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**Insider trading and future
stock returns in firms with
concentrated ownership levels**

By *Dimitris K. Chronopoulos,
David G. McMillan, Fotios I.
Papadimitriou, Manouchehr
Tavakoli*

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Insider trading and future stock returns in firms with concentrated ownership levels

Dimitris K. Chronopoulos

School of Management, University of St Andrews

David G. McMillan,

School of Management, University of Stirling

Fotios I. Papadimitriou

Southampton Business School, University of Southampton

Manouchehr Tavakoli*

School of Management, University of St Andrews

Abstract

We investigate the relationship between insider trading and stock returns in firms with concentrated ownership. To this end, we employ data from East Asian countries which span the period 2003:01-2012:05. Consistent with previous literature, we find a significant negative relationship between the selling activity of insiders and stock returns. However, contrary to studies which focus on highly developed markets, we find that the insiders' buying activity is also inversely related to future stock returns. Our analysis shows that top directors with higher ownership levels drive this result, suggesting that the trading activity of insiders is not always associated with profit making motives and can be explained by their level of ownership. Furthermore, we demonstrate that a trading strategy focusing solely on purchases made by top directors with high ownership levels yields negative returns. The paper has important implications for outside investors who mimic insiders with the aim to realise profits.

JEL Classification: G12; G14; C53

Keywords: Insider trading, Stock returns, Economic value, Trading strategies

* Corresponding author: School of Management, University of St Andrews, The Gateway, St Andrews, Fife, KY16 9 RJ, Scotland, UK. Email: mt@st-andrews.ac.uk; Tel: +44 (0)1334 462810; Fax: +44 (0)1334 462812.

1. Introduction

The demand for lawful information that could potentially help investors predict the future movement of stocks is enormous. There is now a rich literature on insiders' trading which shows that insiders can earn abnormal profits through trading stocks of their own firms (Lin and Howe, 1990; Seyhun, 1986, 1988, 1990 1998; Rozeff and Zaman, 1998; Lakonishok and Lee, 2001; Jenter, 2005; Fidrmuc et al., 2006; Marin and Olivier, 2008; Gangopahyay et al, 2009; Jiang and Zaman, 2010). There is also evidence that outsiders can profit by mimicking the insiders' transactions (Jaffe, 1974; Tavakoli et al., 2012). However, the extant literature mainly focuses on firms in highly developed capital markets where ownership is diffused and insiders hold only a small fraction of the firm's equity. As a result, there is much less evidence based on firms where insiders are also large shareholders which could create different motives for their trading activity. Therefore, it is of utmost significance to explore the link between insiders' trading activity and future stock returns in this case for two reasons. First, it will enable us to assess whether previous findings in markets where ownership is diffused also hold in countries with more concentrated ownership. Second, it will allow us to investigate whether investors can make profits by mimicking the trading activity of insiders with different levels of ownership.

To address these issues, we employ data from a number of countries where firms are characterised by higher ownership concentration. In particular, our dataset includes China, Hong Kong, India, Singapore, and Taiwan and spans the period from 2003:01 to 2012:05. It is well documented that, unlike the US for example, most corporations in Asia have concentrated ownership structures (La Porta et al., 1999; Claessens et al., 2000; Faccio and Lang, 2002). With substantial ownership of the firm's equity, insiders have the incentive and power to take actions that benefit themselves at the expense of the firm's performance and thus ultimately at the expense of outside shareholders (see e.g., Fama and Jensen, 1985). On

the other hand, such concentrated ownership in the hands of insiders can ameliorate the agency conflict between managers and shareholders. Specifically, as their stakes in the company increase, managers pay a larger share of the costs of deviation from value maximisation and therefore are less likely to squander corporate wealth (Jensen and Meckling, 1976). Therefore, it could be argued that the trading activity of insiders with high levels of ownership, such as the ones considered in our paper, may not always be driven by the pursuit of profit based on private information but it could also be associated with other motives. For instance, they might want to support the price of their shares, which may be used in other dealings as collateral, through buying transactions or they could be making a market for their firms' shares if traded in relatively thin markets (Firth et al., 2011). Alternatively, insiders' buying activity may serve as a signal of the quality of their company to outside shareholders (Leland and Pyle, 1977). An important implication of the above and also one of the motivations of our paper is that outside investors who try to mimic the trading behaviour of insiders with high fractions of ownership may not always manage to gain profits compared to investors in the US and other highly developed markets.

Our contributions to the literature in relation to the above issues are as follows. First, although we confirm much of the previous literature by finding a significant negative relation between the selling activity of insiders and future stock returns (e.g. Seyhun, 1986), we show that the relation between buying activity and future stock returns is also negative. This is a new finding in East Asian markets which is in sharp contrast to studies which focus on the US or on European markets (e.g. Lin and Howe, 1990; Gregory et al., 1997; Lakonishok and Lee) and suggests that there could be other motives when insiders acquire shares. In particular, this could be explained by the high level of ownership which typically characterises the firms in the countries of our sample. To investigate the issue, we split directors into two groups, (i) the top directors comprised of the CEO and the Chairman of the

firm, and (ii) the rest of the directors. Interestingly, we indeed find that the negative relationship between stock returns and buying activity is related to the top manager and we further demonstrate that top managers with higher ownership levels drive this result. Therefore, our paper posits the view that the buying activity of insiders in firms where they possess high levels of ownership can be associated with reasons other than timing the market in order to realise profits. For example, as mentioned earlier, they could aim at supporting their own firm's share price, or they could make a market for the shares of their firm. Within this context, our study offers fresh empirical evidence on an important issue while at the same time it complements a smaller body of literature which focuses on firms characterised by concentrated ownership levels (e.g. Wong et al., 2000; Firth et al., 2011).

Second, we provide results of economic value which are in line with our statistical analysis and findings and have important implications for outside investors. Specifically, we show that a trading strategy which focuses solely on purchases made by top directors with low ownership levels yields high positive returns. However, our analysis reveals that a similar strategy which follows the buying activity of insiders with high ownership levels generates negative returns.. We additionally show that the difference between risk-adjusted returns based on the Sharpe ratios obtained from the two different strategies, is also statistically significant. As a further robustness check, we calculated the corresponding risk-adjusted portfolio returns (alphas) for the CAPM, Fama-French three-factor model, and Carhart four-factor model and our results remain unaltered. In light of this interesting finding, our paper suggests that investors who try to mimic the buying activity of insiders should be cautious as insiders may have different motives depending on their level of ownership.

Overall, this paper provides some fresh evidence and empirically demonstrates that the trading activity of insiders is not always associated with the same motives as these can be explained by the different levels of ownership and do not aim at making profits in all

instances. Consequently, outside investors who want to time the market and make a profit for themselves, should be aware of these issues when formulating trading strategies.

The remainder of the paper is organised as follows. Section 2 describes the data employed in this study and offers some summary statistics, Section 3 provides the methodological approach and discusses the empirical findings, and Section 4 concludes the study.

2. Data description

Insider trading data in this paper has been compiled from DataStream (Thomson Reuters), Asian Insider Transaction/Holdings Feed, covering the period from January 2003 to May 2012. This period covers the recent financial crisis that affected markets throughout the world. The database contained records of more than 400,000 insider transactions of which more than 140,000 were classified as direct transactions in 7,203 firms (issuers) that traded on the stock markets of China, Hong Kong, India, Singapore and Taiwan. The data are aggregated to the monthly frequency and similarly to the standard approach in the literature, we only focus on open-market purchases and sales of shares (see e.g., Lakonishok and Lee, 2001; Iqbal and Shetty, 2002; Cohen et al., 2012). Moreover, following Conrad and Kaul (1993) and Lakonishok and Lee (2001) we exclude share grants, transfers, option exercises, non-common shares, depository receipts, closed-end funds, real estate investment trusts, convertible debt, exchange notes and stock options from our analysis. Finally, firms with less than 12 months (not necessarily consecutive) transactions are also excluded.

We merge our insider transactions data with financial firm-level data from Datastream using CUSIP. Firms are excluded from our sample if they do not have share price information. Of the 7,203 firms in the aggregated transaction, 6,551 firms had enough

information regarding valid matching CUSIP codes and firm sizes over the sample period. Furthermore, to filter out potential recording errors embedded in DataStream we follow Ince and Porter (2006) and Andriosopoulos et al. (2014) and we apply a similar screening procedure to stock returns.¹

The asset pricing literature finds significant cross-sectional predictability in stock returns based on firm characteristics including beta, dividend yield, price-earnings ratio, and book-to-market ratio which are correlated with a firm's subsequent stock returns (see e.g. Litzenberger and Ramaswamy, 1982; Bernard and Thomas, 1990; Fama and French, 1992). Therefore, in addition to insider trading activity we also include the dividend yield, price-earnings ratio, book-to-market ratio, the company's beta, and the debt-to-equity ratio in our analysis. Given that recent evidence suggests that U.S. returns can significantly predict stock returns in non-U.S. markets (Rapach et al., 2013), we also include the returns on the S&P500 index. This allows us to examine whether the insider trading information has predictive power over and above information that would be publicly available.

2.1. Summary statistics

Table 1 shows the number of firms with insider trading and the number and volume of insider transactions across all five countries. The ratio of number of insider transaction purchases to insider sales ranges from 2.57 for Taiwan to 8.11 for Singapore for all directors, while the range of the ratio for the top directors is slightly tighter across the countries. With respect to the ratio of volume of insider transaction purchases to insider sales, this ranges from just 2.78 for Hong Kong to 22.86 for China, while the range of the same ratio for top directors is slightly wider. These results are in line with other studies (Cheuk et al., 2006; Firth et al., 2011) and it shows that both the number and volume of insider purchases in these countries are much greater than their respective insider sales as compared to US transactions, where

¹ Returns for months t and $t-1$ are set to missing if $(1+R_t)(1+R_{t-1})-1 < 50\%$, where R_t is the return for month t , and at least one of the two returns is greater than 300% (see also Lee, 2010).

insiders are, on average, sellers (Seyhun, 1998; Jeng et al., 2003; Ravina and Sapienza, 2010; Tavakoli et al., 2012). One possible explanation for this discrepancy is that unlike the U.S. equity-based remuneration is not as popular in Asia and this could lead to relatively less insider selling to rebalance their portfolio following stock or option grants.

In general, our sample data suggests that directors are heavy traders both in terms of number of transactions and volume of trading and buy far more than they sell. Insider traders in Asia, largely directors with high management and executive power may sell relatively less frequently for a number of reasons. These could include making a market for their firms' share with the aim of maintaining their values used as collaterals in other financial dealings, to provide liquidity for their firm's shares or send a positive signal about the future prospects of their firm to the market. However, if directors do sell, apart from personal liquidity needs, it could convey a negative signal regarding the future performance of their companies to the market.

3. Methodology and Results

3.1 Returns and insiders trading activity: predictive regressions

Initially, we employ regressions of one-month-ahead stock returns on directors' trading activity. There is an abundance of evidence in the extant literature which suggests that insiders can earn abnormal returns through buying (selling) shares of their own firm (e.g., Seyhun, 1990, 1998; Lakonishok and Lee, 2001) and hence, this relationship is expected to be positive (negative). To better capture trading activity we consider the volume of shares and we run pooled regressions with standard errors clustered both at the firm and country level. Specifically, we estimate the following predictive regression:

$$R_{i,t+1} = a + b\text{InsideTrade}_{i,t} + \sum_{k=1}^5 c_k X_{k,i,t} + \varepsilon_{i,t}, \quad (1)$$

where $R_{i,t}$ denotes the return on stock i at time t , and $InsideTrade_{i,t}$ is the insiders trading activity, which could be either buys or sells. $X_{i,t}$ denotes a number of controlling variables that have been shown to have predictive power for stock returns namely size, book-to-market ratio, dividend yield, firm's riskiness as measured by β , and the return on the S&P 500 index. The null hypothesis of no predictability, in terms of insiders activity, is that b is zero in equation 1, while the alternative hypothesis of predictability predicates that $b \neq 0$. The results are presented in Table 2.

[Insert Table 2 around here]

Columns 1-3 of Table 2 illustrate that both buying and selling activity are strong predictors of future returns. In line with much of the previous literature we find that selling activity predicts lower future returns (significant at the 1% level). On the other hand, the relation between buying activity and future returns is also negative suggesting that insiders on average incur a loss throughout the sample period which amounts to 1.7 basis points for every million shares bought. This result is in sharp contrast to previous studies which suggest that insiders should be able to earn positive profits when using their informational advantage. This is an interesting finding in East Asian markets which leads to the question of why the relationship between buying activity and future returns follows a different pattern compared to, for instance, the US market. To further explore this issue and identify what drives this result, we decompose our sample into CEOs and Chairs, and other directors and re-examine the aforementioned relationship. The results are presented in Table 3.

[Insert Table 3 around here]

As can be seen from this table, the negative relation between buying activity and future returns in East Asian countries is associated with the top directors (i.e. CEO and Chair). Specifically, both CEOs and Chairs have a negative and statistically significant

coefficient, whereas the rest of the directors' buying activity predicts positive future returns. Furthermore, we find that the difference in the coefficients on buying activity between the rest of the directors and CEOs and Chairs is 31 and 59 basis points respectively, and also statistically significant at the 1% level in all cases. As shown in Column 2, these results are robust when we also control for the directors' selling activity in the model. Based on the above findings, it appears that there is a distinctive difference between top management and the rest of directors regarding their ability to time the market. This is particularly interesting given that top directors should have access to at least the same information as the rest of the directors and hence, it should be possible to exploit it for their own benefit. Therefore, we posit the view that there are other reasons behind their buying activity which are not related to market timing. Instead, a plausible explanation could be that top directors in East Asia's markets might buy their own firms' shares to support their price with the aim to achieve beneficial results in the long-run or to make a market for their firms' shares. This could indeed be the case given that compared to firms in the US for example, firms incorporated in countries covered in our sample have a less diffused ownership and in some cases they can even be family owned.

To further investigate this issue and in line with our proposition, we consider the top directors ownership levels and explore whether these indeed play an important role in this context conditioned on the number of shares acquired. The relevant model is expressed as:

$$R_{i,t+1} = a + b_1 Top_{i,t} + b_2 Own_{i,t} + b_3 Top_{i,t} * Own_{i,t} + \sum_{k=1}^5 c_k X_{k,i,t} + \varepsilon_{i,t}, \quad (2)$$

where $Top_{i,t}$ denotes the top directors buying activity in firm i at time t , $Own_{i,t}$ is the ownership level of the top directors in firm i at time t , and $X_{i,t}$ denotes the control variables as described in equation 1. The results are tabulated in Table 4.

[Insert Table 4 around here]

Looking at Column 1 in Table 4 we observe that there is a negative relation between future returns and the level of ownership conditional on the number of shares acquired. However, the corresponding interaction term is based on all buying activity from top directors associated with both market timing and price support incentives, which probably explains the lack of statistical significance. Top directors with high ownership levels are more likely to initiate a price support purchase motivated by the firm's negative past performance. Based on this notion, we estimate another interaction model (Column 2) to obtain the relation between next month's returns and top directors ownership levels conditioned on the firm's past performance and number of shares acquired. In particular, we capture firms' past performance using a dummy variable ($Perform_t$) that takes the value of one if the previous period's return is negative, and zero otherwise. The results presented in Column 2 suggest that ownership levels are negatively associated with future returns and are also statistically significant. This finding confirms our prior belief that the top directors' buying activity is not always associated with market timing. It could also be motivated by other factors such as price support which could result in insiders realising negative returns.

3.2 Portfolio returns

In this section we analyse the returns of two portfolios formed based on top directors with high ownership levels and top directors with low ownership levels in the company. This analysis complements our previous findings and provides a further robustness check, whereas it is also of interest to investors. Specifically, we consider an investor who goes long on firms with negative past performance when their top directors have high ownership levels and show buying activity. When there is no buying activity the investor goes long on the risk free asset. We also consider a second investor under the same setup with the only difference being that she tracks the buying activity of top directors with low ownership levels.

Apart from reporting the raw returns, we also employ Sharpe ratios and further adjust the portfolio returns on the basis of common risk factors. Fama and French (1996) show that their three-factor model can explain most commonly documented Capital Asset Pricing Model (CAPM) anomalies except for the momentum anomaly. For each portfolio i , the abnormal return in excess of the Fama-French three-factor model is captured by the intercept in the following regression model:

$$R_{i,t} - R_{f,t} = a_i + b_i(R_{m,t} - R_{f,t}) + s_iSMB_t + h_iHML_t + \varepsilon_{i,t}, \quad (3)$$

where $R_{i,t} - R_{f,t}$ is the return on portfolio i in excess of the risk-free rate in month t , $R_{m,t} - R_{f,t}$ is the excess return on the market value-weighted portfolio, SMB is the return differential between portfolios of small and large stocks, and HML is the average return on portfolios of value (high book-to-market ratio) stocks minus the average return on portfolios of growth (low book-to-market ratio) stocks. Thus the factors SMB and HML represent the size and value premia respectively.

Since the Fama-French three-factor model does not capture the momentum effect, Carhart (1997) suggests adding a fourth factor (WML) that is based on the returns of a diversified portfolio going long on recent winners and shorting on recent losers which captures momentum in the three-factor model. For each portfolio i , the abnormal return in excess of the four-factor model is captured by the intercept in the following regression:

$$R_{i,t} - R_{f,t} = a_i + b_i(R_{m,t} - R_{f,t}) + s_iSMB_t + h_iHML_t + w_iWML_t + \varepsilon_{i,t}, \quad (4)$$

where $R_{i,t} - R_{f,t}$ is the return on portfolio i in excess of the risk-free rate in month t , $R_{m,t} - R_{f,t}$ is the excess return on the market value-weighted portfolio, SMB is the size factor, HML is the value factor, and WML is the momentum factor.

Table 5 shows that a trading strategy focusing solely on purchases made by top directors with low ownership levels earns large positive returns, while a strategy that follows the purchases of top directors with high ownership levels does not. For example, the low ownership portfolio earns 1.96% per month, which combined with a standard deviation of 13.24% leads to a Sharpe ratio of 0.147, whereas the high ownership portfolio generates -0.88% per month and yields a Sharpe ratio of -0.122%.

Following Ledoit and Wolf (2008), we test the null hypothesis that the corresponding Sharpe ratios of high and low ownership portfolios are equal, by considering the difference between Sharpe ratios,

$$\Delta SR = SR_{low} - SR_{high} , \quad (5)$$

where SR_{low} denotes the Sharpe ratio of the low ownership portfolio and SR_{high} denotes the Sharpe ratio of the high ownership portfolio. The test statistic by Ledoit and Wolf (2008) uses heteroscedasticity and autocorrelation consistent (HAC) standard errors and is asymptotically distributed as a standard normal.

The estimated Ledoit and Wolf (2008) test statistic tabulated in Table 5, with a two-sided p -value of 0.001, suggests that the Sharpe ratio produced from the low ownership portfolio is statistically different to the one from the high ownership portfolio. This finding indicates that the risk-adjusted return generated by investing in firms with negative past performance when their top directors with low levels of ownership show buying activity, is significantly higher than the corresponding risk-adjusted return produced by investing in firms where the top directors with high ownership are buying shares. The risk-adjusted portfolio returns (alphas) for the CAPM, Fama-French three-factor model, and Carhart four-factor model reveal a similar pattern and corroborate the previous results. In this case a

portfolio strategy that goes long on low ownership buys and short on high ownership buys earns a four-factor alpha of 250 basis points per month ($t=1.72$), or over 30% per year.

Overall, our findings in this section confirm our prior belief that top directors are not always acting with the aim to time the market but there could be alternative reasons such as price support that motivates them to buy shares of their own firm, especially when they have a high stake in the firm (i.e. high ownership level). Therefore, investors in these markets should consider the ownership level of top directors when trying to mimic their trading activity.

4. Conclusion.

This paper investigates the relation between stock returns and the trading activity of insiders in firms with high ownership concentration. To this end, we employ data from countries with this characteristic in firm ownership which include China, Hong Kong, India, Singapore, and Taiwan and cover the period from 2003:01 to 2012:05. Therefore, our paper complements the extant literature which mainly focuses on firms in highly developed markets where ownership is diffused, by providing fresh empirical evidence based on firms where insiders hold a large fraction of the firm's equity and their trading activity might be associated with different motives. The findings in this paper have important implications for two reasons. First, they enable us to assess whether previous findings in markets where ownership is diffused also hold in markets with high ownership concentration and hence, they shed more light on how future stock returns are affected by the different levels of ownership. Second, they allow us to examine whether outside investors who mimic the trading activity of insiders can make profits for themselves. In connection to the above issues, we contribute to the literature in the following ways.

First, although we corroborate the existing literature by finding a significant negative relationship between the selling activity of insiders and future stock returns (e.g. Seyhun, 1986), our results reveal that the relationship between the buying activity of insiders and future stock returns is also negative. This is an interesting new finding in East Asian markets which is in sharp contrast to studies which focus on the US or on European markets (e.g. Lin and Howe, 1990; Gregory et al., 1997; Lakonishok and Lee) and points to the direction that insiders may have different motives when they purchase shares. To explore the issue, we group insiders into top directors and the rest of the directors and we show that the negative relation between the insiders' buying activity and future stock returns is associated with the top directors. Furthermore, we demonstrate that top directors with higher ownership levels drive this result. Consequently, our findings indicate that insiders who possess high levels of ownership can have different motives when they acquire their firm's shares which are not always related to market timing in order to realise profits. For instance, their goal could be to support their own firm's share price, or they might want to make a market for their firm's shares.

Second, we show that a trading strategy which focuses solely on purchases made by top directors with low ownership levels leads to high positive returns. However, we also find that a similar strategy which tracks the buying activity of insiders with high ownership levels generates negative returns. Additionally, we find that the difference between risk-adjusted returns based on the Sharpe ratios obtained from the two different strategies, is also statistically significant. For further robustness, we computed the corresponding risk-adjusted portfolio returns (alphas) for the CAPM, Fama-French three-factor model, and Carhart four-factor model and our results remain unaffected. Therefore, our results based on economic value are consistent with our statistical analysis and further strengthen our main conclusions.

Overall, this paper empirically demonstrates that the trading activity of insiders is not always aimed at realising profits and can be explained by their different levels of ownership. Hence, outside investors who mimic the buying activity of insiders should be aware of these issues and proceed with caution when they form trading strategies in order to time the market.

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Tables

Table 1. Descriptive statistics.

Country	Number of Insider Transactions						Volume of Insider Transactions (millions of shares)					
	All directors			Top directors			All directors			Top directors		
	Acquisitions	Disposals	$\frac{\text{Acquisitions}}{\text{Disposals}}$	Acquisitions	Disposals	$\frac{\text{Acquisitions}}{\text{Disposals}}$	Acquisitions	Disposals	$\frac{\text{Acquisitions}}{\text{Disposals}}$	Acquisitions	Disposals	$\frac{\text{Acquisitions}}{\text{Disposals}}$
CHINA	7672	1691	4.54	1756	299	5.87	58007	2538	22.86	34610	992	34.87
HONG KONG	20162	4728	4.26	11546	1600	7.22	505892	182096	2.78	411575	151104	2.72
INDIA	9630	3026	3.18	3130	1025	3.05	4309	934	4.61	1864	351	5.31
SINGAPORE	9449	1165	8.11	4176	587	7.11	99264	29788	3.33	72513	15258	4.75
TAIWAN	19382	7541	2.57	5105	1787	2.86	182184	17330	10.51	41995	3491	12.03

This table presents descriptive statistics over the full sample period (i.e. 2003:01-2012:05) for all markets under consideration. Specifically, we report both the total number and the volume of insider transactions (acquisitions or disposals) made by all directors. We also split the sample and report the corresponding number and volume of transactions made by the top directors (i.e. comprised of the CEO and the Chairman of the firm).

Table 2. Predictive regressions based on directors' trading activity

	(1)	(2)	(3)
InsideTrade-Buy	-0.017*** (0.001)		-0.017 *** (0.001)
InsideTrade-Sell		-0.019 *** (0.007)	-0.019 *** (0.006)
Size	-0.309 ** (0.144)	-0.309 ** (0.144)	-0.309 ** (0.144)
BM	-0.120 *** (0.023)	-0.120 *** (0.023)	-0.120 *** (0.023)
DY	0.049 *** (0.015)	0.049 *** (0.015)	0.049 *** (0.015)
Debt/TA	-0.009 * (0.005)	-0.009 * (0.005)	-0.009 * (0.005)
beta	0.707 *** (0.271)	0.708 *** (0.271)	0.708 *** (0.271)
S&P500	0.210 (0.143)	0.210 (0.143)	0.210 (0.143)
Crisis dummy	-2.247 *** (0.281)	-2.247 *** (0.281)	-2.246 *** (0.281)

This table reports predictive regressions of stock returns using the insiders' buys and sells as predictive variable. The full sample spans the 2003:01-2012:05 period. The predictive regressions include a number of control variables: *Size* is the natural logarithm of the firm's market equity. *BM* is the book-to-market of a given firm. *DY*, *Debt/TA*, and *beta* are, respectively, the dividend yield, debt-to-assets, and the firm's market risk for a given firm. *S&P500* is the return on the S&P 500 index, whereas *Crisis_dummy* is an indicator variable that takes the value of 1 for all months after June 2007 and 0 otherwise. Standard errors clustered both at firm and country-level are reported in parentheses. Asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 3. Predictive regressions based on the top directors' trading activity

	(1)	(2)
	Volume	
CEO Buy	-0.034 *** (0.003)	-0.034 *** (0.003)
Chair Buy	-0.313 *** (0.046)	-0.318 *** (0.041)
Rest Buy	0.284 *** (0.061)	0.292 *** (0.055)
InsideTrade Sell		-0.020 ** (0.008)
Size	-0.310 ** (0.144)	-0.310 ** (0.144)
BM	-0.120 *** (0.023)	-0.120 *** (0.023)
DY	0.049 *** (0.015)	0.049 *** (0.015)
Debt/TA	-0.009 * (0.005)	-0.009 * (0.005)
beta	0.708 *** (0.271)	0.708 *** (0.271)
S&P500	0.210 (0.143)	0.210 (0.143)
Crisis dummy	-2.246 *** (0.281)	-2.246 *** (0.280)

This table reports predictive regressions of stock returns using top directors' purchases as predictive variable. The full sample spans the 2003:01-2012:05 period. The predictive regressions include a number of control variables: *Rest Buy* denotes purchases by the rest of the directors (insiders). *Size* is the natural logarithm of the firm's market equity. *BM* is the book-to-market of a given firm. *DY*, *Debt/TA*, and *beta* are, respectively, the dividend yield, debt-to-assets, and the firm's market risk for a given firm. *S&P500* is the return on the S&P 500 index, whereas *Crisis_dummy* is an indicator variable that takes the value of 1 for all months after June 2007 and 0 otherwise. Standard errors clustered both at firm and country-level are reported in parentheses. Asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 4. Predictive regressions conditioned on top directors' ownership levels

	(1)	(2)
Top	-0.0005 (0.0279)	-0.185 (0.137)
Own	-1.382 (1.667)	-1.650 (2.692)
Perform		-1.292 ** (0.633)
Top * Own	-0.087 (0.119)	0.700 (0.604)
Top * Perform		1.506 * (0.774)
Own * Perform		0.589 (2.173)
Top * Own * Perform		-2.915 ** (1.166)
Size	-0.470 *** (0.084)	-0.471 *** (0.074)
BM	-0.110 ** (0.056)	-0.116 ** (0.057)
DY	0.115 (0.096)	0.125 (0.096)
Debt/TA	-0.001 (0.0185)	0.0001 (0.018)
beta	-1.019 (0.654)	-0.897 (0.645)
S&P500	(0.346) *** 0.107	0.334 *** (0.106)
Crisis dummy	-5.803 *** (2.068)	-5.704 *** (1.989)

This table reports predictive regressions of stock returns using top directors' purchases as predictive variable conditioned on their ownership level (*Own*) and firm's past performance (*Perform*). The full sample spans the 2003:01-2012:05 period. The predictive regressions include a number of control variables: *Size* is the natural logarithm of the firm's market equity. *BM* is the book-to-market of a given firm. *DY*, *Debt/TA*, and *beta* are, respectively, the dividend yield, debt-to-assets, and the firm's market risk for a given firm. *S&P500* is the return on the S&P 500 index, whereas *Crisis_dummy* is an indicator variable that takes the value of 1 for all months after June 2007 and 0 otherwise. Standard errors clustered both at firm and country-level are reported in parentheses. Asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5. Portfolio performance comparison between top directors with high and top directors with low ownership levels

	High Ownership	Low Ownership	L/S Ownership	Ledoit & Wolf (2008) test
Average returns	-0.88	1.96	2.84	
Standard dev.	7.26	13.24	12.67	
Sharpe ratio	-0.122	0.147		0.001
CAPM alpha	-1.58 **	0.665	2.11 *	
	(-2.23)	(0.51)	(1.67)	
Fama-French alpha	-1.49 *	1.52	2.32 *	
	(-1.78)	(1.00)	(1.69)	
Carhart alpha	-1.52 *	1.52	2.50 *	
	(-1.75)	(0.98)	(1.72)	

This table compares the portfolio performance of two different trading strategies over our full sample which spans the 2003:01-2012:05 period. The first strategy considers an investor who goes long on firms where their top directors have high ownership levels and show buying activity (given a negative past performance). If there is no buying activity from the top directors, the investor goes long on the risk-free asset instead. The second strategy assumes the same setup with the only difference being that the investor tracks the buying activity of top directors with low ownership levels. For both strategies, we obtain their Sharpe ratios and additionally report the corresponding risk-adjusted portfolio returns (alphas) for the CAPM, Fama-French three-factor model, and Carhart four-factor model. L/S denotes a portfolio strategy that goes long on low ownership buys and short on high ownership buys. Finally, we present the p -value of the Ledoit and Wolf (2008) statistic, which tests the null hypothesis that the Sharpe ratios of high and low ownership portfolios are equal. T-statistics are shown in parentheses and statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively.



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