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Informative Content of Insider Purchases: Evidence from the Financial Crisis

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Abstract

Purpose - This paper investigates the impact of insider trading on subsequent stock returns in the UK, with a specific focus on the impact of the global financial crisis of 2007-08 on the relation between CEO and CFO stock purchases and returns.

Design/methodology/approach - The empirical analysis uses 10,230 purchases executed in 679 UK firms by 1,477 directors during the period from 2000 to 2010. Subsequent market-adjusted stock returns are regressed on a set of firm-specific accounting, market and corporate governance variables as well as the characteristics of CEOs and CFOs. Additionally, the analysis distinguishes between the opportunistic and routine trades.

Findings – The findings reveal that the position of the trading director and the nature of their trades are important in determining the impact on returns of insider trades. In particular, CEO purchases are on the whole more informative than CFO purchases and opportunistic purchases. The trades in the post-crisis period have a greater impact on subsequent stock returns.

Research limitations/implications – The empirical analysis is limited to the trades made by two executives. Future research should consider inside trades by all directors and distinguish between executive and non-executive directors. Also, a behavioral measure should be developed to test if the financial crisis affected the trading behavior of directors and whether directors use insider trading strategically to signal information to the market.

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Practical implications – The impact of directors’ dealings on stock returns is not homogeneous. Financial analysts and investors should pay more attention to different types of trades and the identity of trading director.

Originality/value - This paper, to our knowledge, provides the first attempt that combines in the same framework the identity and personal attributes of trading executive directors, firm-level corporate governance features, the nature of purchase transactions, and the trading period characteristics. Furthermore the empirical analysis is carried out during a period that also covers the recent global financial crisis period and its immediate aftermath.

Keywords CEO, CFO, insider trading, opportunistic and routine purchases, stock returns, financial crisis.

Paper type Research paper

JEL classification: G30, G32, G39

1. Introduction

This paper investigates the relationship between open market purchases made by CEOs and CFOs and subsequent stock returns. Prior studies of insider trading show that corporate insiders earn abnormal returns on their trades, which is taken as evidence that insiders have superior information about a firm's future performance. In these studies, insider trading is recognized as an important source of information and outsiders expect insider transactions to be informative because company directors, in particular the executives, are better informed about the operating and financing characteristics of their firms (Hoque and Lasfer, 2013; Jiang and Zaman, 2010; Lakonishok and Lee, 2001; and Seyhun, 1986). Early research on insider trading considers the short-term market reaction and provides evidence of abnormal returns on aggregate insider trading in the months following directors' dealings (Finnerty, 1976; Jaffe, 1974; Seyhun, 1988; and Sylvain *et al.*, 2002). This earlier strand of the literature was followed by extensive research that focuses on the long-term profitability of insider trading. This research reports strong evidence on the abnormal returns outsiders can achieve by replicating the trades of insiders, suggesting that the predictive power of insider trades regarding the future market returns is high (Brochet, 2010; Gregory *et al.*, 2013; and Lakonishok and Lee, 2001)².

More recently, it is argued that the subsequent returns to trades by insiders may also depend on the position directors hold within the firm. For example, in a study of US companies, focusing on the trades made by CEOs and CFOs, Wang *et al.* (2012) provide

² There is also evidence that insiders trade on the basis of their contrarian beliefs, buying (selling) undervalued (overvalued) shares in an attempt to take advantage of any perceived misvaluation (Jiang and Zaman, 2010; Piotroski and Roulstone, 2005; and Rozeff and Zaman, 1998).

strong evidence that CFOs earn significantly greater returns from their purchases of company shares than CEOs. They argue that trades of CFOs reveal more information about future stock returns. Also, Ravina and Sapienza (2010) examine the impact of purchase transactions made by independent company directors. They find that positive abnormal returns that independent directors earn when they purchase shares in their companies are not significantly different from those earned by executive directors. Fidrmuc *et al.* (2006) also report positive abnormal returns on insider purchases for UK firms. However, they find that the market's positive reaction to the trades made by CEOs is lower than it is for other directors.

In a similar vein to Wang *et al.* (2012) we investigate the informative content of trades made by CEOs and CFOs by examining the impact of their open market purchases on stock returns. In doing so, we note that the two executive directors are the most informed directors about the issues relevant to firm value, while we assume that the ability to convey and trade on information vary between these two executives. Although the market tends to perceive their trades as a signal of superior information, the information content of their trades, and hence the impact on subsequent returns, are likely to differ. It is argued that, in comparison to CFOs, CEOs are higher in the corporate hierarchy and usually have superior insights into the firm's affairs. Therefore, CEO insider transactions are potentially more informative than CFO trading (Lin and Howe, 1990; and Seyhun, 1986). However, it is also recognized that CFO trades may be more informative because CEOs are more closely scrutinized by the market and hence may be more reluctant to trade using their informational advantage over outsiders. In contrast, CFOs would be more willing to exploit their superior information by trading, which makes their transactions more strongly linked to future earnings and returns (Wang *et al.*, 2012).

There are two distinct features of the analysis provided in this paper. Firstly, we acknowledge that insider trading is not homogenous as to the timing of purchase transactions

made by the firm's CEO and CFO. To this end, we consider two types of insider stock purchases, *routine* and *opportunistic*, classifying trades on the basis of the historical trading behavior of the trading insider. Distinguishing between the two types of trades enables us to better focus on the informative content of insider purchases as opportunistic trades are more likely to be triggered by private information. To the extent that opportunistic purchases are informed, we argue that they should be associated with greater subsequent market returns compared to routine purchases. Moreover, we do not rule out the possibility that the difference in the impact on returns of different types of purchases may also depend on whether the trading executive is the firm's CEO or CFO. We therefore identify four groups of insider trades, namely CEO-opportunistic, CEO-routines, CFO-opportunistic, and CFO-routine purchases, and provide insights into the purchase-return relation for each group.

Secondly, we incorporate the view that the predictive power of insider trades is likely to vary over time with market-wide changes and macroeconomic shocks. We argue that the severity of asymmetric information between insiders and outsiders, and hence the impact of private information on returns, should be greater during the recent global financial crisis. To incorporate this view, we test whether the predicted relation between insider trading and market-adjusted returns changes between the normal times, captured by the trades during the period from 2000 to 2006, and the crisis period from 2007 to 2008. Additionally, we consider the period from 2009 to 2010 as the post-crisis period.

Our sample consists of 10,230 open market purchases executed in 679 UK firms by 1,477 top executives in the sample period (2000-2010). During this period CFOs (CEOs) make 5,450 (4,780) purchases. We also observe that the average value of opportunistic purchases is significantly greater than it is for routine purchases. This holds throughout the sample period. Our detailed descriptive and regression analysis show that the subsequent market-adjusted returns to insider purchase transactions are generally positive. However, the

findings also reveal that the positive returns are much weaker in the longer term. This possibly suggests that the informative content of the purchases by CEOs and CFOs is less significant than the market's perception of how informative they are. More importantly, our initial findings imply that there are no significant differences between opportunistic and routine trades. Nonetheless, the results change when we distinguish between opportunistic and routine trades made by both types of executives and carry out the analysis for different sub-periods. More specifically, the findings indicate that the opportunistic trades made by both CEOs and CFOs are more informative than the routine ones in the longer term, but only in the post-crisis period. We cannot provide any evidence supporting the view that opportunistic trades would be more informative during the crisis. If anything, the market reacts more positively to routine trades in the short term during this period, in particular to those made by CEOs. Moreover, the longer-term market-adjusted returns associated with CEO opportunistic trades are significantly lower. Overall, the strongest results on the positive impact of insider purchases on returns relates to CEO trades made in the post-crisis period. We also find that the market-adjusted returns seem to increase with the size of trade and decrease with greater external affiliations and the number of past trades. Among the corporate governance characteristics included in the analysis, board independence affects the returns positively during the crisis and negatively in the post-crisis period. The latter finding possibly suggests that board independence and insider purchases are substitutes in reducing the information asymmetry between insiders and outsiders.

This study extends the literature on the informative content of insider trading in several important ways. Firstly, the analysis of the paper provides a unique setting by unifying the recent analyses of Wang *et al.* (2012) and Cohen *et al.* (2012) in a framework that allows us to distinguish not only between CEO and CFO purchases but also opportunistic and routine trades. Also, differently from both studies, we incorporate in the empirical

analysis important managerial and corporate governance characteristics, which may impact the returns subsequent to director purchases. Including them in the analysis enables us to control for the potential role they may play as an additional channel of information and a tool to reduce the consequences of asymmetric information between insiders and outsiders. Secondly, the empirical analysis is carried out during a period that also covers the recent global financial crisis period and its immediate aftermath. Each prediction regarding the relation between open market purchases and subsequent returns is tested to see if the findings change with the experience of the recent financial crisis. Furthermore, to our knowledge, this paper provides the first attempt that combines in the same framework the identity and personal attributes of trading executive directors, firm-level corporate governance features, the nature of purchase transactions, and the trading period characteristics. Last but not least, our analysis makes a clear distinction between the immediate and gradual reaction to insider trading by considering both the short-term market reaction to insider trading and the long-term informativeness of the trade carried by CEOs and CFOs.

The remainder of the paper proceeds as follows. In the next section we discuss the regulatory framework which sets out the rules with regard to directors' dealings. Section 2 outlines the regulations on directors' dealings in the UK. Section 3 explains the main variables and provides a description of the data used in the analysis. In Section 4, we provide a descriptive analysis of the returns to insider trading. In Section 5, we discuss the regression results and Section 6 concludes the paper.

2. The Regulatory Framework on Directors' Dealings in the UK

Dealing by directors is generally defined as buying and selling of securities and rights or obligations, including the grant and exercise of options and pledging shares as security for a loan. Open market purchases made by directors, which this study is concerned with, are

regulated indifferently from other types of directors' deals. The regulatory framework regarding the dealings of directors in the UK is primarily contained in the Companies Act, which is the main legislation and source of company law in the UK. Under the law, directors are required to notify the company of any dealings in its shares as soon as possible and no later than on the fifth business day following the transaction. Companies must in turn notify the Company Announcements Office of the London Stock Exchange without delay and no later than the end of the business day following receipt of the information by the company.

In addition, the Model Code on directors' dealings, set out in Chapter 9 of the Listing Rules (LR9 Annex 1)³, provides further guidance for companies and directors in relation to directors' dealings. For example, regarding the purpose of their dealings, the Code requires directors not to deal in any securities of the company on considerations of a short-term nature. Also, directors not must to deal during "close period" that is the period of two months preceding the announcement of the company's annual or half-yearly results. Furthermore, directors must not deal at any time when they are in possession of unpublished price-sensitive information in relation to the security. Finally, directors are required not to trade without advising the designated director (usually the chairman) in advance and receiving clearance.

3. Data

Our primary data on insider trades are collected from the Morningstar UK database, which provides information on trade characteristics (i.e. type, size, date) and the identity of trading directors (i.e. name, role). The database also provides information on the equity ownership of insiders prior to their transactions. Additional information on the managerial and corporate governance characteristics is sourced from BoardEx. Using financial data

³ See http://www.fsa.gov.uk/library/policy/listing_rules for an extensive analysis of the current and historic Listing Rules in the UK.

provided by Datastream (Thomson Reuters) we analyse stock returns for up to 90 days before and after each transaction. All the returns used in the regression analysis are market-adjusted, and the FTSE All-Share index is used for the adjustment. In line with the majority of earlier research, we base our analysis only on open purchases as they are more likely to represent actions taken as a result of private information. All other types of insider transactions (e.g., exercises of options, and private purchases and sales) are excluded.

Several sample selection criteria are applied. First, in line with previous research (e.g. Fidrmuc *et al.*, 2006), transactions performed by directors of financial institutions are excluded. Second, small transactions with a value lower than £10 are excluded to avoid unnecessary noise in the estimation of returns. Furthermore, multiple purchases made by the insider on the same day are combined into a single data point, assuming that they are motivated by the same information.

Table 1 presents the stages to derive the final sample of firms and directors used in the study. Our initial sample includes 19,298 open-market purchase transactions, of which 10,548 (8,750) were made by CEOs (CFOs) during the sample period. In our final sample, we have 10,230 observations for purchase transactions in which there are 4,780 and 5,450 purchases carried out by CEOs and CFOs respectively. Of these purchases, 2,930 transactions are recorded during the crisis period, compared to 2,843 purchases made in the post-crisis period. Furthermore, the final sample used in the empirical analysis provides us with transactions performed by 1,477 distinct executives from 679 different firms. In any sub-periods, we have at least 406 firms and 656 executives to consider.

[Insert Table 1 here]

3.1. *Dependent variable: market adjusted returns*

In calculating the post-trading returns, which is the main variable of interest, we follow a similar procedure that is widely used in prior research (see, e.g., Brown and Warner, 1985; Kothari and Warner, 1997; and Ravina and Sapienza, 2010). Following each director-trading day we compute market-adjusted buy-and-hold-returns (*MBAHR*), inclusive of dividends, for up to 5, 10, 60, and 90 days. Specifically, we first estimate the abnormal return for firm i on day t as $AR_{i,t} = R_{i,t} - R_{m,t}$, where $R_{i,t}$ is the daily return for the traded share i on day t and $R_{m,t}$ is the return on the value-weighted FTSE All-Share⁴ index on the same day. We then define various *MBAHRs*, namely RET_5 , RET_10 , RET_60 and RET_90 , by taking the difference between firm returns over the relevant window and returns on the value-weighted FTSE All-Share index, where both returns are compounded over the same relevant period. Specifically,

using daily return data we estimate $MBHAR_i = \prod_{t=1}^T (1 + RET_{i,t}) - \prod_{t=1}^T (1 + RET_{m,t})$ where T takes the value of 5, 10, 60, or 90 days.

3.2. *Explanatory variables: managerial and corporate governance variables*

In our empirical analysis we focus on three groups of variables, namely trade and managerial characteristics, and the corporate governance attributes of firms. Furthermore, we control for several firm-specific variables including size, book-to-market and information on past returns. A full description of the variables is given in Appendix 1.

⁴ FTSE ALL-Share Index represents about 99 percent of UK market capitalization, aggregating of the FTSE 100, FTSE 250 and FTSE Small Cap Indices (http://www.ftse.com/Indices/UK_Indices). Each company in the Index is first weighted using the number of shares-in-issue and the share price. Then, the free float factor is incorporated to arrive at the final weight, considering only the shares available for trading and hence ignoring those shares held by restricted shareholders such as family owners.

Transaction characteristics. To differentiate between routine and opportunistic purchase trades, we classify the insider transaction as routine if an executive director trades in the same month over the past three consecutive years prior to the transaction that is considered. Otherwise, the trade is classified as opportunistic. We predict that the relation between opportunistically made trades and subsequent returns is positive. Also, the relation is expected to be stronger than that between routine trades and returns. Additionally, we test if subsequent purchase returns are also impacted by the size of the trade transaction by incorporating in the analysis the natural logarithm of the value of purchase transactions. Obviously, the impact of larger purchases on subsequent returns is expected to be greater. Finally, the number of past trades made by the trading director prior to the purchase transaction date is considered. Although we do not have a clear-cut prediction, we postulate that the impact of purchases on returns is likely to get smaller when it is preceded by a greater number of trades by the same director as it is less likely to be based on significant informational advantage.

Managerial characteristics. We consider four important characteristics of trading directors in the empirical analysis. First, we argue that managers with longer tenure in their firms are more likely to have superior knowledge about the firm's prospects and the internal processes within the firm, leading them to have greater power and influence in the company. The impact of tenure on subsequent returns can be positive as tenure improves access to relevant information (Bebchuk *et al.*, 2010). Nevertheless, it is also possible that the relation is negative as longer tenure is likely to lead to excessive managerial power, which can be perceived negatively by the market. Second, it is argued that greater equity ownership not only increases the ability of directors to influence firm decisions, but also provides them with more flexibility to trade (Denis *et al.*, 1997; and Eckbo and Thorburn, 2003). We then expect that the informative content of director transactions increases with higher equity ownership.

However, as also discussed in (Fidrmuc *et al.*, 2006), an increase in the equity ownership of directors would not significantly impact the informative content of purchase transactions if it is made by executives who already hold large stakes. Finally, we consider in the analysis the amount of time directors have before their retirement, which can potentially capture the experience and risk attitude of the trading director.

Corporate governance characteristics. Corporate governance literature suggests several mechanisms that can limit the adverse effects of the information asymmetry between insiders and outsiders in the presence of costly agency incentives. In this paper we consider three corporate governance characteristics which may affect the informative content of insider trading, namely board size, board independence and institutional ownership concentration. A positive relation is expected between board size and the effective monitoring of executives as a greater number of board members is expected to increase both the quantity and quality of advice and expertise they provide firms with (Fitch and Slezak, 2008). Acharya and Johnson (2010) analyze the impact of the number of insiders on the frequency of their trades and suggest that a greater number of insiders lead to more insider trading. Even if large boards are less effective in monitoring corporate financial decision-making they are expected to be more effective in terms of decreasing the information gap between insiders and outsiders. Therefore, we expect board size to have a negative effect on the informative content of CEO and CFO trades.

Another aspect of corporate governance that may influence the returns on insider trading relates to board independence. We argue that the monitoring of executive directors in firms with less independent boards is weaker. This in turn makes it more likely for executive directors to use private information and generate abnormal returns. Accordingly, a negative relation is expected between the returns from director trades and board independence. However, non-executive directors may choose to play a less confrontational role as they lack

sufficient incentives to provide an effective monitoring of executives. Furthermore, the reduced ability of corporate governance codes to enforce the duties of directors may cause non-executive directors to be less active. To the extent that this happens, the impact of non-executives on the returns from insider trading can be weaker or insignificant.

The last corporate governance attribute we consider is the institutional ownership concentration. Large investors have greater voting power as well as more incentives to monitor management, promoting good corporate governance (Agrawal and Knoeber, 1996; and Shleifer and Vishny, 1997). Also, institutional investors are better than other investors at collecting and processing information. Although they may also trade on the basis of noise, they are expected to make their decisions based on relevant and superior information (e.g. Ke and Petroni, 2004; and Yan and Zhang, 2009). Therefore, in the presence of large shareholders the degree of information asymmetry between insiders and outsiders is likely to be reduced, resulting in a lower predictive power of the insider trading and smaller profitability.

Other firm-specific control variables. In our analysis, we also control for firm-specific characteristics including size, growth opportunities, industry and past returns, which can influence stock returns irrespective of the identity of the trader. To this end, based on previous research, which shows that managers may exhibit contrarian behavior (Lakonishok and Lee, 2001; and Rozeff and Zaman, 1998), we expect a negative relation between the past returns and the subsequent returns on purchase transactions. Additionally, similar to earlier studies, we expect an inverse relation between firm size and the profitability of insider trading (Jeng *et al.*, 2003; and Seyhun, 1986) as the scrutiny of investors in larger firms is much greater and in smaller firms the ability of top executives to access valuable information is greater, which in turn reduces the informational advantage of executives. The next control variable used in the study is book-to-market ratio, which is a proxy for the firm's growth

opportunities, and is generally taken as a predictor of future stock returns (Baker *et al.*, 2003). It is expected that the book-to-market ratio will exert a positive impact on returns from insider trading by executives.

4. Descriptive and Univariate Analysis

In presenting our descriptive statistics and the results, we consider three sub-periods, as well as reporting results for the whole sample period of 2000 to 2010. The three sub-periods are as follows: 2000-2006 (*pre-crisis*); 2007-2008 (*crisis*); and 2009-2010 (*post-crisis*).

4.1. Descriptive analysis of independent variables

Table 2 provides summary statistics of the variables that are used in the subsequent empirical analysis. We report these statistics by grouping them into firm, corporate governance, managerial, and transaction characteristics. The average (median) book-to-market value during the whole sample period is 0.60 (0.46). However, as would be expected, there are significant differences across different sub-periods. The mean book-to-market value during the crisis drops to 0.46 whereas in the post-crisis it increases to 0.86, possibly suggesting that there are more value firms during the period following the crisis. The average board size for the total sample is 7.7 and remains similar in the three sub-periods. The average firm has 55 percent of their board members as non-executive directors. Notably, the ratio of the number of non-executive directors to total board size increases from 53 percent in the pre-crisis period to 58 percent after the crisis. The concentration of institutional ownership, *Inst_Own_Cont*, is relatively stable across the sub-periods with an average value of 22.59 percent in the pre-crisis period and 27.66 and 26.96 percent in the crisis and post-crisis periods respectively. The average (median) concentration for the whole sample is 25.12 (23.15) percent.

[Insert Table 2 here]

Moving on to directors' characteristics, we observe that the average holdings of both CEOs and CFOs increase over time. Specifically, the mean value of CEO (CFO) holdings increases to 2.28 (0.39) percent in the post-crisis period from 1.72 (0.33) percent observed in the pre-crisis period. The findings suggest that on average CEOs have a longer tenure than CFOs in their current firm at the time of their trading. The average tenure for a CEO (CFO) during the sample period is just over 6 (5) years. Furthermore, CEOs are relatively closer to retirement than CFOs, who have on average 2.5 more years than CEOs to retire at the time of their trades. The average number of external affiliations of the trading directors also differs significantly. On average, 21 percent of the CEOs in the sample are linked to another firm as a director, whereas the mean percentage value for the CFOs is only 12. More interestingly, the external affiliations of both director groups decrease during the crisis compared to the pre-crisis period, from 24 (14) for the CEOs (CFOs) to 18 (9) percent. Although the ratio remains unchanged for the CEOs during the post-crisis period, it increases for the CFOs, to a level that is even higher than its pre-crisis value. The average number of times CEOs and CFOs trade, *Past_Trades*, during the sample period are 7.5 and 9.5 respectively. The frequency of CFO trading is consistently greater than that of CEO trading in all periods. In line with the findings of previous research (Cohen *et al.*, 2012), there are more opportunistic purchases for both executives in all periods. However, while the percentage of opportunistic trades is 68 and 67 percent respectively in the pre-crisis and the crisis periods, it drops to 54 percent during the period following the crisis. This holds for both CEOs (52 percent) and CFOs (55 percent). It is likely that the number of profit-making opportunities during the crisis remains high due to lower market prices and possibly undervalued assets, which may partially explain why the percentage of opportunistic trades remains almost unchanged during this period. Similarly, once the market has corrected itself in the subsequent period, the sharp

drop in the ratio of opportunistic to total trades may indicate either the unwillingness of directors to use private information in trading or a lack of relevant private information. We explore these possibilities later in the paper.

[Insert Table 3 here]

In Table 3, we provide further information on the purchase transactions that are made by both types of directors in both types of trade. There are several observations that arise from the analysis of the results. First, the value of the average opportunistic trade during the whole sample is much greater, at about £46K, than the average routine trade, which is about £11K. The significant difference holds across all sub-periods, where it is the largest during the post-crisis period with the mean value of the routine trades (about £9.9K) being less than 15 percent of that of opportunistic ones (about £68.8K). Second, comparing the value of the purchase transactions across different periods, we observe that the mean value of transactions increases from £24.7K in the pre-crisis period to £38.7K during the crisis and continues to increase to £41.5K in the post-crisis period. This is despite the fact that the number of purchase transactions drops sharply during the same period from 4,457 in the pre-crisis period to 2,843 in the post-crisis period (see Panel B). Furthermore, while the average value of the opportunistic trade increases by about 127 percent from £30.4K in the pre-crisis period to £68.8K in the post-crisis period, the average routine trade value decreases by about 23 percent during the same period, from £12.8K to 9.9K. Interestingly, this does not hold for the CEO routine trades, whose value increases first sharply during the crisis period, from £10.9K to £15.3K, and then drops again to £11.9K, which is still above the pre-crisis level. The only mean trade value which drops below the corresponding average level of the pre-crisis period is that of the CFO routine trade in which the values are about £14K and £7.9K respectively, representing a drop of about 44 percent. Overall, we conclude that while the volume of

purchase trades increases during the sample period the observed increase seems to result from the significant rise in the mean transaction value of opportunistic trades rather than an increase in the number of transactions.

4.2. *Descriptive analysis of returns*

In Table 4 we provide an analysis of adjusted returns by focusing on the differences in returns on the CEO and CFO trades. In doing so, we attempt to see whether the crisis period of 2007 and 2008 makes any difference in the impact of insider trades on the subsequent stock returns. In general, the findings suggest that the opportunistic CEO trades generate greater adjusted returns regardless of the sub-period.⁵ When we differentiate between the returns in different periods, we note that the return on routine CEO trades is always positive and greater than that on CFO trades in the crisis period. Furthermore, the returns on CFO trades during the same period are mostly negative. Also, we note that the longer-term routine CEO trade returns (*RET_60* and *RET_90*) are higher than the corresponding opportunistic CEO trades in the crisis period.

Moving on to the return during the post-crisis period, all adjusted opportunistic returns are greater than the corresponding ones in the crisis period. Similarly, the returns on routine CFO trades in the post-crisis period are greater except for *RET_5*. However, the observed returns on routine CEO trades drop significantly in this period and the shorter-term returns, *RET_5* and *RET_10*, turn negative.

[Insert Tables 4 here]

⁵ The only exception relates to the returns for *RET_60* in the pre-crisis period in which the mean value of CEO opportunistic trades (2.86 percent) is lower than it is for the CFOs (3.18 percent).

5. Regression Results

5.1. *The determinants of returns – baseline model*

In Table 5 we report the findings for our baseline model in which the regression results are obtained using the whole sample period. We distinguish between different sub-periods by incorporating period time dummies in the analysis, *Crisis* and *Post-crisis*. In addition to other executive director characteristics, we also include dummy variables to test the impact of different types of trade on the observed adjusted returns. Specifically, we examine whether the subsequent returns to opportunistic and routine trades by CEOs and opportunistic trades by CFOs are significantly different from the returns following routine trades by CFOs. Accordingly, the CFO routine trades that are made in the pre-crisis period serve as the baseline category in the model, captured by the constant term. The regression results relate to four types of return. The first two, *RET_5* and *RET_10*, capture the short-term cumulative market-adjusted returns from insider trading, whereas *RET_60* and *RET_90* are included to reflect the long-term impact of the trades made by directors.

[Insert Table 5 here]

Turning to the results, we find that the trades by both CEOs and CFOs lead to positive market-adjusted returns in the short term. Specifically, the 5-day and 10-day returns on CFO routine purchases in the pre-crisis period, captured by the constant term, are positive and significant at the 1% level. The estimated coefficients for the other sub-groups of trades, namely *CEO_Oppportunistic*, *CEO_Routine* and *CFO_Oppportunistic*, are not statistically different from those estimated for the *CFO_Routine* dummy. The findings suggest that the market perceives inside purchases as informative about the future prospects of the company and reacts accordingly in the early subsequent days regardless of the type of trade and

executive director. However, there is no significant relation between inside purchases and the returns in 60 and 90 days. These results remain unchanged when we change the baseline category to capture, for example, the CEO opportunistic trades in the pre-crisis period.

Although the different types of purchases do not reveal significant differences, transaction size (*Trade_Size*) and the number of previous trades (*Past_Trade*) by directors affect the adjusted returns, albeit differently. All market-adjusted returns are significantly greater for larger transactions, suggesting that the size of purchases made by directors impacts the market's perception of how significant inside purchases are, supported by the results in relation to RET_5 and RET_10, and how informative they are, supported by the results in relation to RET_60 and RET_90. However, the number of previous trades does not seem to increase the informativeness of purchases. The greater the number of purchases made by directors, the lower the return they lead to in the short term, while the impact is insignificant in the longer term. Similarly, we find mixed results in relation to the director characteristics. The holdings of directors prior to the transaction do not affect the subsequent returns. On the other hand, the amount of time they sit on the board, *Tenure*, has a significant impact only on the return in 5 days and the impact is negative. It has no bearing on longer subsequent returns. Additionally, the longer the time to retirement, the lower the effect we observe on subsequent returns, and the relation is significant only for 5-day returns. This is not in line with what we would normally expect to hold. The only director characteristic that seems to be relevant in the medium term relates to their outside experience. The adjusted returns on the trades made by directors who have external affiliations are lower, reflected in the negative and significant estimated coefficients for 60- and 90-day returns.

Purchases in value firms with higher book-to-market ratios lead to positive and significant returns both in the short term and in the long term. It seems that executive directors have superior information about the market value of their companies supported, by the stronger

results (both economically and significantly) with regard to long-term returns. The findings for firm size are, however, mixed. Although the adjusted returns are insignificant in the short term, purchases in larger firms seem to be informative in the longer term.

Although we do not test directly the hypothesis that the behavior of directors is contrarian, we provide some evidence that there is a relation between the short-term returns on director purchases and the returns observed prior to their trades. Purchases made by directors following higher past 30- and 90-day returns lead to negative adjusted returns in the short term with no significant impact in the long term. Similarly, those purchases following negative recent returns lead to gains above the market return in the short term.

Turning to the findings on the relation between corporate governance characteristics and the market-adjusted returns, we find that board characteristics and institutional ownership play a limited role in determining the subsequent returns. Purchases by directors sitting on larger boards lead to smaller-than-the-market returns in 5 days with no significant impact on other returns. Moreover, board independence does not impact the adjusted returns except in the long term and only for 90-day returns. Purchases by directors in firms with more independent boards are associated with negative adjusted returns in the long term. To the extent that board independence is a desirable and effective corporate governance feature, the executive directors have limited or no ability to access private (superior) information in companies with more independent directors and any attempts to gain from trading in those companies do not pay off. Similarly, purchases in the companies with greater concentration of institutional ownership lead to negative adjusted returns in the short term and no significant gains or losses in the long term.

Finally, in line with our earlier descriptive results, the adjusted returns associated with purchases during the crisis are significantly lower than in the pre-crisis period. However, the post-crisis and the pre-crisis period returns are similar except for the average 90-day adjusted

return. During the post-crisis period, purchases made by directors are associated with lower market-adjusted returns in the long term compared to the pre-crisis period.

5.2. *The determinants of returns in the sub-periods*

Although the above analysis controls for the possibility that adjusted returns differ across different periods, it does not allow the impact of the determinants of adjusted returns to change between the periods. In Table 6 we estimate the same model for three different sub-periods to test this possibility.⁶

[Insert Table 6 here]

The results for the pre-crisis period are overall similar to those provided for the baseline model in Table 5. More specifically, the adjusted returns subsequent to purchase transactions are positive and significant in the short term and purchases do not seem to be informative in the long term. Whether trades are opportunistic or routine and made by CEOs or CFOs does not seem to matter. One noticeable change in the results, however, is that the estimated impact of transaction size is positive and significant for all returns both in the short term and in the long term during the pre-crisis period. That is, the market reacts positively to larger purchases and they seem to be informative.

The results regarding the crisis period reveal that the routine purchases made by CEOs are more informative than all other purchase transactions. The estimated coefficient of *CEO_Routine* is positive and significant only for 90-day returns. The findings reveal that the CEO routine purchases yield a market-adjusted return in 90 days which is 2.71 percent more

⁶ We focus on director, trade and corporate governance characteristics and hence do not report in the following tables the findings in relation to firm-specific characteristics and the past returns for brevity. However, the results are available upon request.

than the routine purchases made by CFOs. There is some evidence that opportunistic trades are neither well received by the market in the short term nor informative in the long term during the crisis. Although the results are insignificant, the estimated coefficients associated with opportunistic trades are negative regardless of the return and the executive. Also, in the crisis period the importance of transaction size and the number of previous trades are reduced substantially. In addition, we find that the time directors spend on the board affects the adjusted returns in the long term negatively. The negative and significant results regarding the variable which is proxy for the board experience of directors are more difficult to explain for the long-term adjusted returns. In contrast to the pre-crisis period, when purchases are made by directors who have other board experience the adjusted returns for all types are insignificant, reflected in the estimated coefficient of the variable *Affiliations*. However, the amount of time directors have to retire exerts a significant effect for returns both in the short term and the long term. The longer the amount of time to retire the less likely that the inside purchase is informative. To the extent that this variable also captures the experience and age of directors, the findings are in line with the view that more experienced directors are more likely to access private information and use it in trading. Finally, our results suggest that the influence of corporate governance characteristics of firms on the adjusted returns changes during the crisis period. What seems to matter most as a governance mechanism is the degree of board independence. The findings reveal that inside purchases by directors of firms with relatively more independent directors are likely to be more informative in the long term. The positive relation between board independence and adjusted returns is at odds with the view that the likelihood of directors having private information and using it in their trading is lower in a *good* corporate governance environment. Accordingly, board independence should not lead to positive market-adjusted returns subsequent to director transactions. As for the effect of institutional ownership on adjusted returns during the crisis, we find that the

negative effect, albeit moderate, that we observe in the pre-crisis period recedes largely in the crisis years.

Finally, in Table 6 we present the regression results in the post-crisis period, which provide us with stronger results than the findings reported for the earlier periods. First, it is clear that the opportunistic purchases made by CEOs and CFOs generally lead to greater returns in the long term. Also, the market reacts positively to inside trades in the short term as evidenced by the significant constant term for *RET_5*. The findings imply that the market-adjusted returns on routine trades made by CFOs are positive, albeit significant only for *RET_5*, and the returns on other types of trade are not significantly different. This provides some evidence on the relevance of inside trades at least in the short term. However, findings regarding the informativeness of purchases in the long term are unambiguous. The cumulative adjusted returns on the opportunistic trades by both CEOs and CFOs after transactions over 60 and 90 days are significantly higher. More importantly, the CEO opportunistic trades in the post-crisis period yield greater returns than those made by CFOs. Specifically, the adjusted returns from CEO (CFO) opportunistic trades in 60 and 90 days are respectively about 4.25 and 6.63 (3.62 and 4.98) percent greater than the return on CFO routine trades. The difference between CEO and CFO returns during these subsequent trading days is 0.63 percent in 60 days and 1.65 percent in 90 trading days. Overall, the findings are strongly in favor of the opportunistic trades by both directors for their ability to convey relevant information to the market, with some evidence that CEO opportunistic trades are more effective in doing so.

Another important finding in Table 6 relates to the impact of board independence. Contrary to the positive effect it has on returns during the crisis period, the role of board independence in determining the returns associated with purchase transactions in the post-crisis period seems to have changed substantially. There is strong evidence that the returns

are significantly lower in firms in which board independence is stronger. This implies that board independence is an effective mechanism in mitigating the asymmetric information between insiders and outsiders, which renders the trades by insiders much less informative. That is, it substitutes the role played by insider trading in conveying private information, suggesting that directors can neither signal private information to outsiders nor profit from their trades.

6. Summary and Conclusions

Insider trading has received considerable attention in the literature because insiders are believed to trade on private information and hence outsiders who mimic these trades have an opportunity to make abnormal profits. Prior studies provide evidence that buy-and-hold trading strategies yield abnormal returns, suggesting that the predictive power of insider trades regarding the future stock returns is high. Until recently, insider trades were mostly treated homogeneously without distinguishing between the directors who trade and the type of trades they make. In this study, in contrast to prior research, we provide a unified framework that enables us to analyse simultaneously both the distinction between CEO and CFO open market purchases, and whether they trade routinely and opportunistically. In line with earlier studies, we consider only purchase transactions as they are more likely to be driven by information and predict that routine trades are less likely to be based on private information as they are made regularly around the same time during the year. More importantly, we investigate the impact of the recent global financial crisis on the relationship between insider purchases and subsequent returns.

We observe that CFOs make more purchases than CEOs; there are more opportunistic purchases than routine ones regardless of the specific director and the sub-period; and the average value of opportunistic purchases is significantly greater than that for routine

purchases. Our empirical analysis reveals that the subsequent market-adjusted returns to insider open market purchases are generally positive. Importantly, the findings imply that there are no significant differences between opportunistic and routine trades. Nonetheless, the results change when we distinguish between the two executives and carry out the analysis for different sub-periods. We then find that the opportunistic trades made by both CEOs and CFOs are more informative, albeit only in the post-crisis period. Interestingly, the market reacts more positively to routine trades made by CEOs in the short term during the crisis period. Overall, the strongest results for the positive impact of insider purchases on returns relates to the trades made by CEOs in the post-crisis period. We also show that the market-adjusted returns increase with the size of trade and decrease with greater external affiliations of executives and the number of past trades. Our results reveal that board independence affects the returns positively during the crisis and negatively in the post-crisis period.

Taken as a whole, our analysis suggests that the position of the trading director and the nature of their trades are important in investigating the impact on returns of insider trades. Contrary to the findings of prior research, we find that CEO purchases are on the whole more informative than CFO purchases and opportunistic purchases, in particular those made in the post-crisis period, have a greater impact on subsequent returns. It seems that the recent financial crisis has changed the market's perception of insider trades regarding their informative content. However, we note that our analysis cannot shed light on whether insiders have also changed their trading strategies incorporating the shift in the market sentiment. This awaits further research.

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