Instituto Superior de Economia e Gestão
UNIVERSIDADE TÉCNICA DE LISBOA

ADVANCE – Centro de Investigação Avançada do ISEG

"Do Insiders Time Their Trades? Evidence from Euronext Lisbon"

Pedro Gonçalves
Technical University of Lisbon
School of Economics and Management
Rua Miguel Lupi, 20
1249-078, Lisbon, Portugal
pedromsg@gmail.com

João Duque
Technical University of Lisbon
School of Economics and Management
Rua Miguel Lupi, 20
1249-078, Lisbon, Portugal
jduque@iseg.utl.pt
(Contact Author)

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Abstract

In this paper, we examine the existence of insider trading abnormal profits in Euronext Lisbon from January 2001 to December 2005. Using the methodology of event studies, our overall results show that, in spite of existing legislation to regulate transactions, insiders are still able to make abnormal profits. Results also show that insider buying is a stronger indicator than insider selling and that the magnitude and duration of abnormal profits depend on both firm and transaction-specific factors. These include industry classification, firm size, firm valuation and relative trading volume..

Key words: insider trading; information and market efficiency; event studies; abnormal return; corporation and securities law; asymmetric and private information.

JEL Classification: G14, K22, D82.

* Corresponding author
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1. INTRODUCTION

"*Unless […] insiders just happened to possess superior analytical ability, their excess return must be due to the illegal exploitation of insider information*".[1]

Insider trading literature deals with the following question: do insiders make use of non-public information to earn profits larger than they would have had if they traded on the available public-information?

In our study we assume insiders to be those individuals who are compelled to inform the Portuguese Securities Market Commission (CMVM - *Comissão do Mercado de Valores Mobiliários*) about the purchase and disposal of shares from the company with which they are related. CMVM is responsible for the regulation and supervision of the Portuguese stock market and tries to guarantee its integrity and transparency. Therefore the regulator, through the Portuguese Securities Code (CVM - Código dos Valores Mobiliários) imposes a rule set to prevent insiders from using privileged information while trading stocks of their own firms. The Portuguese Securities Code (article 378, n.°3) describes privileged information as "all non-public information that, being accurate and with respect to any issuer or securities or other financial instruments, would be capable, if it was given advertising, of influencing in a sensitive manner its price in the market".

The reason for all the attention dedicated to insiders´ activities is best summarized in an article in "Individual Investor" (Feb. 1998, p. 54): "Company executives and directors know their business more intimately than any Wall Street analyst ever would. They know when a new product is flying out the door, when inventories are piling up, whether profit margins are expanding or whether production costs are rising…You always hear about the smart money. Generally, that is the smart money." In our paper, we assume this kind of knowledge as being privileged information as well.

1 Elton and Gruber (1995)

Therefore, our investigation aims to detect and measure the existence of insider trading abnormal profits in Portugal during the period from January 2001 to December 2005. It will cover, when available, all insider transactions on companies from Euronext Lisbon.

To decide whether or not insiders time their trades, we use the traditional methodology of event studies to test the existence of abnormal returns around the days when insiders purchase or sale their company shares.

Following the literature, we also tested if the magnitude and duration of abnormal profits depend significantly on firm-specific and transaction-specific factors (such as industry classification, firm size, firm valuation and relative trading volume of the insider transactions).

The remainder of this work is organized as follows. Chapter 2 presents the literature review. Chapter 3 presents the problem identification, where we summarize the legal framework regarding insider trade activity in Portugal. Chapter 4 describes the data and provides the summary statistics and chapter 5 the methodology applied. Chapter 6 discusses the empirical results and chapter 7 concludes the study.

2. LITERATURE REVIEW

Many studies conclude that insiders can earn abnormal profits through trading stocks of their own firms. Nevertheless, the intensity, pattern, duration and significance of those profits have varied substantially across countries and markets. The magnitude of abnormal profits depends on firm-specific and transaction-specific factors (such as firm size, trading volume, etc.), and the conclusions may also depend on whether insiders are purchasing or selling shares. The conclusions can be affected by modifying the standard event study methodology assumptions, and the regulation and enforcement of insider trading laws can also play a major role. This particular aspect turns this research very market dependent since in each market a different regulation is applied.

Table 1 summarizes the main results in the literature. There is a common pattern in the literature: insiders' purchases (sales) are typically preceded by negative (positive) abnormal returns before the transaction date and for the event day as well. After the event takes place, the purchases are followed by positive returns while after the sales share prices usually decrease.

Table 1: Literature Review

Author (s)	Sample period	Firm number	Exchange [1]	Sample			Event windows [2]	CAR		
				Overall	Purchases	Sales		Aggregated	Purchases	Sales
Jaffe (1974) [3]	1962-1968	200	CRSP	952	466	486	[-15, 0]	-2,00%		
							[0, +1]	0,60%		
							[0, +2]	1,18%		
							[0, +8]	1,36%		
							[0, +15]	0,50%		
Baesel and Stein (1979) [4]	1968-1972	111	TSE	580 (OI)			[0, +12]	3,80%		
				403 (BD)			[0, +12]	7,80%		
Heinkel and Kraus (1987) [5]	1979-1981	132	VSE	1.932			[-19, 0]		6,22%	10,11%
							[0, +40]		10,24%	-4,30%
Moss and Kohers (1990) [6]	1982-1983	500	NYSE / AMEX		119 (i)				67,42%	
					293 (ii)				34,71%	
						135 (iii)				-41,99%
						122 (iv)				-350,89%
Calvo and Lasfer (2002)	1997-2001	203	LSE	1.111	793	318	[-10, -1]		-2,18%	1,74%
							[+1, +10]		1,56%	-1,94%
Seyhun (1986)	1975-1981	769	NYSE / AMEX	59.148	24.371	34.777	[-100, 0]	-2,10%	-1,40%	2,50%
							[-20, 0]	-1,30%	-0,70%	1,70%
							[+1, +20]	1,00%	1,10%	-0,90%
							[+1, +100]	2,30%	3,00%	-1,70%
Jeng *et al* (1999) [7]	1975-1996		NYSE / AMEX	563.863	214.897	348.966	[0, +5]		2,69%	0,80%
			Nasdaq				[+5, +21]		1,29%	0,15%
							[+21, +180]		0,54%	-0,16%
Friederich *et al* (2000)	1986-1994	196	LSE	4.399	2.558	1.841	[-20, +0]		-2,70%	1,22%
							[0, +20]		1,96%	-1,47%
Cheuk *et al* (2006)	1993-1998	541	SEHK	23.675	16.221	7.574	[-20, -1]		-3,11%	2,58%
							[+1, +5]		0,19%	-1,14%
							[+1, +10]		0,43%	-2,28%
							[+1, +20]		0,58%	-4,14%
Del Brio *et al* (2002) [8]	1992-1996	88	MSE	995	589	406	[0, +1]	0,33%	0,13%	0,37%
							[+1, +15]	-0,03%	0,44%	-0,58%
							[+1, +60]	0,80%	0,91%	1,00%

1 - Abbreviations: CRSP (Chicago Research in Security Prices); TSE (Toronto Stock Exchange); VSE (Vancouver Stock Exchange); NYSE (New York Stock Exchange); AMEX (American Stock Exchange); London Stock Exchange (LSE); Stock Exchange of Hong Kong (SEHK); Madrid Stock Exchange (MSE). 2 - Jaffe (1974) and Baesel and Stein (1979) considered monthly data while the remaining authors dealt with daily security data. 3 - Results from Jaffe (1974) initial sample. 4 - Baesel and Stein (1979) chose to divide the trading activities into two subgroups: ordinary insiders (OI) and bank directors (BD). 5 - The only insider event with even marginally significant abnormal returns after the event was large net trades made in high volume fraction (active) weeks. 6 - The authors used the paired-difference test to compare the means of two variables (mean return to insiders and mean market return) when data are obtained from samples that are related. i) Buying prior to earning greater than expected; ii) Buying prior to dividend increase; iii) Selling prior to earning less than expected; iv) Selling prior to dividend decrease. 7 - Jeng *et al* (1999) used the CAPM to evaluate the equally weighted returns to all insider trades. The authors have also employed the 4-Factor Model and the Characteristic-Selectivity (CS) Measure methods. 8 - Del Brio *et al* (2002) results, using the traditional market model in the return-generating process.

3. THE PROBLEM IDENTIFICATION

If an insider trades on privileged information, then one would expect to see insiders purchase in days before the security price increases and sell them in the days before the security price declines. This is the main hypothesis on which we have based our investigation. "If non-informed investors are aware of the wealth transfer induced by insider trading, they refrain from trading, resulting in illiquidity, and therefore inefficiency in the markets" (Kyle, 1985). Beny (2005) found that "countries with more prohibitive insider trading laws have more accurate stock prices and more liquid stock markets".

As a result, regulators tried to "impose a rule set to enhance investor's confidence about the fairness of trading in the financial market" Bhattacharya and Daouk's (2002). The Portuguese Securities Code (article 378, n.°1) imposes that whoever holds and trades based on privileged information should "be punished by imprisonment for a maximum of three years or by a fine".

3.1. Legal Framework

Insider trading is regulated in Portugal by the "CMVM Regulation N°. 7/2001 Corporate Governance (with the amendments introduced and re-published by CMVM Regulation N°. 11/2003)". According to the article 3 of this regulation, CMVM must be informed of the purchase and disposal of shares admitted for trade in a regulated market involving: a) Members of the board of directors of the company issuing the shares; b) Members of the board of management of a parent company of the issuer of the shares; c) A company controlled by one of the persons mentioned in items a) and b); and d) A person acting on behalf of the persons mentioned in items a) and b). In our investigation, we assume these individuals to be insiders.

They are required to notify the invested company of the transactions within seven working days after the event. The invested company must notify immediately CMVM of the information received, but this information is not disclosed to the public. Data regarding

insider transactions is only available to the public when the company releases its annual reports.

In spite of the legal framework, CMVM has detected various illegal insiders trading activities as reported on its annual reports. The activities reported by the regulator are only related to illegal inside trading, which means the acquisition or disposal of financial instruments by a person who knows, or should know, that the information possessed is inside information. The article 3 of the "CMVM Regulation N°.7/2001" came into force on 1 February 2002. Thus, for the financial year commencing on January 2001, all companies we have included in our sample have already started disclosing their annual reports with information in appendixes regarding inside trading actions.

In the meantime, Portugal witnessed the first condemnatory sentence for the crime of inside trading, pronounced by the Criminal Court in Lisbon on 25 July 2003. The Court convicted a non-executive member of the Board of Directors and shareholder in the company "Vidago, Melgaço & Pedras Salgadas, SA", as the mastermind of the crime of insider trading.

3.2. The Study Hypothesis

In our investigation, we analyse the abnormal return for each company to identify these (illegal) and other potential insider trading activities.

We have based our investigation on one main hypothesis: that an insider earns abnormal returns if after purchases (sales) stock prices rise (decline) abnormally. We try to answer the questions using the traditional event study methodology, where the null hypothesis to be tested is whether abnormal returns in the event day and for the surrounding period are significantly different from zero.

Abnormal returns are also analysed for industry classification, as well as for samples grouped by firm size, relative trading volume, price to book ratio (P/B) and price earnings ratio (P/E).

Wong (2002) found that when cumulative daily excess returns are separated by firm size according to each firm's market capitalization, only the smallest capitalization shows significant returns within the post event period. Small firms are found to generate the largest and most persistent abnormal profits. Trading volume is found to be positively associated with the quality of information. Relative trading volume is therefore used as an indicator of the quality of information associated with each insider transaction. The sample is also grouped and ranked by P/B and P/E to examine if insiders take into account their company valuation while trading shares of their own firms. It is hypothesized that high P/B may predict bad performance, while low P/B value predicts good performance. [2] The literature also documented (see Cheuk *et al.* (2006)) a negative relationship between P/E and future stock returns. With this valuation hypothesis, we are expecting to see purchases with high (low) P/B and P/E to perform worse (better). On the other hand, we do expect to see sales with high (low) P/B and P/E to perform well (poorly).

4. DATA CONSTRUCTION

Our original sample included the 55 shares listed in the Eurolist from Euronext Lisbon at the end of 2005. The sample period of this study is January 2001 to December 2005, covering two years of market slump (PSI-20 dropped 24,73% in 2001 and 25,62% in 2002), and three years of market rally (PSI-20 gained 15,84% in 2003; 12,64% in 2004 and 13,40 % in 2005).

Each company's data was manually collected from their annual reports. Data on daily cash-dividend-adjusted stock returns were obtained from the Bloomberg terminal database. For each company, as well as for the benchmark index, we have extracted daily closing prices

[2] Cheuk *et al*. (2006) assume this hypothesis, using the book to market ratio. We assume the same hypothesis using the inverse ratio: the price to book ratio.

to calculate daily returns. Our analysis only considered insider transactions dealing with shares, which led us to drop all transactions with bonds and other related securities, such as derivatives. Transactions upon treasury's stocks were also dropped.

Within the sample period, we initially collected 2.426 insider transactions. Then, following Del Brio *et al.* (2002) "we excluded a number of transactions that are not likely to be driven by privileged information". Consequently, 1.142 observations were withdrawn from the sample. We separated the excluded data into eight categories as reported in Table 2.

Table 2: Transactions Excluded from the Sample

	Increase	Decrease	Total
(1) Conversions	16	-	16
(2) Capital increase & IPO	134	2	136
(3) Remunerations plans	398	74	472
(4) Transferences	17	12	29
(5) Takeover	1	1	2
(6) Capital change	16	-	16
(7) No date	47	46	93
(8) Corporate insiders	307	71	378
Total	936	206	1.142

All the above-described screening resulted in 1.284 eligible transactions. "In cases where an insider has carried out more than one transaction in a particular day, we include only one transaction", adding up the shares purchased or sold. This screening reduced the sample to 1.080 observations, with 686 purchases and 394 sales. "There were transactions where either the same or different directors from the same firm were trading in different directions" (e.g., a purchase of 25.000 shares and a sale of 201.793 on the same day). "In this case, net transactions were reported", (i.e., 176.793 as sale) Calvo *et al.* (2002). The sample was then reduced to 1.059 trades. Finally, we have also applied the Brown and Warner (1985) procedure: for a security to be included in the sample, "it must have at least 30 daily returns in the entire period (estimation window plus the event window), and no missing return data in the last 20 days". This allows us to reduce the influence of asynchronous trading.

4.1. Final Sample

With this last screening our sample was reduced to 1.052 transactions, and the number of firms dropped to 28. Nevertheless, they cover all the nine industry sectors quoted at Eurolist (as reported in Table 3) and 95% of the Portuguese market capitalization at the end of 2005.

Table 3: Frequency Distribution of Insider Trading by Industry Classification

	Purchases	Sales	All Transactions	Ratio of purchases to sales	Number of companies *
Financial	247	144	391	1,72	5
Basic Materials	58	31	89	1,87	5
Communications	142	114	256	1,25	5
Consumer, Cyclical	154	25	179	6,16	4
Consumer, Non-cyclical	8	10	18	0,80	3
Diversified	1	0	1	-	1
Industrial	47	55	102	0,85	3
Technology	3	1	4	3,00	1
Utilities	7	5	12	1,40	1
Total	667	385	1.052	1,73	28

Note: * The figures in the column refer to the number of companies in that industry classification at the end of December 2005. Industry classification is assigned by the Stock Exchange according to the nature of the business of the company.

Purchases outnumber sales, split into 667 (63%) purchases and 385 (37%) sales. The ratio of insider purchases to insider sales is 1,73:1, such that almost two out of three insider transactions are purchases. Although there are far more purchases than sales in each year of the sample period, the average number of shares per transaction is larger for sales (64.945) than for purchases (26.152). The ratio between the average number of shares sold by transaction and the number of shares purchased by transaction is 2,48, which suggest that shares are usually sold in larger blocks. Seyhun (1998) also found that insiders in the U.S. are likely to break up purchases into smaller transactions for fear of insider trading sanctions. He suggested that an insider purchase provides a stronger signal to both the authority and the general public than does an insider sale.

Table 4 summarizes inside trading activities cut off by firm size, P/B, P/E and relative trading volume, following Cheuk *et al.* (2006) procedure. We use three cutoffs to classify all transactions in each group.

Table 4: Cut off of insider trading events by firm size, relative trading volume, P/B and P/E

	A - Firm size					
	Purchases			Sales		
	Smallest 1/3	Medium 1/3	Largest 1/3	Smallest 1/3	Medium 1/3	Largest 1/3
From	12	245	2.822	13	245	2.822
to	222	2.809	12.597	222	2.809	12.597
N	222	222	223	128	128	129
	B - Relative trading volume					
	Purchases			Sales		
	Lowest 1/3	Medium 1/3	Highest 1/3	Lowest 1/3	Medium 1/3	Highest 1/3
From	0,0000%	0,0008%	0,0037%	0,0000%	0,0016%	0,0093%
to	0,0008%	0,0037%	1,4308%	0,0015%	0,0091%	1,4767%
N	222	222	223	128	128	129
	C - Price to book value					
	Purchases			Sales		
	Lowest 1/3	Medium 1/3	Highest 1/3	Lowest 1/3	Medium 1/3	Highest 1/3
From	0,32	1,61	2,46	0,34	1,75	2,49
to	1,60	2,45	25,69	1,75	2,49	15,48
N	210	210	209	127	127	127
	D - Price earnings ratio					
	Purchases			Sales		
	Lowest 1/3	Medium 1/3	Highest 1/3	Lowest 1/3	Medium 1/3	Highest 1/3
From	1,55	11,11	15,46	3,10	12,90	17,98
to	11,01	15,46	94,86	12,90	17,96	100,86
N	141	141	141	99	99	99

Firm size is measured in millions of euros. Data regarding the market capitalization, the total number of shares outstanding, the P/B and P/E ratios were obtained from the Bloomberg terminal database.

In order to test for the differences by firm size, companies in the sample are segregated into three groups according to their market capitalization at the time of the insider transactions (small, medium and large size firms). The size of an inside trading firm is calculated for every transaction based on the month-end figures of the month prior to when the insider trading occurred.

As in Cheuk *et al.* (2006) and other studies, relative trading volume is given as the ratio between total number of shares traded in the insider transaction and the total number of outstanding shares of the stock at that moment. Total number of outstanding shares is based on the month-end figure of the month prior to the month when the insider trade occurred. Each transaction is then ranked by the relative trading volume (low, medium and high) and is assigned to one of three groups: low relative trading volume, medium relative trading volume, and high trading volume.

The P/B is equal to a stock's price divided by its book value (i.e., total stockholders' equity) per share. The book value of the insider-trading firm, for every transaction, is based on the data from the most recent reporting period before trading (quarterly, semi-annual or annual). In our sample, each transaction is ranked by the P/B of the stock concerned and is assigned to one of the three groups: low P/B, medium P/B, and high P/B. In this particular analysis we have dropped 42 transactions from our sample, since book value information was not available[3].

The P/E is the ratio of the current share price to earnings per share (EPS) of the past year. The EPS of the inside trading firm for every transaction is based on the fiscal year-end figure of the year prior to that year when insider trading occurred. Similar to the analysis with the previous ratio, each transaction is ranked by the P/E of the stock concerned and is assigned to one of three groups: low P/E, medium P/E, and high P/E. In this examination, the sample of 1.052 transactions was reduced to 720, since there were 332 transactions where the respective EPS was negative and therefore P/E was not computed.

4.2. Sample Adjustments

Throughout this research, we have done some sample modifications and adjustments related to complications arising from violations of the statistical assumptions, being able to accommodate more specific hypotheses.

The first one was brought forward by MacKinlay (1997) who states that while aggregating the abnormal returns across firms "it is assumed that there is no clustering, meaning that the event windows of the included securities do not overlap in terms of calendar time. This assumption allows us to calculate the variance of the aggregated sample cumulative abnormal returns without concerning about the covariances across securities because they are assumed to be null". If this assumption is incorrect, then the parametric tests may be biased. Therefore, distributional results presented at the section 5 for the aggregated abnormal returns will no longer be valid. Brown and Warner (1985) point out that, in

[3] This is the reason why in Table 4 the number of purchases and sales (N) drops when section C is compared with N in sections A and B.

general, "the use of daily or weekly data makes clustering of events on a single day much less severe than the use of monthly data". "Diversification across industries also mitigates the problem"; as stated by Bernard (1987). Since our sample is highly diversified (all industry sectors are present in our data) we hope to overcome the referred problem. Following the portfolio approach suggested by MacKinlay (1997), the abnormal returns for those securities that share the same event day were aggregated into a single portfolio. We have build up 171 different portfolios, with an average of 2.15 securities per portfolio. As a result our sample was thereafter reduced to 855 (522 purchases and 333 sales), from the previous 1.052 transactions.

Following Calvo *et al.* (2002), we also built a non-overlapping sample in order to guarantee that the abnormal return calculation of an inside transaction is not influenced by the abnormal return of an early event. We assume that when insiders purchase or sell on consecutive days, they are trading with the same privileged bit of information. In order to prepare our sample, we follow Duque and Pinto's (2004) procedure to remove overlapping of event windows. Therefore, when transactions occurred on consecutive days, or within less than a five-day time interval, it was assumed as a single inside transaction, and the "event day" was assumed to include the entire time interval between the day of the first event and the day of the last event. The use of such a procedure reduced our sample even further. From 855 we came out with 450 transactions (255 purchases and 195 sales).

5. METHODOLOGY

The methodology and notation for the modelling of abnormal returns ($AR_{i\tau}$) follow largely MacKinlay (1997) and Campbell *et al.* (1997). We have done few additional adjustments in line with the insider trading literature.

The $AR_{i\tau}$ is computed by subtracting expected returns $E[R_{i\tau} \mid X_{\tau}]$ from the actual returns $R_{i\tau}$ (the log return of company i at time τ),

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau} \mid X_{\tau}). \qquad (1)$$

$X\tau$ stands for the conditioning set of information for the expected return. Event time (a counter) is denoted by τ, with the event date corresponding to $\tau = 0$. Different authors use different models to estimate expected returns. However, Brown and Warner (1980) after comparing different methodologies used in event studies showed "that beyond a simple, one factor market model, there is no evidence that more sophisticated methodologies convey any benefit".

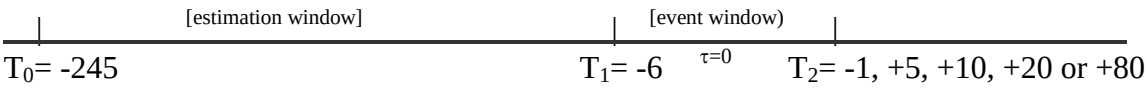
The market model is a statistical model, which relates the return of any given security to the return of the market portfolio. This method takes into account both market-wide factors and the systematic risk of each sample security. We used the PSI-20 index as a proxy to the market portfolio. For any security *i* the market model is

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \qquad (2)$$

$$E(\varepsilon_{it} = 0) \qquad \text{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}.$$

ε_{it} is the zero mean disturbance term and α_i, β_i, and $\sigma^2_{\varepsilon_i}$ are the parameters of the market model. $R_{i\tau}$ and $R_{m\tau}$ are the log returns in event period τ for security i and for the market portfolio, respectively.

Following the Brown and Warner's (1985) procedure to compute the $AR_{i\tau}$ we have firstly considered an event window of eleven days [-5, +5], which includes five days before the event, the event day, and five days after insiders' transactions. Afterwards, and following inside trading literature, we analysed other event windows as well: [-5, -1], [+1, +5]; [+1, +10]; [+1, +20] and [+1, +80]. The event day ($\tau = 0$) is taken as the day the insider transaction actually takes place.



For each security we use a maximum of 325 daily returns observations for the period around its respective event, starting at day T_0 = -245 and ending at day T_2 = -1, + 5, +10, +20 or +80 relative to the event, depending on which event window we chose to examine. The first 239 days period (from $\tau = T_0 + 1$ to $\tau = T_1$) is called the estimation window. For those event periods that include days before the event day, namely [-5, +5] and [-5, -1], the length of the event window is $L_2 = T_2 - T_1$ (11 or 5 days). For other event windows starting at day +1, the length of the event window is $L_2 = T_2$.

5.1. Abnormal Return and its Statistical Properties

Given the market model parameter estimates, one can measure and analyse the $AR_{i\tau}$, measured as

$$\hat{A}R_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}. \qquad (3)$$

The abnormal return is the disturbance term (ε_{it} from equation 2) of the market model calculated on a sample basis.

It is usual to aggregate the individual securities abnormal returns through time and across securities in order to draw overall inferences for the event under scope.

The individual securities' abnormal returns can be aggregated using $\hat{A}R_{i\tau}$ from equation (3) for each event period $\tau = T_1 + 1,\ldots, T_2$. Given N events, the sample aggregated abnormal returns for period τ is

$$\overline{AR}_\tau = \frac{1}{N}\sum_{i=1}^{N} \hat{A}R_{i\tau}, \qquad (4)$$

The average abnormal returns can afterwards be aggregated over the event window using the same approach as that used to calculate the cumulative abnormal return for each security *i*. For any interval in the event window[4]

$$\overline{CAR}(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \overline{AR}_\tau, \tag{5}$$

H_0 can be tested using the following statistics[5]

$$\theta_1 = \frac{\overline{AR}_\tau}{\text{var}(\overline{AR}_\tau)^{1/2}} \sim N(0,1), \tag{6}$$

$$\theta_2 = \frac{\overline{CAR}(\tau_1, \tau_2)}{\text{var}(\overline{CAR}(\tau_1, \tau_2))^{1/2}} \sim N(0,1). \tag{7}$$

In order to test if our conclusions could be biased as a consequence of an inadequate model, we also used the mean adjusted return and the market adjusted return models in the return-generating process. For the mean adjusted return, abnormal return is taken as

$$AR_{i\tau} = R_{i\tau} - \overline{R}_i. \tag{8}$$

Mean adjusted returns are computed by subtracting the average return for stock i during the estimation period from the stock's return during the event period. This method does not explicitly takes into account the risk of the stock and the return of the market portfolio. For the market adjusted return, abnormal return is taken as,

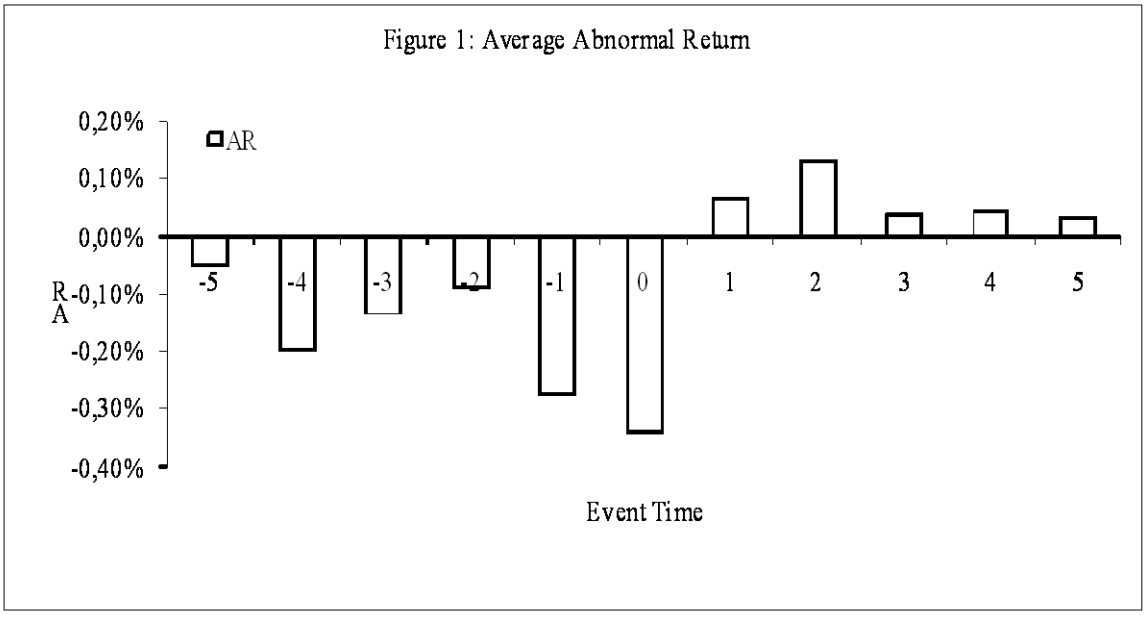
$$AR_{i\tau} = R_{i\tau} - R_{m\tau}. \tag{9}$$

[4] For the variance estimators the assumption that the event windows of the N securities do not overlap is used to set the covariance terms to zero.

[5] This distributional result is asymptotic with respect to the number of securities N and the length of estimation window L_1.

6. EMPIRICAL FINDINGS

We have initially applied the event study methodology described earlier to all the 1.052 transactions reported previously. Following Brown and Warner's (1985) methodology we started by considering an event window of eleven days [-5, +5]. We apply the methodology for the purchases and sales samples, but also for the aggregated transactions. As stated by Del Brio *et al.* (2002), if we believe that both purchase and sale returns should be measured as positive abnormal returns in the overall sample, excess returns for insiders' sales should be multiplied by -1 for the purpose of aggregation. The aggregated results we have obtained analysing 1.052 transactions are largely consistent with the literature providing evidences that a security return around insiders' trades follows a pattern, as shown in Figure 1.



This finding can be confirmed by analysing the statistical test described earlier, with the results being presented in Table 5.

Table 5: Results of Tests to Abnormal Return Overall sample			
Day	AR	Test θ_1	
-5	-0,05%	-1,061	
-4	-0,20%	-4,204	***
-3	-0,13%	-2,832	***
-2	-0,09%	-1,878	*
-1	-0,27%	-5,782	***
0	-0,34%	-7,214	***
1	0,07%	1,409	
2	0,13%	2,802	***
3	0,04%	0,798	
4	0,04%	0,890	
5	0,03%	0,683	

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

The first striking result is that insiders' transactions are preceded by negative abnormal returns during the five days before the event and for the event day as well, which means that insiders wait for a short-run persistent decline (increase) in the stock price to buy (sell) shares.

The individual day's abnormal returns were thereafter added to compute the cumulative abnormal return (CAR), with the results presented in Table 6.

Table 6: Cumulative Daily Abnormal Returns for Insider Trading Events									
Event window	Overall sample			Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2		CAR	Test θ_2	
Pre-event window [-5, -1]	-0,75%	-7,046	***	-0,18%	-1,340		1,74%	9,646	***
Transaction day [0]	-0,34%	-7,214	***	-0,15%	-2,570	**	0,67%	8,366	***
Post-event window [+1, +5]	0,31%	2,943	***	0,35%	2,678	***	-0,25%	-1,361	
Post-event window [+1, +10]	0,40%	2,647	***	0,54%	2,922	***	-0,15%	-0,575	
Post-event window [+1, +20]	0,76%	3,604	***	0,92%	3,501	***	-0,50%	-1,387	
Post-event window [+1, +80]	3,11%	7,329	***	4,25%	8,105	***	-1,14%	-1,579	

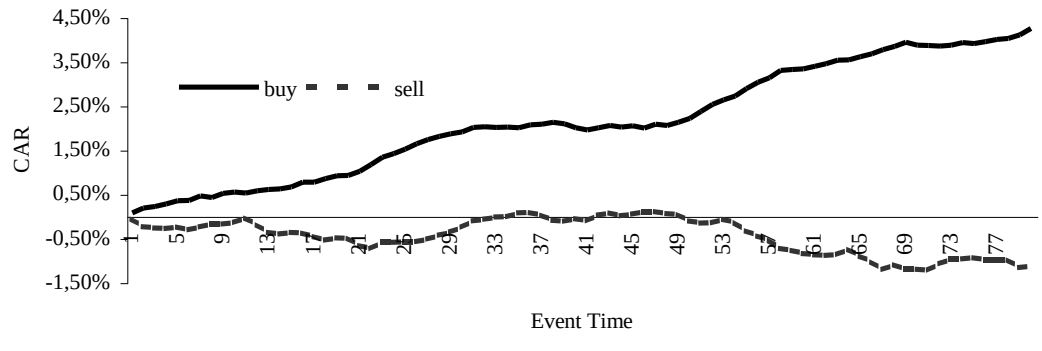
The symbols ***, **, and * show two-tail significance at the 1%, 5% and 10% levels, respectively.

CAR for pre-event window [-5, -1] confirms that an insider purchases (sales) occur after a period of low (high) stock price. After the event took place, the overall sample results (N=1.052) show that prices tend to increase after insider purchases and decrease after insider sales, for all the four post-event windows analysed. For the aggregated sample, the 5-day, 10-day, 20-day, and 80-day CAR are 0,31%, 0,40%, 0,76% and 3,11%, respectively,

and all are statistically significant. The null hypothesis is therefore rejected with a 99% confidence level.

Breaking up the overall sample between purchases and sales, we found that for the shares bought (N=667), the patterns and results remain identical to those from the aggregated sample. Insiders are able to make profits from their purchases, since CAR is significantly positive within all the event windows analysed. Since the abnormal return lingers for a period of at least 80 days (as illustrated in Figure 2), outsiders are capable of making abnormal profit by following insider purchases. Nevertheless, and according to Portuguese laws, information regarding insider transactions is only available to the public at the time a company releases its annual reports. Therefore, although our findings suggest the possibility of making abnormal profits by mimicking insider purchases, this strategy is not practicable due to the lack of information immediately after the transactions take place.

Figure 2: Cumulative Abnormal Return



From the sales sample (N=385), CAR is positive and significant before the insider transactions happen, which means that insiders wait for a short-run increase in the stock price to sell shares. After the event day and for all post-event window, although being always negative, CAR points towards the absence of significant excess return, because the hypothesis that the variable is null is always accepted. Previous researches suggest insider buying is a stronger indicator than selling. Insiders may sell shares to invest the money

elsewhere, to pay off loans, pay off mortgages, etc. Insiders would have little other incentive to buy unless the thought the stock price would increase in the future.

6.1. Firm and Transaction-Specific Factors

In order to study any industry specific effect, we split the sample into industries. Table 7 presents CAR according to industry classifications for the entire sample.

Table 7: Cumulative Daily Abnormal Returns for Insider Trading by Industry Classification

	Financial				Basic Materials			
	Insider purchase		Insider sales		Insider purchase		Insider sales	
Event window	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2
[-5, -1]	-0,74%	-5,015 ***	0,65%	3,004 ***	0,00%	-0,008	3,56%	6,810 ***
[0]	-0,21%	-3,215 ***	0,23%	2,355 **	0,23%	1,315	0,36%	1,528
[+1, +5]	0,14%	0,951	0,02%	0,101	0,42%	1,089	-0,36%	-0,695
[+1, +10]	-0,02%	-0,090	0,06%	0,204	0,54%	0,989	-0,25%	-0,336
[+1, +20]	0,11%	0,358	-0,08%	-0,175	0,31%	0,403	0,89%	0,853
[+1, +80]	-1,92%	-3,265 ***	-0,03%	-0,033	1,75%	1,127	4,48%	2,143 **
	Communications				Consumer, Cyclical			
	Insider purchase		Insider sales		Insider purchase		Insider sales	
Event window	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2
[-5, -1]	1,11%	3,004 ***	1,60%	4,332 ***	-0,04%	-0,143	6,91%	6,254 ***
[0]	-0,13%	-0,817	0,88%	5,342 ***	-0,13%	-0,920	3,88%	7,856 ***
[+1, +5]	0,97%	2,627 ***	-0,61%	-1,648 *	-0,12%	-0,377	1,41%	1,275
[+1, +10]	1,96%	3,755 ***	0,39%	0,744	0,25%	0,566	-1,90%	-1,218
[+1, +20]	3,08%	4,179 ***	0,92%	1,246	1,11%	1,777 *	-10,67%	-4,827 ***
[+1, +80]	13,61%	9,221 ***	0,81%	0,547	5,51%	4,410 ***	-6,12%	-1,384
	Consumer, Non-cyclical				Industrial			
	Insider purchase		Insider sales		Insider purchase		Insider sales	
Event window	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2	CAR	Test θ_2
[-5, -1]	-2,13%	-1,407	4,65%	4,404 ***	-1,16%	-2,839 ***	0,99%	1,919 *
[0]	-0,66%	-0,979	0,49%	1,027	-0,11%	-0,607	0,29%	1,260
[+1, +5]	0,02%	0,010	0,15%	0,140	0,44%	1,084	-0,90%	-1,728 *
[+1, +10]	-0,62%	-0,289	1,31%	0,879	-0,58%	-0,999	-0,71%	-0,965
[+1, +20]	-2,06%	-0,679	9,11%	4,314 ***	-0,50%	-0,605	-1,62%	-1,558
[+1, +80]	-0,65%	-0,108	-8,41%	-1,991 **	5,50%	3,356 ***	-6,32%	-3,049 ***

The symbols ***, **, and *indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

We refrain from analysing diversified, technology and utility industries, since each one had only one company (as shown in Table 3). The analysis of the six remaining sectors shows that only insiders from communications industry are able to make significant profits through insider purchases at all the post-event windows. The purchases made by insiders

from the financial sector have the worst performance among the industries analysed. This contrasts with the conclusion of Baesel and Stein (1979) who found that bank directors earn larger premiums than ordinary insiders. In terms of sale transactions, insiders of the consumer (cyclical) and industrial sectors tend to perform much better.

As observed before, Wong (2002) and Seyhun (1998) noticed that insiders' benefit might well be a result of some size effect. Having this in mind we started by testing the inside trades split up by firm size. Table 8 shows the CAR grouped by the firm size.

Table 8: Cumulative Daily Abnormal returns for Insider Trading Events by Firm Size

	Small 1/3					
	Insider purchase			Insider sales		
Event window	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	0,10%	0,390		3,36%	8,989	***
[0]	0,03%	0,236		1,53%	9,160	***
[+1, +5]	0,49%	1,845	*	0,66%	1,770	*
[+1, +10]	0,98%	2,640	***	0,38%	0,718	
[+1, +20]	1,48%	2,809	***	-0,68%	-0,903	
[+1, +80]	6,61%	6,269	***	1,17%	0,784	
	Medium 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	0,20%	0,808		1,57%	4,901	***
[0]	-0,21%	-1,888	*	0,39%	2,737	***
[+1, +5]	0,49%	1,980	**	-0,95%	-2,962	***
[+1, +10]	0,72%	2,047	**	-0,07%	-0,155	
[+1, +20]	1,56%	3,127	***	0,60%	0,936	
[+1, +80]	8,92%	8,961	***	-1,67%	-1,303	
	Large 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,83%	-5,495	***	0,26%	1,192	
[0]	-0,27%	-3,994	***	0,09%	0,904	
[+1, +5]	0,07%	0,481		-0,45%	-2,068	**
[+1, +10]	-0,08%	-0,385		-0,75%	-2,428	**
[+1, +20]	-0,29%	-0,952		-1,42%	-3,239	***
[+1, +80]	-2,80%	-4,626	***	-2,93%	-3,339	***

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

For insider purchases, only the small and medium capitalisations show significantly positive post-event CAR. Cheuk *et al.* (2006) argue that in many cases, especially in small firms, the separation of management and ownership is rare. Since manager–owners are, in

general, more informed about the business prospects of their own firms, insider trading which involves the directors of small corporations is likely to be the most profitable. Relating firm size to insider sales, the results show that only large firms insiders are taking any abnormal benefit from selling their stocks. The CAR for all the four post-event windows is negative and statistically significant.

Following the conclusions of Jeng *et al.* (1999) we wonder whether insider trades are anyhow related to trade volume. Table 9 shows the CAR grouped by the relative trading volume of the transactions.

Table 9: Cumulative Daily Abnormal Returns for Insider Trading Events by Relative Trading Volume

	Low 1/3					
	Insider purchase			Insider sales		
Event window	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,17%	-0,774		1,18%	4,038	***
[0]	-0,04%	-0,430		0,35%	2,702	***
[+1, +5]	0,17%	0,767		-0,75%	-2,549	**
[+1, +10]	0,22%	0,684		-0,73%	-1,756	*
[+1, +20]	0,76%	1,689	*	-1,53%	-2,608	***
[+1, +80]	4,04%	4,510	***	-3,58%	-3,060	***
	Medium 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,26%	-1,212		2,07%	6,991	***
[0]	-0,14%	-1,462		0,83%	6,243	***
[+1, +5]	0,10%	0,457		-0,05%	-0,177	
[+1, +10]	1,01%	2,401	**	0,25%	0,594	
[+1, +20]	1,01%	2,401	**	0,34%	0,581	
[+1, +80]	2,56%	3,032	***	0,43%	0,364	
	High 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,10%	-0,397		1,96%	5,696	***
[0]	-0,27%	-2,481	**	0,84%	5,470	***
[+1, +5]	0,78%	3,214	***	0,07%	0,193	
[+1, +10]	1,00%	2,907	***	0,04%	0,086	
[+1, +20]	0,98%	2,008	**	-0,31%	-0,450	
[+1, +80]	6,13%	6,283	***	-0,25%	-0,179	

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

Purchases in the high relative trading volume group predict better performance for all the event windows. For sales transactions, post-event CAR is statistically significant only for

small relative trading volume. This means that larger abnormal profits are achieved when insiders purchase in larger blocks or when they sell shares in smaller lots. Previously we showed that insiders in Portuguese market usually sell shares in larger blocks, and now we found that only shares sold in small lots bring the greatest profits. This result is in line with findings that insiders may sell shares not to avoid losses through the exploitation of private information, but to invest the money elsewhere or to supply any consumptions need. Jeng *et al.* (1999) also argue that "insiders with sizeable corporate holding may undertake high volume sales to diversification or liquidity purposes".

The relationship between the two valuation ratios and abnormal return is examined next.

Table 10: Cumulative Daily Abnormal Returns for Insider Trading Events by Price to Book Ratio

	Low 1/3					
	Insider purchase			Insider sales		
Event window	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	0,39%	1,545		3,24%	9,166	***
[0]	-0,06%	-0,556		1,42%	8,967	***
[+1, +5]	0,93%	3,696	***	0,54%	1,539	
[+1, +10]	1,73%	4,877	***	0,24%	0,476	
[+1, +20]	2,46%	4,897	***	-0,54%	-0,759	
[+1, +80]	6,61%	6,577	***	4,60%	3,253	***
	Medium 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,30%	-1,282		0,51%	1,811	*
[0]	-0,07%	-0,697		0,15%	1,223	
[+1, +5]	-0,05%	-0,214		-0,47%	-1,684	*
[+1, +10]	-0,35%	-1,051		-0,19%	-0,465	
[+1, +20]	0,19%	0,411		-0,40%	-0,717	
[+1, +80]	4,81%	5,144	***	-1,89%	-1,679	*
	High 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,84%	-3,730	***	1,50%	4,998	***
[0]	-0,33%	-3,281	***	0,44%	3,253	***
[+1, +5]	0,09%	0,405		-0,84%	-2,780	***
[+1, +10]	0,09%	0,280		-0,54%	-1,272	
[+1, +20]	-0,07%	-0,166		-0,59%	-0,973	
[+1, +80]	0,15%	0,169		-6,14%	-5,104	***

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

As noticed before, inside trading benefits may well be related to P/B and P/E ratios (see see Cheuk *et al*. (2006)). It is hypothesized that insiders tend to buy at periods of low P/B and

low P/E and sell at periods of high P/B and high P/E. Table 10 shows that stocks bought by insiders with the lowest P/B perform better than the stocks bought with medium and high ratio. Contrarily, for stocks sold by insiders, the CAR is significantly negative only for those shares with the highest P/B. This is consistent with the hypothesis that a high P/B predicts bad future performance.

A low P/E ratio is also associated with a high future stock return, while high P/E is associated with a low future stock return. Table 11 illustrates this relationship.

Table 11: Cumulative Daily Abnormal Returns for Insider Trading Events by Price Earnings Ratio

	Low 1/3					
	Insider purchase			Insider sales		
Event window	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,27%	-1,333		1,70%	5,548	***
[0]	0,07%	0,809		0,39%	2,830	***
[+1, +5]	0,39%	1,941	*	-0,28%	-0,920	
[+1, +10]	0,37%	1,286		-0,19%	-0,449	
[+1, +20]	1,25%	3,098	***	-0,42%	-0,690	
[+1, +80]	1,41%	1,741	*	-1,13%	-0,928	
	Medium 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-0,58%	-2,515	**	0,21%	0,819	
[0]	-0,30%	-2,914	***	0,31%	2,701	***
[+1, +5]	0,06%	0,242		-0,23%	-0,922	
[+1, +10]	-0,15%	-0,472		-0,41%	-1,149	
[+1, +20]	-0,19%	-0,414		-0,71%	-1,394	
[+1, +80]	-0,30%	-0,326		-0,76%	-0,751	
	High 1/3					
	Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2	
[-5, -1]	-1,13%	-4,558	***	1,54%	4,448	***
[0]	-0,23%	-2,049	**	0,40%	1,058	
[+1, +5]	0,59%	2,387	**	-0,43%	-1,242	
[+1, +10]	0,36%	1,017		-0,62%	-1,274	
[+1, +20]	-0,51%	-1,032		-1,38%	-1,990	**
[+1, +80]	-1,06%	-1,072		-4,11%	-2,968	***

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

Therefore, as stated by Cheuk *et al*. (2006), it is likely that insiders, who are more able to assess the value of their firms, buy when the P/E of the stock is low, and sell when the P/E is high. Table 11 shows that for the purchase sample, positive post-event CAR is only

found in the low P/E group. Contrarily, for the sales transactions, post-event CAR is significantly negative only for the high P/E group. Both results are significant only for [+1, +20] and [+1, +80] event windows.

Overall, our results confirm that insiders take into account their company valuation before buying or selling stocks of their own firms.

6.2. Methodology Adjustments

As explained before, we also used two alternative strategies in order to control the results. Abnormal returns were also computed using the mean adjusted return (equation 8) and the market adjusted return (equation 9). For the mean adjusted return, the patterns remain identical, as shown in Table 12 (which compares with the results from Table 6).

Table 12: CAR for Insider Trading Events Using the Mean Adjusted Return Model

Event Window	Overall sample			Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2		CAR	Test θ_2	
Pre-event window [-5, -1]	-1,08%	-8,862	***	-0,54%	-3,595	***	2,01%	9,756	***
Transaction day [0]	-0,46%	-8,441	***	-0,26%	-3,928	***	0,80%	8,654	***
Post-event window [+1, +5]	0,29%	2,401	**	0,42%	2,754	***	-0,08%	-0,384	
Post-event window [+1, +10]	0,37%	2,161	**	0,72%	3,358	***	0,22%	0,770	
Post-event window [+1, +20]	0,92%	3,771	***	1,43%	4,751	***	-0,03%	-0,063	
Post-event window [+1, +80]	4,41%	9,060	***	7,10%	11,767	***	0,24%	0,296	

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

Previously, we have done some sample modifications and adjustments related to complications arising from violations of the statistical assumptions. These complications arise when event windows of the included securities overlap in terms of calendar time or when abnormal return calculation is influenced by the abnormal return of an early event. These adjustments, however, did not modify our main conclusions and findings.

Table 13 reports the results, already taking into account the clustering issue. We have go back to the market model.

Table 13: Cumulative Daily Abnormal Returns Taking into Account the Clustering Issue									
Event Window	Overall sample			Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2		CAR	Test θ_2	
Pre-event window [-5, -1]	-0,75%	-6,593	***	-0,11%	-0,798		1,74%	9,150	***
Transaction day [0]	-0,35%	-7,011	***	-0,16%	-2,557	**	0,66%	7,757	***
Post-event window [+1, +5]	0,35%	3,103	***	0,46%	3,271	***	-0,18%	-0,963	
Post-event window [+1, +10]	0,46%	2,870	***	0,64%	3,211	***	-0,18%	-0,677	
Post-event window [+1, +20]	0,86%	3,803	***	1,05%	3,758	***	-0,56%	-1,470	
Post-event window [+1, +80]	3,36%	7,438	***	4,85%	8,657	***	-1,04%	-1,366	

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

Although we have reduced the sample size and chosen a new approach for those transactions where the clustering was noticeable in the event dates, the results remain mostly identical, and for the three samples, the statistical significant regions remain unchanged. Friederich *et al.* (2000) argue that "although event clustering can affect the results through cross-sectional correlation of the excess returns, this is not necessarily a strong limitation when different industries and daily data are used because the probability of events being clustered decreases under those circumstances".

This portfolio approach allows us also to achieve a better fitting for the market model parameters. Using the initial sample (N=1.052), the average value for the coefficient of determination R^2 is 0,20, higher than the estimation found by Duque and Pinto (2004)[6]. The authors have used the PSI Geral index to compute the market return parameters, rather than the PSI-20 index that we use in our research. After the portfolio approach, R^2 coefficient average was slightly improved to 0,22. The average β_i (0,70 for the 1.052 sample or 0,72 for the 855 sample) differ substantially from 1, but the average beta was computed as a non-weight average of 28 securities (only 17 belonged to PSI-20 index at the end of the sample period, although they count for 98% of the benchmark value).

Table 14 reports the results taking into account the clustering issue and the non-overlapping approach simultaneously.

[6] The higher the R-squared the larger the variance reduction of abnormal return.

Table 14: CAR Taking into Account the Clustering Issue and a Non-Overlapping Approach									
Event Window	Overall sample			Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2		CAR	Test θ_2	
Pre-event window [-5, -1]	-0,71%	-4,702	***	-0,21%	-1,087		1,37%	5,633	***
Transaction day [0]	-0,74%	-10,888	***	-0,46%	-5,370	***	1,10%	10,111	***
Post-event window [+1, +5]	0,47%	3,143	***	0,50%	2,601	***	-0,45%	-1,838	*
Post-event window [+1, +10]	0,49%	2,286	**	0,67%	2,484	**	-0,25%	-0,730	
Post-event window [+1, +20]	0,51%	1,681	*	0,74%	1,942	*	-0,20%	-0,417	
Post-event window [+1, +80]	0,49%	0,807		0,70%	0,921		-0,21%	-0,212	

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

The CAR for the significant test for the first three shorter post-event windows and the AR for the event day remain robust and practically identical. CAR for both [-5, -1] and [+1, +5] windows, where we have completely eliminated the overlapping, are -0,71% (θ_2 = -4,702) and 0,47% (θ_2 = 3,143). In the previous sample, CAR for [-5, -1] and [+1, +5] event windows were -0,75% (θ_2 = -6,593) and 0,35% (θ_2 = 3,103). For longer periods, namely for the [+1, +80] event window, the test θ_2 cease from being significant. Larger event windows could reflect other factors that lead shares to rally or slump that is external and outside the firm control, and news or events that are unknown by insider at the time the transaction is executed.

One potential problem that can arise from using both the mean adjusted return and market model is that the results can be sensitive to the inclusion (or exclusion) of other event periods into the estimation period. Brown and Warner (1980) argue that if high levels of abnormal performance are present, then including observations from around the time of the event gives more weight to apparent "outliers", tending to increase the variance of the security-specific performance measures, and lowering the power of the tests. To cope with this potential problem, we have redone the analysis using the market adjusted return model. This method allows for abnormal return not to be contaminated by other events taking place during the estimation period.

The results are presented in Table 15.

Table 15: Cumulative Daily Abnormal Returns Using the Market Adjusted Return									
Event Window	Overall sample			Insider purchase			Insider sales		
	CAR	Test θ_2		CAR	Test θ_2		CAR	Test θ_2	
Pre-event window [-5, -1]	-0,58%	-3,548	***	0,02%	0,097		1,36%	5,246	***
Transaction day [0]	-0,82%	-11,226	***	-0,66%	-7,087	***	1,02%	8,836	***
Post-event window [+1, +5]	0,37%	2,255	**	0,42%	2,010	**	-0,30%	-1,159	
Post-event window [+1, +10]	0,25%	1,101		0,49%	1,684	*	0,06%	0,171	
Post-event window [+1, +20]	0,28%	0,860		0,73%	1,761	*	0,31%	0,602	
Post-event window [+1, +80]	-0,51%	-0,789		0,72%	0,872		2,13%	2,060	**

The symbols ***, **, and * indicate two-tail significance at the 1%, 5% and 10% levels, respectively.

For the aggregate sample, the pattern and significance of the abnormal returns persist until the [+1, +5] event window, but we loose the effect for the remaining post-event windows.

7. CONCLUSIONS

Although there exist other studies on the subject using similar methodologies and data treatment, this type of research is particularly sensitive to differences in jurisdiction. As noticed by Bhattacharya and Daouk's (2002) and Beny (2005), inside trading legislation varies widely around the world with different impact on trading activity and information release. Even within the European Union, that issued the "Directive 2003/6/EC", the rules and regulations do not provide a completely uniform set of practices, resulting on a country dependent effect. This is why the results for the Portuguese market become relevant.

Our overall results show that, although there is legislation to regulate insiders' transactions in Portugal, they still seem to be able to make abnormal profits when trading shares of their own firms. The patterns we found "in abnormal returns are consistent with directors engaging in short-term market timing: they sell (buy) after an increase (decline) in prices, and their trades are followed by a partial price reversal", a result similar to Friederich *et al.* (2000). But our results suggest that insider buying is a stronger indicator than insider selling.

Although our findings suggest the possibility of making abnormal profits by mimicking insider purchases (since the abnormal return lingers for a period of at least 80 days), this strategy is not practicable due to the lack of information immediately after the transactions take place. Once the information is released to the public it will have no further trading

value. The "Directive 2003/6/EC" of the European Parliament regarding the release of insider trading information recommends that issuers in member states inform the public of inside information as soon as possible[7]. In Portugal, this recommendation has yet to be enforced.

Our results also suggest that some insiders' transactions may comprise more information than others.

For the shares bought, we find that the largest and persistent abnormal returns are found in purchases that have some common denominators: the firm belongs preferentially to the communication industry; the firm is small or medium in terms of market capitalization; the relative trading volume of the purchase is high and the price to book ratio and the price earnings ratio of the security is small.

For the shares sold, although the results from analysing the entire sample point towards the absence of significant negative excess returns, there are some firm and transaction-specific factors that lead abnormal returns to fall within the statistical significant regions. These sales have some common features: the firm is usually a consumer (cyclical) or an industrial company; the firm is large in terms of market value; the relative trading volume of the sales is low and the price to book ratio and the price earnings ratio of the shares sold are typically high.

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[7] Article n. ° 6 from the "Directive 2003/6/EC"

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