economic fundamentals and aggregate demand.
- 3 Research on business groups often focuses on firm performance (Khanna and Palepu [2000] for India and Claessens, Fan, and Lang [2006] for East Asia) and the role of internal capital markets within these groups (Almeida, Kim, and Kim [2015] for South Korea).
- 4 See for example Copeland and Galai (1983); Kyle (1985); Glosten and Milgrom (1985).

ment errors of studies that use changes in quarterly institutional holdings to proxy for trading activity.⁵ Altogether, for each domestic stock, the paper measures the performance of trades by both affiliated and non-affiliated AFPs.

The database includes over 150,000 trades, with 6,612 transactions executed by AFPs on group-affiliated stocks. For every stock and each individual AFP, performance is measured as the value-weighted average returns of all trades in the stock within a month or quarter. The paper then estimates the difference in performance between the trades of the group-affiliated AFP and the trading performance of other non-affiliated AFPs in the same stock during the same period. This empirical strategy controls for differences in returns across stocks and unobserved time-variant firm and market characteristics, and captures the component of trading performance that is attributable to the timing ability of AFPs on affiliated stocks.

The paper finds that trades by affiliated AFPs outperform the trades of non-affiliated AFPs in the same stock-month by 0.85 percent (t -statistic = 2.78) using raw returns and by 0.53 percent (t -statistic = 1.99) when using market-adjusted returns. Similar results are found if trading performance is measured at quarterly frequencies. The results are also robust when multiple stock controls that account for differences in firm size, earnings, and trading activity are included.

While insider trading is likely to be more prevalent in emerging markets (Griffin, Hirschey, and Kelly 2011), we should note that the findings here are not driven by the potential access to private information by all institutional investors. To be precise, by conditioning on the stock-period and comparing the performance between affiliated versus non-affiliated asset managers, the measure of excess performance is exclusively associated with group affiliation. Overall, the superior trading skills on the stocks of group-related companies support the hypothesis that institutional investors access private information that is only available to members of the business group. Given the prevalence of business groups around the world, similar findings are expected in other countries.

One potential limitation to uncovering informed trading in other markets, however, is the lack of access to transactional data. Since data holdings of institutional investors are commonly available to researchers (e.g., Opazo, Raddatz, and Schmukler 2015, for pensions funds in Chile), the paper introduces an empirical strategy to test for informed trading based on monthly portfolios. That is, a test for informational advantages of group-affiliated AFPs which exclusively uses data on holdings while omitting the details on actual trades (e.g., information on execution prices and trades that are reversed within the month).

The strategy can be summarized as follows. Test whether monthly changes in holdings by affiliated funds are more correlated with future stock performance than changes in holdings by non-affiliated funds in the same stock, and relative to changes by the same fund in other similar stocks with no affiliation. The paper finds that increases (decreases) in holdings by affiliated AFPs are followed by positive (negative) abnormal returns in the next month. While such findings are consistent with an informational edge for affiliated AFPs, the paper provides a word of caution when using this strategy in other settings. For instance, if information by affiliated asset managers is short-lived and trading opportunities dissipate quickly, stock prices are likely to adjust at faster rates than the frequency at which the portfolio is reported (Kothari and Warner 2001). Therefore, a researcher would be unable to measure a positive correlation between changes in holdings and future performance. The fact that the paper finds a positive relationship between monthly holdings and future stock returns for affiliated AFPs is most likely attributed to the speed of price adjustment in the Colombian stock market and the type of information available to pension fund managers.

The empirical analysis contributes to two strands of the literature. First, several studies investigate cross-market information flows (e.g., Irvine, Lipson, and Puckett 2006; Massa and Rehman 2008; Ivashina and Sun 2011; Massa and Žaldokas 2017). Most papers focus on the exchange of private infor-

5 As shown by Puckett and Yan (2011), the inability to account for interim trades is likely to underestimate the information advantage of different types of investors.

mation between the banking and investment division of the same financial conglomerate. In fact, efforts by regulatory authorities are often aimed at preventing this behavior.⁶ The paper adds to this literature by documenting informed trading in the context of business groups, where private information appears to flow fluidly across member companies. Given the scale and prevalence of these corporate networks around the world, financial authorities should enhance their regulatory frameworks with special focus on disclosure. For example, similar to the reporting rules on corporate insider transactions, authorities could require companies in a group to disclose their trades on affiliated stocks in a timely manner. After all, the correct definition of a corporate insider is likely to extend beyond the individual firm when a business group structure is considered.

Second, the work is related to the literature that studies the relation between institutional investors and financial development. Institutional investors are often viewed as catalysts for the development of efficient trading systems and for the adoption of modern accounting standards, and are expected to improve market liquidity through more active trading and to promote better corporate governance in the companies in which they invest (e.g., [Ferreira and Matos 2008](#); [Aggarwal et al. 2011](#)). Moreover, these ideas have been commonly used in many countries to promote pension reforms based on privately-managed capitalization systems ([Vittas 1996](#)).⁷ The evidence here, contrary to these popular views, highlights a potential threat to capital market development when large institutional investors have significant ties to domestic business groups. For instance, by trading on private information, pension fund managers effectively increase the agency costs for other minority shareholders. In the sample, group-affiliated stocks display lower trading volumes and a smaller share of investment by foreign investors relative to non-affiliated stocks. Overall, the findings suggest that while group members accrue private gains from access to private information, extensive investor-industry relations might curb the expected benefits from the presence of institutional investors.

The rest of the paper is organized as follows. Section 2 provides some background on the Colombian institutional setting. The paper's main hypothesis and data description are presented in section 3. Sections 4 and 5 present the methodology for estimating trading performance and the main results of the paper. Section 6, conducts the empirical tests using monthly holdings data. Section 7 concludes.

2. The Institutional Setting

Business Groups in Colombia

Corporate ownership concentration among publicly traded companies is common outside the United States and the United Kingdom. Since the seminal work of [La Porta, Lopez-de-Silanes, and Shleifer \(1999\)](#), which considered a small group of developed economies, there has been extensive evidence for East Asia ([Claessens, Djankov, and Lang 2000](#)), continental Europe ([Barca and Becht 2001](#)), and Latin America ([OECD 2015](#)) showing that controlling shareholders typically have power over firms which significantly exceeds their cash flow rights through the use of pyramids, cross-ownership, participation in management, and other complex web structures.

The formation of conglomerates and business groups in Colombia dates back to the 1950s, when vertical integration was introduced to control productive chains from upstream to downstream industries. Most of these firms started as family enterprises and then became corporate groups with strategic investments in their core business. In these groups, non-core activities along with investment holdings and fiduciary funds play a central role in forming coalitions and control boards ([Gutiérrez, Pombo, and Taborda 2008](#)).

6 Given that Chinese walls are in many cases porous and enforcement of insider trading laws in many jurisdictions is weak, it is not surprising that there are many papers documenting the illegal use of private information to trade in public exchanges.

7 In 1993, Colombia was among the first countries to establish a pension system with individual retirement accounts managed by sophisticated institutions.

Two prominent examples of the scale and ample presence of these conglomerates in several economic sectors are the Business Group of Antioquia (GEA for its Spanish name) and the Aval Group. GEA is a business group formed by more than 120 listed and non-listed firms. Its core businesses are cement, processed food, construction, textiles, and financial services. Among its financial companies are the largest commercial bank and insurance company in the country, and the second largest AFP, Protección.⁸ The Aval Group, on the other hand, is the largest financial conglomerate in the country. The conglomerate, which is controlled by its founder, Luis Carlos Sarmiento, comprises four commercial banks, one investment bank, and the largest AFP, Porvenir. The group also has a presence in other industries such as telecommunications, energy, and real estate, and in firms with a sufficient amount of voting stocks to control their policies.

The Private Pension System

The Colombian private pension industry is a fully funded defined contribution system with personal retirement accounts.⁹ These funds are managed by privately-owned AFPs. AFPs collect compulsory contributions by workers, manage the investment portfolio, and payout benefits. Between 2006 and 2011, there were six AFPs operating in the country. Each AFP is a legally independent company, and while their shareholders may include banks and other financial institutions, their physical location and operation are separate from their parent companies.

Before 2011, a worker investment decision was restricted to the choice of an AFP. During this time, each AFP would pool workers' contributions into one fund. In other words, any two workers associated with a particular AFP would have the same asset allocation independent of their age or income.¹⁰ The government regulates the portfolio strategies of AFPs by imposing limits on specific asset classes and individual securities. For example, by December 2010 some of these limits were: (a) Maximum 50 percent on domestic government debt, (b) a maximum 40 percent on equity securities, (c) a maximum 40 percent on foreign securities, and (d) maximum 5 percent on alternative investments and derivatives. To limit the exposure of pension funds in parent companies of the AFP and those in which pension fund managers might have a conflict of interest, there is a 10 percent ceiling on investments. These are shareholders with at least 5 percent ownership or 5 percent of voting rights in the AFP.¹¹

AFPs are expected to collect information and attempt to obtain the best possible returns in their investments for at least two reasons. First, AFPs are required to invest part of their net worth in the funds they manage. More precisely, 1 percent of each fund has to be constituted by the managing company with their own net worth. Second, while AFP clients do not switch often across management companies in response to returns, informal conversations with AFP officials suggest that these management companies award year-end bonuses to their top executives based on the performance of the portfolio relative to other AFPs.¹² The general argument is that while performance-flow incentives are rather weak in the mandatory retirement accounts, AFPs can attract high income clients into other products (e.g., voluntary pensions) when they outperform other pension managers.

8 Measured by total assets at the end of 2010.

9 Most of its design follows the leading example of Chile.

10 Starting in 2011, AFPs were allowed to offer a menu of three funds with different risk profiles, i.e., risky, moderate, and conservative (translated from their Spanish names). Consequently, the worker was allowed to choose an AFP and the share of his or her personal account that would be invested in each of the three funds, subject to some age restrictions.

11 This restriction is common in many countries, for example, pension funds in Mexico and Peru have a 5 and 10 percent limit respectively on parent companies. The 10 percent limit on investment in parent companies in Colombia includes both equity and debt instruments.

12 This is often the case in these systems where investors are known to display significant inertia, commonly staying with their initial AFP.

The Colombian Stock Exchange

The Colombian Stock Exchange was created in 2001 from the merger between three separate exchanges that operated in different areas of the country. A decade later, by December 2011, the exchange had 79 listed companies with a total market capitalization of \$270 billion. Relative to GDP, the Colombian equity market ranked second among Latin American countries that year (see [table 1](#)). Stock trading activity, however, is often low. In 2011, the turnover rate was 13 percent, below the rates in Brazil (67 percent), Mexico (24 percent), and Chile (19 percent).

Table 1. Stock Markets in Latin America

Country	Market cap / GDP (percent)			Turnover ratio (percent)			Listed firms		
	2006	2011	2016	2006	2011	2016	2006	2011	2016
Brazil	64	47	42	39	67	74	347	366	338
Chile	113	107	86	16	19	11	244	229	214
Colombia	35	60	37	28	13	13	94	79	68
Mexico	36	35	34	23	24	28	132	128	137
Peru	45	48	42	10	6	3	189	202	217

Source: Data from the World Federation of Exchanges.

Note: Statistics for selected Latin American Stock Markets: Market capitalization is presented as a percentage of the Gross Domestic Product (GDP) in each country. Turnover ratio is total traded volume over market capitalization.

Between 2006 and 2011, the stock market operated as a continuous trading system from 8 am to 1 pm on weekdays.¹³ During market hours, investors submit anonymous orders via authorized brokers registered at the exchange. These orders are matched through an automated trading system. Like other investors, pension fund managers have no real-time information on the trades performed by other AFPs. In fact, only the broker representing each side of a transaction knows his or her client's identity at the time of execution.

In exchanges where trading is intermediated, it is possible that brokers might take advantage of their knowledge of large transactions by their clients. For example, trading ahead of these orders (front-running) or sharing order-related information with other clients (tipping). In the latter case, it is possible that some investors might learn in real time about the trades of AFPs in group-affiliated companies. While these practices are illegal, an AFP typically protects against such strategies by splitting its order in several small transactions through multiple brokers.¹⁴

At the beginning of each month, the portfolios of pension funds are made public to all managers (i.e., the holdings in each asset). At that moment, each AFP can determine which managers were net buyers or sellers of a particular stock during the previous month. In this setting, we should expect AFPs to learn about the trading strategies of their peers only at monthly frequencies.

3. Hypothesis and Data

An AFP and a listed firm belong to the same business group when the two companies share the same principal shareholder. In such a case, the AFP is essentially a firm insider. Knowledge of private forecasts, confidential reports, and future deals could be an invaluable source that might help the pension fund

13 After January 2011, trading hours were extended to 8:30 am to 3:00 pm and later synchronized with the New York Stock Exchange.

14 In supplementary online appendix S1, available with this article at *The World Bank Economic Review* website, we provide an example where an AFP made large purchases on an affiliated company in anticipation of a major business announcement. The stock purchases were performed over multiple days via different brokers.

manager to identify the precise time to trade a stock. Such a manager can benefit from the use of group-related information by making better trades and outperforming other pension funds, possibly attracting additional money flows, and increasing future compensation.

If information flows between listed companies and their group-affiliated AFP, trades of affiliated asset managers are expected to systematically outperform trades by non-affiliated managers in the same stock. The hypothesis is postulated as follows:

H1. *Trades by affiliated AFPs should outperform those of non-affiliated AFPs in the same firm.*

The alternative hypothesis is that, in the absence of information flows within business groups, trading performance by affiliated and non-affiliated AFPs should be the same.

Data Sources and Main Variables

Data for this paper were collected from three sources. Pension funds transaction data were provided by the Colombian Stock Exchange from January 1, 2006, to December 31, 2011. Each record discloses the date and time of each transaction, a stock identifier, order type (buy or sell), transaction price, and number of shares traded. In addition, each transaction record has a unique investor ID number that tracks all the transactions for each AFP throughout the sample period.

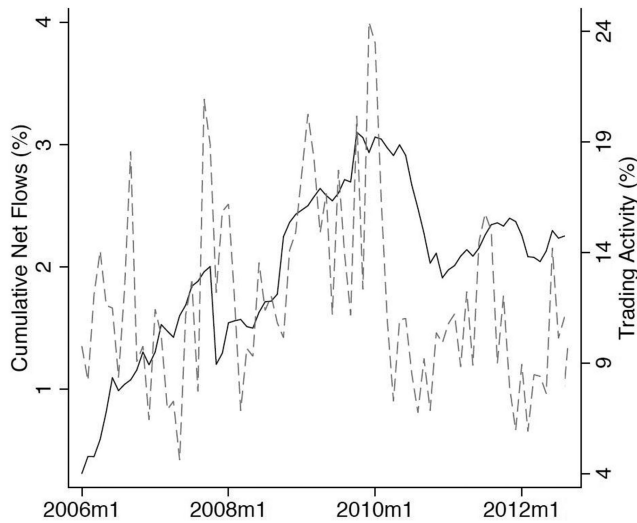
Information on portfolio holdings of Colombian Pension Funds was provided by the Superfinanciera de Colombia (SFC), a supervisory agency within Colombia's Finance and Public Credit Ministry which oversees all financial, insurance, and pension services in the country. The data include detailed security allocations for all private pension funds on a monthly basis between January 2004 and December 2011.

Compustat Global is used for daily stock prices and firms' quarterly balance sheet information.¹⁵ To avoid stocks with small trading activity, the sample is restricted to stocks that trade at least 20 percent of the business days when the stock was active. The sample is also limited to stocks in which at least one AFP had any holdings during the period. The final sample includes 61 stocks and 150,734 total trades by AFPs. These 61 stocks represent 93 percent of total stock market capitalization and 95 percent of trading volume.

Figure 1 presents the time series of the monthly cumulative net flows of pensions funds into stocks (solid line) normalized by the size of the domestic stock market. According to the figure, AFPs have consistently increased their participation in the stock market, with the exception of a few short-lived periods of net outflows. By December 2010, Colombian pension funds invested 32 percent of their \$59.6 billion of assets under management in domestic stocks, which amounted to 13 percent of total market capitalization. Figure 1 also displays the monthly traded value of AFPs as a percentage of the total amount traded in the stock exchange (dashed lines). On average, pension fund trades represent over 12 percent of the value traded in each month. Overall, not only do these funds make up for a significant portion of the domestic equity market, but they also represent a large fraction of the trading volume.

The SFC also reports quarterly equity ownership information, that is names and holdings of the largest 20 shareholders, as well as the share of foreign and government ownership in each stock. We use ownership data and take pyramiding and cross-holdings into account to determine the control rights of the principal shareholder of each company as is now common in the literature (Claessens et al. 2002). A stock-AFP pair is part of the same business group when the two companies share the same principal owner. While multiple listed companies might have the same principal shareholder, each of the six AFPs have different owners. In turn, an AFP can be matched with different stocks at the same time, but no single stock is matched with multiple AFPs.

15 Compustat Global has missing information for several small Colombian firms. I collect balance sheets for these companies directly from the SFC.

Figure 1. Pension Fund Flows and Trades

Source: Colombian Stock Exchange.

Note: Monthly cumulative net flows in domestic stocks normalized by total market capitalization (solid line) and AFPs value traded as a percentage of total traded value in each month (dashed line).

In all, 30 stocks are matched with a particular AFP. These listed firms with group affiliation represent 41 percent of the total market capitalization and 49 percent of trading volume. Panel A of [table 2](#) presents summary statistics for trades on affiliated and non-affiliated stocks. The sample period includes 6,612 transactions of AFPs in affiliated companies. According to the table, the average traded value in affiliated stocks is higher than the average traded value in non-affiliated companies. Panel B of [table 2](#) reports assets under management as of December 2010, average monthly net flows as a percentage of assets under management, the number of stocks in the portfolio, and stocks with group affiliation for each AFP. The AFP Proteccion had the most affiliated stocks in the sample, and only one AFP had no matches.

Finally, [table 3](#) presents summary statistics for stocks in the sample sorted by affiliation type.¹⁶ The last column includes *t*-statistics for a difference in means test for each of the variables in the table (i.e., group-affiliated minus non-affiliated). According to the table, foreign investors appear to limit their exposure to companies in business groups, with foreign ownership in non-affiliated companies at 30 percent, and only 13 percent in companies with group affiliation. Affiliated firms also have greater domestic institutional ownership, are more leveraged on average, and their stocks display lower turnover than non-affiliated firms.

4. Methodology

To test for differences in trading performance we proceed as follows. For each fund-stock pair, we use each transaction and track its performance from the execution date (using the execution price) until the end of the month or quarter. These holding-period return calculations account for both stock splits and dividend distributions. The market-adjusted returns are calculated by subtracting the market return over the same period. We use the General Stock Market Index (IGBC for its Spanish acronym), a value- and

¹⁶ The complete list of variables with their corresponding definitions and sources are presented in [table 4](#).

Table 2. Descriptive Statistics for Transactional Data

	Panel A. Transactions					
	2006	2007	2008	2009	2010	2011
Transactions on affiliated companies						
Total number of trades	238	507	2,534	1,420	1,254	839
Total traded value (USD millions)	19.88	32.26	111.55	146.32	51.66	61.83
Average traded value per trade (USD)	163,648	129,770	89,036	223,504	83,255	147,011
Total number of buys	204	475	2,298	1,401	194	370
Average traded value per buy (USD)	110,749	128,810	88,801	222,684	51,001	97,839
Total number of sells	34	32	236	19	1,060	469
Average traded value per sell (USD)	481,045	144,020	91,324	283,946	51,001	185,802
Transactions on non-affiliated Companies						
Total number of trades	19,460	17,447	27,410	35,874	22,332	21,599
Total traded value (USD millions)	882	878	847	1,290	929	1,014
Average traded value per trade (USD)	91,047	100,770	62,805	73,737	83,010	94,479
Total number of buys	13,028	11,918	19,272	27,869	8,851	11,575
Average traded value per buy (USD)	90,324	97,632	60,370	74,423	87,181	100,770
Total number of sells	6,432	5,529	8,138	8,005	13,481	10,024
Average traded value per sell (USD)	92,514	107,534	68,569	71,348	87,181	87,216
Panel B. Pension Fund Managers (AFP) and Group Affiliations						
AFP name	AUM (USD billions)	Flows (percent of AUM)	No. of stocks	Stocks with affiliation		
Ing	6.67	2.35	43	2		
Colfondos	8.00	2.22	40	2		
Horizonte	9.27	2.02	42	1		
Porvenir	19.30	2.32	29	8		
Proteccion	13.77	2.32	41	17		
Skandia	2.53	3.60	29	0		

Source: Data from the Colombian Stock Exchange and Superfinanciera de Colombia (SFC).

Note: Panel A presents descriptive statistics for each year of the sample period for trades executed on affiliated and non-affiliated stocks. Panel B reports assets under management (AUM) and monthly net flows for each pension fund manager. The table also reports the number of stocks that were traded by each AFP during the sample period and those that are in the same business group.

Table 3. Summary Statistics

Variable	Group-affiliated			Non-affiliated			Mean difference <i>t</i> -statistic
	Mean	Median	SD	Mean	Median	SD	
INS	0.888	0.920	0.134	0.848	0.938	0.202	3.94
FOREIGN	0.130	0.020	0.228	0.303	0.052	0.379	-9.35
GOVNT	0.047	0.000	0.120	0.30	0.000	0.412	-14.06
B/M	1.223	0.755	1.284	1.292	0.681	2.244	-0.62
SIZE	15.655	15.896	1.250	14.427	14.313	1.66	14.05
ROA	0.022	0.014	0.035	0.042	0.030	0.067	-6.26
LEV	2.399	0.613	3.139	1.219	0.372	2.805	6.68
TURNOVER	0.128	0.208	0.109	0.268	0.285	0.237	5.86

Source: Superfinanciera de Colombia.

Note: Descriptive statistics for publicly traded companies. Mean, median, and standard deviation of variables split by affiliated and non-affiliated companies. INST, FOREIGN, and GOVNT are the percentage of shares held by domestic institutional investors, by foreign investors, and by the Colombian government respectively. B/M is the book-to-market ratio. SIZE, ROA, and LEV are the log of total assets, return over assets, and firms liabilities. TURNOVER is the number of shares traded in a year.

Table 4. Variable Definitions

Variable	Definition	Source
$INST_{s,t}$	Percentage of shares held by institutional investors	SFC
$FOREIGN_{s,t}$	The percentage of shares held by foreign investors	SFC
$B/M_{s,t}$	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
$SIZE_{s,t}$	Firm size computed as the log of total assets at the end of the quarter	SFC
$ROA_{s,t}$	Return over assets	SFC
$LEV_{s,t}$	Leverage computed as total liabilities divided by total assets	SFC
$TURNOVER_{s,t}$	Number of shares traded in a year, divided by the number of shares outstanding	Compustat Global
$AFFIL_{s,f,t}$	An indicator variable for each stock-PFA pair. It equals to 1 if the PFA and the firm belong to the same business group	SFC

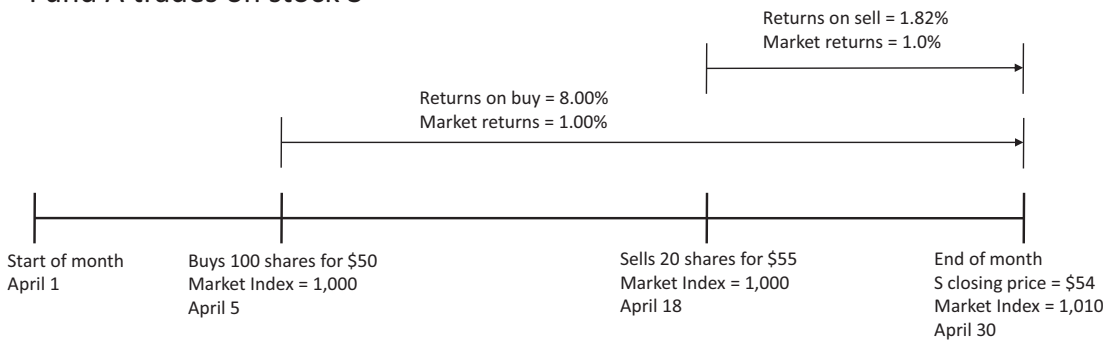
Source: Data from Compustat Global and Superfinanciera de Colombia (SFC).

liquidity-based index for the Colombian stock market.¹⁷ Next, for each stock-fund pair we calculate the principal-weighted raw and adjusted returns for all trades executed within the period.

Figure 2 illustrates the methodology. In the figure, pension fund A executes one purchase of \$5,000 (100 shares × \$50) and one sell of \$1,100 (20 shares × \$55) during the month on stock S. The total value traded on the stock is \$6,100 and the principal-weighted raw return is 6.89 percent. In this example, the weighted and raw returns for the purchase are 0.82 (\$5,000/\$6,100) and 8.00 percent respectively, and those for the sell are 0.18 (\$1,100/\$6,100) and 1.82 percent. Market-adjusted returns are calculated by subtracting the market index return over the identical holding period for each transaction and taking the weighted average return for all trades. This yields a principal-weighted market-adjusted return of 5.89 percent.

Figure 2. Example of Trading Performance

Fund A trades on stock S



Source: Author's analysis based on an example provided in the text.

While the measurement of performance follows Puckett and Yan (2011), we depart from their strategy in one important aspect. Instead of accumulating total performance by investor (i.e., by adding returns across all stocks within a given period for every investor), we analyze returns at the stock level for every institutional investor in the sample.

To determine whether pension funds display superior skills in timing their trades in group-affiliated stocks, we estimate fund f monthly or quarterly trading returns on stock s ($ret_{f,s,t}$) as follows:

$$ret_{f,s,t} = \alpha_f + \alpha_s + \alpha_t + \beta_1 AFFIL_{f,s,t} + \beta_2 CONTROLS_{s,t} + \varepsilon_{f,s,t}. \tag{1}$$

17 To avoid spurious correlations, when calculating the market-adjusted performance of a fund in a given stock, the IGBC returns are computed excluding the stock from the index.

$AFFIL_{f,s,t}$ is a dummy variable equal to one if the stock and pension fund belong to the same business group at time t . Our stock controls include firm size $SIZE_{s,t}$, book-to-market ratio $BM_{s,t}$, and returns over assets $ROA_{s,t}$. Furthermore, we include fund (α_f), stock (α_s), and time (α_t) fixed effects. Time fixed effects correct for serial correlation parametrically and we also calculate standard errors clustered at the stock level as in Petersen (2009). Fund fixed effects control for the possibility that the superior performance is driven by a single AFP.

The coefficient β in equation (1) can be interpreted as the difference between the performance of trades by an affiliated fund m versus the performance of trades by a non-affiliated fund n in the the same stock s in period t . This performance is calculated in excess of the relative performance of fund m over fund n in a stock w that has no group affiliation to either AFP. More formally, $\beta = (ret_{m,s,t} - ret_{n,s,t}) - (ret_{m,w,t} - ret_{n,w,t})$. In other words, by comparing same stock-period trading returns between affiliated and non-affiliated pension funds, we can control for stock, fund, and market time-variant characteristics, isolating the component of performance that is attributable to the affiliation status of the AFP.

The empirical approach with trading performance for each stock-fund pair has one important advantage over methods that measure informed trading at the stock level. For example, the probability of informed trading (PIN) first proposed by Easley et al. (1996) measures the proportion of trades in a stock that are likely motivated by private information.¹⁸ PIN estimates, however, are only useful to compare stocks in the cross-section. On the other hand our strategy and main question are within stock. That is, we test for each stock whether the group affiliated fund manager displays superior performance versus those with no affiliation. While portfolio managers do not always trade on information, as they might trade based on liquidity or hedging needs, the premise here is that better-informed managers will make more profitable trades on average.

5. Empirical Results

We begin our empirical analysis by investigating the average differences in trading performance. For each stock-period, we calculate the difference between the returns of the affiliated AFP and the returns of non-affiliated AFPs. Table 5 presents this difference in performance averaged across the subsample

Table 5. Excess Performance in Affiliated Stocks

	Monthly	Quarterly
Raw return	0.742** (2.09)	1.774** (2.32)
Adjusted return	0.548* (1.75)	1.519** (2.17)
Buy	0.393** (2.092)	1.460** (2.861)
Sell	0.087 (0.395)	0.887 (1.244)
Buy adjusted	0.285** (2.309)	1.308** (1.998)
Sell adjusted	0.223 (0.643)	0.667 (1.301)

Source: Author's analysis based on data from Compustat Global, Superfinanciera de Colombia, and the Colombian Stock Exchange.

Note: For each stock, we calculate the difference in trading performance between affiliated and non-affiliated AFPs during each month/quarter. The table reports averages in excess performance for all trades, and buy and sell transactions separately. Numbers in parentheses are t -statistics, calculated from standard errors clustered at the stock level. ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1 percent/5 percent/10 percent level.

18 PIN is commonly used in the literature to analyze the role of information asymmetry on liquidity and expected returns (e.g., Easley and O'Hara 2004; Cruces and Kawamura 2004).

of 30 stocks with group affiliation over the sample period.¹⁹ For these stocks, affiliated pension funds significantly outperform non-affiliated managers during a month by 0.74 percent (t -statistic = 2.09) and by 1.77 percent (t -statistic = 2.32) over a quarter. Affiliated managers also outperform their peers when we calculate market adjusted returns.

Several studies have documented asymmetry in the performance of buy and sell trades by institutional investors (Chan and Lakonishok 1993, 1995; Puckett and Yan 2011). The general argument is that under short-sale constraints, an institutional investor is limited to sell only securities in its portfolio, while it is unconstrained when purchasing new securities. In turn, institutional sales might not necessarily convey negative firm-specific information. To account for this observation, table 5 reports the difference between trading performance among affiliated and non-affiliated AFPs (raw and market-adjusted), disaggregated for buys and sells. Consistent with previous studies, the excess performance of affiliated pension fund managers in the sample is mostly driven by purchases. In particular, AFPs buy transactions on affiliated stocks to generate monthly excess raw (market-adjusted) returns of 0.39 percent (0.29 percent). Conversely, excess returns on sell trades are indistinguishable from zero.

We now turn to our estimates of model (1). According to table 6, pension funds trading on affiliated stocks generate an excess rate of return of 0.85 percent (t -statistic = 2.78) over non-affiliated funds that

Table 6. Estimation of Trading Performance

	Monthly			Quarterly		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Raw Returns						
<i>AFFIL</i>	0.846*** (2.775)	0.838*** (2.698)	0.833** (2.672)	1.788** (2.256)	1.787** (2.263)	1.814** (2.288)
Log of trading volume		0.330 (1.367)			0.150 (0.211)	
Log of number of investors			0.344** (2.080)			-0.522 (-0.882)
Adjusted R^2	0.081	0.083	0.083	0.181	0.183	0.183
Panel B. Market-Adjusted Returns						
<i>AFFIL</i>	0.533** (1.992)	0.530** (1.987)	0.526* (1.706)	1.506* (1.680)	1.506* (1.683)	1.553* (1.745)
Log of trading volume		0.097 (0.321)			-0.223 (-0.285)	
Log of number of investors			0.170 (0.788)			-0.938 (-1.456)
Adjusted R^2	0.146	0.147	0.147	0.125	0.127	0.129
Stock fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Stock	Stock	Stock	Stock	Stock	Stock
Stock controls	No	Yes	Yes	No	Yes	Yes
No. of observations	3473	3463	3363	1773	1766	1766

Source: Author's analysis based on data from Compustat Global, Superfinanciera de Colombia, and the Colombian Stock Exchange.

Note: The dependent variables are principal-weighted raw and market-adjusted returns calculated from all intra-month (columns 1-3) and intra-quarter (columns 4-5) trades. $AFFIL_{f,s,t}$ is a dummy variable equal to one if the stock s and fund f belong to the same business group. All the specifications include stock, time, and fund fixed effects. Numbers in parentheses are t -statistics clustered at the stock level. ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1 percent/5 percent/10 percent level.

19 Since differences in performance might be correlated for each stock, we compute t -statistics based on standard errors clustered at the stock level.

trade the same stock during the same month. The difference is 0.53 percent (t -statistic = 1.99) when we compare market adjusted returns. The estimated coefficient for group affiliation changes only marginally when we include stock-level controls (columns 2 and 3).²⁰ The table also presents estimates of raw and market-adjusted returns at quarterly frequencies (columns 4 to 6). In particular, trading activity during the quarter generates 1.79 percent excess returns for affiliated over non-affiliated AFPs (t -statistic = 2.26). The difference in quarterly market-adjusted returns is also positive at 1.51 percent, although only marginally significant at the 10 percent confidence level (t -statistic = 1.68).

We repeat the estimation of equation 1 for buy and sell trades separately. Table 7 presents the coefficients for group affiliation in each case. All the specifications include time, stock, and fund fixed effects with t -statistics clustered at the stock level. The first column (“all trades”) in the table displays the coefficient for group affiliation when all trades during the period are included, replicating the results from columns (1 to 4) in table 6. We find that most of the excess performance of affiliated pension funds can be attributed to buy transactions. For example, out of the 0.85 percent excess returns that affiliated AFPs generate from their trading activity during a month, 0.77 percent (t -statistic = 2.77) corresponds to the performance of stock purchases. A similar pattern is found for market-adjusted returns and trading performance measured quarterly. The excess performance of sell trades is positive but statistically insignificant. While this result would suggest that affiliated AFPs do not generate excess returns from sell trades, some sell transactions might still improve the fund’s overall performance, for example, if the sell is part of a profitable round-trip trade that was executed within the month.

Table 7. Buy and Sell Trades

	All trades	Buys	Sells
Raw returns (monthly)	0.846*** (2.775)	0.769*** (2.770)	0.070 (0.337)
Raw returns (quarterly)	1.788** (2.256)	1.205** (2.328)	0.732 (1.145)
Adjusted returns (monthly)	0.533** (1.992)	0.494** (2.222)	0.112 (0.377)
Adjusted returns (quarterly)	1.506* (1.680)	0.960 (1.528)	0.883 (1.044)

Source: Author’s analysis based on data from Compustat Global, Superfinanciera de Colombia, and the Colombian Stock Exchange.

Note: The dependent variables are principal-weighted raw and market-adjusted returns calculated from intra-month and intra-quarter buy and sell trades. The table presents estimated coefficients for $AFFIL_{f,s,t}$, a dummy variable equal to one if the stock s and fund f belong to the same business group. All the specifications include stock, time, and fund fixed effects. Numbers in parentheses are t -statistics clustered at the stock level. ***/**/* indicate that the coefficient estimates are significantly different from zero at the 1 percent/5 percent/10 percent level.

The evidence above indicates that affiliated AFPs have superior trading skills in stocks that belong to their business group. This raises the question as to the type of information that is available to fund managers, that is whether it is private knowledge of M&A activity, good/bad quarterly performance, government contracts, or some other. Unfortunately, given the small number of stocks in the Colombian market, the data are not well suited to adding more layers to the cross-sectional analysis. For instance, Thomson Reuters only has a total of 19 M&A deals of Colombian stocks with group affiliation in our sample.²¹ Other data that might be useful to uncover the nature of information are very limited. For

20 The table displays the estimates for the log of monthly trading volume and the log of the number of investors in each stock and omits other controls for brevity.

21 While the total reports of M&A and other investment deals in Thomson Reuters during our period of observation are around 215, we can only match 19 of those records to stocks that have group affiliation with one of our AFPs.

example, data on analyst earning forecasts from the Institutional Brokers' Estimate System (IBES) are only available for 10 Colombian stocks before 2011 (only three of these are affiliated with an AFP).

While our setting does not allow us to perform meaningful empirical tests to determine the type of information flows in business groups, our results do indicate that institutional investors consistently overperform in their trades of affiliated companies, which would suggest that there is significant private information available to them.

An supplementary online appendix S1 presents an example where an AFP made large stock purchases of a company in the same business group ahead of the public announcement of a major acquisition deal. In addition to providing anecdotal evidence on the type of information that might be available to institutional investors that belong to the business group, the example also shows how the affiliated manager trades to take advantage of the information. That is, the AFP splits its trades over multiple small transactions and submit orders via different brokers.

6. Estimating Information Flows with the Data on Holdings

The results in the previous section support the hypothesis that institutional investors possess significant trading skills on the stocks of group-affiliated companies. The empirical strategy above was possible thanks to the access to transactional data for Colombian pension funds. In most cases, records of individual transactions are not available for a researcher trying to identify informed trading.²² For institutional investors, the most common available data are holdings at monthly or quarterly frequencies.

In this section, we introduce an empirical strategy to test for informed trading using monthly holdings. In such a case, total changes in individual stock holdings between periods are observed while information of trades that are reversed within the period and details on individual transactions are omitted.

We begin by restating our initial hypothesis (H1) under the assumption that only the data on holdings are available: If information flows from listed companies to their affiliated pension fund managers, we expect that changes in holdings of these funds to be correlated systematically with the future performance of the stock. That is, if changes in holdings in affiliated stocks are driven by information available to the pension fund manager of the group, then the performance in stocks in which affiliated funds increase (decrease) their holdings should be superior (inferior) to the performance following the change in holdings by non-affiliated AFPs.

H2. *Changes in holdings by affiliated funds should be more correlated with stock future performance than (a) changes in holdings by non-affiliated funds in the same stock and (b) changes in holdings by the same fund in other similar stocks with no affiliation.*

The alternative hypothesis is that in the absence of information flows within business groups, the relationship between changes in holdings and future stock performance should be the same for affiliated and non-affiliated firms.

To test for H2 we proceed as follows. We define the percentage of stock s held by each fund at the end of month t as

$$H_{f,s,t} = \frac{A_{f,s,t}}{SO_{s,t}} \quad (2)$$

22 Supervisory agencies and financial regulators, however, do have access to trading data, and it is possible that in different financial jurisdictions these agencies could use a similar empirical strategy to the one used in our paper to identify cases of informed trading in business groups.

where $A_{f,s,t}$ is the number of shares in the portfolio of pension fund f and $SO_{s,t}$ is the number of shares outstanding. A typical proxy for trading activity is the change in holdings between $t - 1$ and t (e.g., [Massa and Rehman 2008](#)):

$$\Delta H_{f,s,t} = H_{f,s,t} - H_{f,s,t-1}. \quad (3)$$

For each stock, adjusted returns ($ARET_{s,t}$) are calculated as $ARET_{s,t} = r_{s,t} - E[r_{s,t}]$, where $r_{s,t}$ are stock returns between $t - 1$ and t , and expected returns ($E[r_{s,t}]$) are calculated relative to the market index.

In order to assess whether *trades* are informative, we test if changes in holdings are positively correlated with future stock returns. Additionally, we check for momentum versus contrarian style of trading by relating changes in holdings to past abnormal stock returns. We estimate the following regression model:

$$\Delta H_{f,s,t} = \alpha_f + \alpha_s + \alpha_t + \beta_1 X_{s,t} + \beta_2 X_{s,t} \times AFFIL_{f,s,t} + \beta_3 AFFIL_{f,s,t} + \gamma CONTROLS_{f,s,t} + \varepsilon_{f,s,t} \quad (4)$$

where $X_{s,t}$ is either stock s lagged monthly abnormal returns $ARET_{s,t-1}$ or future monthly abnormal returns $ARET_{s,t+1}$. We use the same set of controls as in section 5, including time, stock, and fund fixed effects. The coefficient β_2 measures how past and future returns are related to pension fund changes in stock holdings over time when the fund belongs to the same business group as the firm. Given the potential persistence, we allow the error term $\varepsilon_{f,s,t}$ to be correlated within stocks. We standardize $\Delta H_{f,s,t}$ such that the magnitude of the estimated coefficients is directly informative about economic significance.

[Table 8](#) presents the results. The coefficient on $ARET_{t-1}$ in column 1 is positive and significant at the 5 percent confidence level. Pension fund managers appear to be momentum traders on the average stock. There is extensive evidence of momentum trading among institutional asset managers. Perhaps the closest setup to the Colombian institutional environment is Chile, where [Raddatz and Schmukler \(2013\)](#) document momentum strategies among AFPs. According to [Pedraza \(2015\)](#), momentum trading by AFPs in these countries is exacerbated by regulation which explicitly penalizes pension fund managers for underperformance relative to their peers.²³ In these circumstances, if an AFP is under-invested relative to its peers in a stock with high returns, it might have to increase its holdings in the stock in order to avoid the likelihood of underperforming its peers in the future. Interestingly, the estimated coefficient of $ARET_{t-1} \times AFFIL_{f,s,t}$ in column (1) is not statistically different from zero, which implies that fund managers are momentum traders in both affiliated and non-affiliated stocks.

To answer the question of whether trades by affiliated pension funds are informative about future returns we turn to column (2) in [table 8](#). The coefficient of $ARET_{s,t+1}$ is not significantly different from zero; that is, there is no evidence that trades by pension fund managers on non-affiliated stocks are positively correlated with future abnormal returns. On the contrary, the estimated parameter on the interaction term $ARET_{s,t+1} \times AFFIL_{f,s,t}$ is positive at 0.028 and significant with a t -statistic of 2.60. The result suggests that monthly changes in holdings by pension funds on affiliated firms are in general informative about future abnormal returns. The economic significance of the result can be interpreted as follows. After an AFP increases its net flows in an affiliated stock by one standard deviation, the stock experiences on average abnormal returns of 35.7 percent during the following month ($0.028 \times 35.7 = 1$). These results, momentum trading in all stocks and the positive correlation between trades and future returns for affiliated stocks, are robust to controlling for lagged AFP holdings (columns 2 to 4 in [table 8](#)).

In addition to adjusting returns using the IGBC index, stock performance ($ARET$) is measured relative to the value-weighted average returns across all active stock in the exchange. Since the IGBC is a value- and liquidity-based index, it might overweight stocks with high trading activity.²⁴ For example,

23 This regulation is popular in many countries in the region with pension systems based on individual retirement accounts, e.g., Chile, Peru, Uruguay, among several others.

24 Starting in 2013, the exchange replaced the IGBC with the Colombian Capital Index (COLCAP), a value-based market index.

Table 8. Trading by Pension Funds and Abnormal Stock Returns

	(1)	(2)	(3)	(4)	(5)	(6)
$ARET_{t-1}$	0.009** (1.982)		0.009** (2.109)		0.012** (2.034)	
$ARET_{t+1}$		0.005 (0.954)		0.005 (0.931)		0.005 (0.973)
$ARET_{t-1} \times AFFIL$	0.020 (1.011)		0.021 (1.070)		0.019 (0.972)	
$ARET_{t+1} \times AFFIL$		0.028*** (2.601)		0.033** (2.448)		0.031** (2.568)
$AFFIL$	-0.108 (-0.732)	-0.144 (-0.943)	-0.084 (-0.589)	-0.107 (-0.734)	-0.105 (-0.690)	-0.142 (-0.909)
$SIZE$	0.063 (0.193)	0.069 (0.201)	0.021 (0.063)	0.027 (0.077)	0.069 (0.208)	0.074 (0.215)
$TURNOVER$	0.118 (0.397)	0.081 (0.307)	0.116 (0.374)	0.088 (0.307)	0.118 (0.398)	0.081 (0.309)
H_{t-1}			-6.663** (-2.370)	-6.799*** (-2.584)		
CONSTANT	-1.506 (-0.259)	-1.644 (-0.271)	-0.735 (-0.126)	-0.880 (-0.145)	-1.598 (-0.273)	-1.733 (-0.284)
Stock fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Stock	Stock	Stock	Stock	Stock	Stock
R^2	0.05	0.05	0.05	0.05	0.05	0.05
Number observations	4215	4150	4215	4134	4215	4134

Source: Author's analysis based on data from Compustat Global and Superfinanciera de Colombia.

Note: The dependent variable is the monthly change in holdings $\Delta H_{f,s,t}$ of pension fund f in stock s . $ARET_{s,t}$ is the monthly abnormal returns calculated relative to a market index; columns (1–4) use the IGBC index and columns (5–6) use the value weighted returns of all active stocks in the domestic market. $AFFIL_{f,s,t}$ is a dummy variable equal to one if the stock s and fund f belong to the same business group. Serial correlation is corrected parametrically with monthly fixed effects as in Petersen (2009) and t -statistics (in parentheses) are calculated from standard errors clustered at the stock level. ***/**/** indicate that the coefficient estimates are significantly different from zero at the 1 percent/5 percent/10 percent level.

Ecopetrol, a state-owned oil company that debuted on the exchange in November 2007, was the most traded stock for several months in our sample. While its market value never exceeded 30 percent of the total market capitalization, the stock's weight on the IGBC reached a maximum value of 52 percent in February 2009. To avoid the potential bias that might result from overweighting stocks with high turnover, columns (5 to 6) present the estimates of equation (4) when abnormal returns ($ARET$) are calculated relative to the value-weighted market returns. The main findings hold under these specifications.²⁵

In an additional robustness check, we test whether higher predictability stems from larger stock ownership relative to other pension funds. For instance, AFPs might specialize in a subset of listed firms, in which they end up with larger fractional ownership relative to other pension fund managers. We denote $w_{f,s,t}$ as the weight of stock s in the portfolio of pension fund f at the end of month t . For each stock, we calculate its weight $\pi_{s,t}$ in the industry portfolio, which refers to the aggregate holdings of all pension funds. To be precise, $\pi_{s,t} = \frac{1}{AUM_t} p_{s,t} \times \sum_f A_{f,s,t}$, where AUM_t are the total assets under management by all pension funds at time t , and $p_{s,t}$ is the stock price. We define overexposure as the weight of stock s in the portfolio of fund f relative to the weight in the industry portfolio, that is $OEXP_{f,s,t} = w_{f,s,t} - \pi_{s,t}$. The mean and standard deviation of overexposure in the sample are 0.05 and 0.46 percent respectively.

25 We also exclude Ecopetrol from the sample and estimate equation (4). The results are almost identical to columns (5 to 6) in table 8 and we omit them for brevity.

We test whether monthly changes in holdings by AFPs in stocks with large overexposure better predict future returns. We estimate equation (4) including $OEXP_{f,s,t-1}$ and the interaction with future abnormal returns in replacement of the affiliation dummy. Table 9 presents the results. The coefficient for lagged overexposure is negative and statistically significant in all specifications. The economic significance of overexposure on stock flows can be read as follows. If a stock is underweighted on a fund by 1 percent relative to the industry portfolio, the AFP will increase its net flows (ΔH) in the stock by 0.169 standard deviations over the following month. This finding is consistent with herding behavior—AFPs with low relative ownership in a stock might increase their holdings to maintain a low tracking error relative to their peers, perhaps to avoid underperformance.

Table 9. Relative Ownership vs. Other Pension Funds

	(1)	(2)	(3)	(4)
$ARET_{t-1}$	0.012** (1.878)		0.012* (1.863)	
$ARET_{t+1}$		0.008 (1.597)		0.008 (1.621)
$ARET_{t-1} \times OEXP_{t-1}$	-0.010 (-1.165)		-0.010 (-1.166)	
$ARET_{t+1} \times OEXP_{t-1}$		0.011 (1.421)		0.011 (0.921)
$OEXP_{t-1}$	-0.169** (-2.690)	-0.159** (-2.443)	-0.191** (-2.539)	-0.174** (-2.422)
H_{t-1}			1.662 (0.690)	1.237 (0.603)
CONSTANT	-1.025 (-0.194)	-1.085 (-0.196)	-1.194 (-0.227)	-1.208 (-0.219)
Stock fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes
Cluster	Stock	Stock	Stock	Stock
R^2	0.05	0.05	0.05	0.05
Number observations	4087	4006	4087	4006

Source: Author's analysis based on data from Compustat Global and Superfinanciera de Colombia.

Note: The dependent variable is the monthly change in holdings $\Delta H_{f,s,t}$ of pension fund f in stock s . $ARET_{s,t}$ is the monthly abnormal returns calculated relative to a market index. Overexposure is defined as the weight ($w_{f,s,t}$) in stock s of fund f relative to the peer portfolio $OEXP_{f,s,t} = w_{f,s,t} - \pi_{s,t}$. The peer portfolio refers to the holdings of all six pension funds in each stock ($\pi_{s,t}$). Serial correlation is corrected parametrically with month fixed effects as in Petersen (2009) and t -statistics (in parentheses) are calculated from standard errors clustered at the stock level. ***/**/** indicate that the coefficient estimates are significantly different from zero at the 1 percent/5 percent/10 percent level.

We confirm once again that AFPs are momentum traders on the average stock; the coefficients for lagged abnormal returns are positive and significant in columns (1) and (3). However, the correlation between changes in holdings by overexposed AFPs and future stock returns is indistinguishable from zero. The result implies that changes in holdings by AFPs with large exposure to a stock do not anticipate returns as we documented for affiliated pension funds earlier. In other words, while a common strategy among AFPs is to trade to stay close to the industry portfolio, stock predictability results from trades on affiliated stocks and not from trades on stocks with large fractional holdings.

The strategy with monthly holdings provides further support for the informational advantage of group-related asset managers. In particular, changes in monthly holdings on affiliated firms

anticipate future returns. It is interesting that even though the empirical strategy with portfolio holdings does not fully capture the potential trading profits to pension fund managers with private information, the overall results are still consistent with the previous findings in section 5. Whether a similar strategy could help identify information flows in other settings is likely to depend on the speed of the market and the type of information that investors access. For example, if stock prices incorporate new information quickly, and trading opportunities are short-lived, all the price adjustment is expected to occur within the month, and the correlation between changes in holdings and future returns would be zero. In the Colombian example, at least, it appears that information is being incorporated slowly since there is evidence of abnormal returns even in the month after an affiliated AFP increased its holdings.

7. Conclusions

This paper documented informed trading by institutional investors when they belong to a business group. The paper finds that trades by affiliated pension fund managers significantly outperform trades by non-affiliated managers. The results suggest that institutional investors with group affiliation to listed companies have access to private information.

An important lesson from this work is that the widespread presence of business group networks might limit the potential gains from financial innovation (in line with the arguments of [Stulz \[2005\]](#)). For instance, between 2011 and 2016, the Colombian Exchange and local regulatory authorities continued their efforts to foster equity market deepening. In collaboration with the exchanges of Chile, Peru, and Mexico, they implemented the Latin America Integrated Market (MILA), which allowed investors to trade securities across borders through local brokerage firms. Also, the exchange introduced new electronic platforms to trade stock options and futures. Despite these efforts, the domestic stock market remains small—with more delisting than new public offerings in the period, and no significant improvements in trading activity. It is possible that the limited impact from these innovations can be in part explained by the pervasive role of insider trading in the market. Furthermore, it is possible that business groups use the holdings from affiliated pension funds to increase the control in publicly traded companies of the group, thereby increasing ownership concentration and the agency costs for minority shareholders.

Overall, domestic institutional investors with extensive ties to local industries might hamper financial development by indirectly discouraging outside investors to participate in these markets, and in turn increase the cost of capital for firms (e.g., [Amihud 2002](#); [Brennan and Subrahmanyam 1996](#)). Moreover, by discouraging outside investors to produce information, secondary markets might become less informationally efficient ([Gul, Kim, and Qiu 2010](#)), failing to provide useful signals to households, firms, financial intermediaries, and regulatory authorities. It is possible that the private benefits of information flows between business groups and the potential economies of scale in the asset management industry might be outweighed by the social costs of the higher cost of capital and less efficient markets. In such a case, local financial authorities might need to consider regulation that discourages trading activity in group affiliated firms.

References

- Aggarwal, R., I. Erel, M. Ferreira, and P. Matos. 2011. "Does Governance Travel Around the World? Evidence from Institutional Investors." *Journal of Financial Economics* 100 (1): 154–81.
- Almeida, H., C.-S. Kim, and H. B. Kim. 2015. "Internal Capital Markets in Business Groups: Evidence from the Asian Financial Crisis." *Journal of Finance* 70 (6): 2539–86.
- Amihud, Y. 2002. "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects." *Journal of Financial Markets* 5 (1): 31–56.

- Barca, F., and M. Becht. 2001. *The Control of Corporate Europe*. Oxford: Oxford University Press.
- Bodnaruk, A., M. Massa, and A. Simonov. 2009. "Investment Banks as Insiders and the Market for Corporate Control." *Review of Financial Studies* 22 (12): 4989–5026.
- Brennan, M. J., and A. Subrahmanyam. 1996. "Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns." *Journal of Financial Economics* 41 (3): 441–64.
- Chan, L. K. C., and J. Lakonishok. 1993. "Institutional Trades and Intraday Stock Price Behavior." *Journal of Financial Economics* 33 (2): 173–99.
- . 1995. "The Behavior of Stock Prices Around Institutional Trades." *Journal of Finance* 50 (4): 1147–74.
- Claessens, S., S. Djankov, and L. H. P. Lang. 2000. "The Separation of Ownership and Control in East Asian Corporations." *Journal of Financial Economics* 58 (1): 81–112.
- Claessens, S., S. Djankov, J. P. H. Fan, and L. Lang. 2002. "Disentangling the Incentive and Entrenchment Effects of Large Shareholdings." *Journal of Finance* 57 (6): 2741–71.
- Claessens, S., J. P. H. Fan, and L. H. P. Lang. 2006. "The Benefits and Costs of Group Affiliation: Evidence from East Asia." *Emerging Markets Review* 7 (1): 1–26.
- Cohen, L., A. Frazzini, and C. Malloy. 2008. "The Small World of Investing: Board Connections and Mutual Fund Returns." *Journal of Political Economy* 116 (5): 951–79.
- Copeland, T., and D. Galai. 1983. "Information Effects on the Bid-Ask Spread." *Journal of Finance* 38 (5): 1457–69.
- Coval, J. D., and T. J. Moskowitz. 2001. "The Geography of Investment: Informed Trading and Asset Prices." *Journal of Political Economy* 109 (4): 811–41.
- Cruces, J. J., and E. Kawamura. 2004. "Insider Trading and Corporate Governance in Latin America." *Investor Protection and Corporate Governance* p. 85.
- Easley, D., N. M. Kiefer, M. O'Hara, and J. B. Paperman. 1996. "Liquidity, Information, and Infrequently Traded Stocks." *Journal of Finance* 51 (4): 1405–36.
- Easley, D., and M. O'Hara. 2004. "Information and the Cost of Capital." *Journal of Finance* 59 (4): 1553–83.
- Faccio, M., and L. H. P. Lang. 2002. "The Ultimate Ownership of Western European Corporations." *Journal of Financial Economics* 65 (3): 365–95.
- Ferreira, M. A., and P. Matos. 2008. "The Colors of Investors' Money: The Role of Institutional Investors around the World." *Journal of Financial Economics* 88 (3): 499–533.
- Glosten, L. R., and P. R. Milgrom. 1985. "Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders." *Journal of Financial Economics* 14 (1): 71–100.
- Griffin, J. M., N. H. Hirschey, and P. J. Kelly. 2011. "How Important Is the Financial Media in Global Markets?" *Review of Financial Studies* 24 (12): 3941–92.
- Gul, F. A., J.-B. Kim, and A. A. Qiu. 2010. "Ownership Concentration, Foreign Shareholding, Audit Quality, and Stock Price Synchronicity: Evidence from China." *Journal of Financial Economics* 95 (3): 425–42.
- Gutiérrez, L. H., C. Pombo, and R. Taborda. 2008. "Ownership and Control in Colombian Corporations." *Quarterly Review of Economics and Finance* 48 (1): 22–47.
- Irvine, P., M. Lipson, and A. Puckett. 2006. "Tipping." *Review of Financial Studies* 20 (3): 741–68.
- Ivashina, V., and Z. Sun. 2011. "Institutional Stock Trading on Loan Market Information." *Journal of Financial Economics* 100 (2): 284–303.
- Khanna, T., and K. Palepu. 2000. "Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups." *Journal of Finance* 55 (2): 867–91.
- Kothari, S. P., and J. B. Warner. 2001. "Evaluating Mutual Fund Performance." *Journal of Finance* 56 (5): 1985–2010.
- Kyle, A. S. 1985. "Continuous Auctions and Insider Trading." *Econometrica* 53 (6): 1315–35.
- La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 1999. "Corporate Ownership around the World." *Journal of Finance* 54 (2): 471–517.
- Massa, M., and A. Žaldokas. 2017. "Information Transfers among Co-Owned Firms." *Journal of Financial Intermediation* 31: 77–92.
- Massa, M., and Z. Rehman. 2008. "Information Flows within Financial Conglomerates: Evidence from the Banks–Mutual Funds Relation." *Journal of Financial Economics* 89 (2): 288–306.
- Masulis, R. W., P. K. Pham, and J. Zein. 2011. "Family Business Groups around the World: Financing Advantages, Control Motivations, and Organizational Choices." *Review of Financial Studies* 24 (11): 3556–3600.

- Organisation for Economic Co-operation and Development (OECD). 2015. *Corporate Governance of Company Groups in Latin America*. Paris: OECD Publishing.
- Opazo, L., C. Raddatz, and S. L. Schmukler. 2015. "Institutional Investors and Long-Term Investment: Evidence from Chile." *World Bank Economic Review* 29 (3): 479–522.
- Pedraza, A. 2015. "Strategic Interactions and Portfolio Choice in Money Management: Theory and Evidence." *Journal of Money, Credit and Banking* 47 (8): 1531–69.
- Petersen, M. 2009. "Estimating Standard Errors in Finance Panel Datasets: Comparing Approaches." *Review of Financial Studies* 22 (1): 435–80.
- Puckett, A., and X. S. Yan. 2011. "The Interim Trading Skills of Institutional Investors." *Journal of Finance* 66 (2): 601–33.
- Raddatz, C., and S. L. Schmukler. 2013. "Deconstructing Herding: Evidence from Pension Fund Investment Behavior." *Journal of Financial Services Research* 43 (1): 99–126.
- Stulz, R. M. 2005. "The Limits of Financial Globalization." *Journal of Finance* 60 (4): 1595–1638.
- Vittas, D. 1996. "Pension Funds and Capital Markets." *Public Policy for the Private Sector Note* 71, 1–1.