Insider Trading on the UK Stock Market: Information Contents and Managerial Incentives

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ABSTRACT

This study investigates the managerial incentive of insider trading. A research subject that has not been empirically examined in the UK yet. In doing so, this study merges two parallels but related tracks: The information contents of insider trading which is a Finance subject backed by the Effiecient Market Hypothesis (EMH) and the managerial incentives of insider trading which is a Management subject backed by the Agency Theory. In fact, the managerial incentives of insider trading only becomes testable once there is evidence that insider trading is profitable.

In detecting the information contents of insider trading, this research differs from previous literature in that (1) it employed three signal definitions, (2) it used daily data, (3) it used the security' return index, instead of share prices, (4) it used a most recent set of data, (5) it used the Capital Asset Pricing Model (CAPM) to estimate the expected returns, (6) it reports the results within a shorter event window and (7) it provides, for the first time, empirical evidence on the Executive Share Options (ESO) transactions, in addition to ordinary shares. In terms of the managerial incentive part of this research, a major contribution of this research is that it provides evidence for the first time on the managerial aspects of insider trading by directors in the UK.

The analysis has examined the short-term profitability of FTSE100 directors trading in their own firm's ordinary shares and executive shares options, over recent years (1999 to 2000). The empirical results of this study shows that except for the executive share options portfolios, the empirical results significantly reject the null hypothesis that directors trading in their own company's securities are not profitable. Instead they suggest the alternative hypotheses that directors buying portfolios achieve positive abnormal return and those of selling ones avoid negative abnormal returns. The results of this study have been checked on by re-running the analysis taking into account thin trading, confounding events, year-by-year analysis, and firm size. The robustness check analysis shows that there is no thin trading problem in the sample securities, no firm key event/announcement conoccured with the director dealing transactions, thus the director dealing abnormal returns are not a result of other events. In addition, smaller firms outperform larger ones, particularly in the longer event windows of buying transactions.

and directors buying in the year 2000 outperform those in 1999. However, the year 1999 was a successful selling year for FTSE100 directors.

Two important conclusions are suggested by employing different signal methodologies. These are first, different signal definition produce different results, not only in terms of the level and sign of cumulative abnormal return (CAR), but also in terms of the significance of the statistical results. On one hand, multiple (MS) and quantitative (QSs) signals produced significant CARs at earlier days than single signal (SS). This leads to suggest that the market reacts significantly sooner to successive signals than to a single signal. On the other hand, none of the other signals produce significantly results that reject (accept) what has been accepted (rejected) by the single signal. The results of three tests, parametric (standard errors) and non-parametric (Wilcoxon Signed Ranks Test), about the equality of the means of CARs of SS and of MS, QS1, QS2, QS3 and QS4 might lead to suggest that while the magnitude of CARs across various signals is identical, the time when these CARs becomes significant is varied. CARs of compounded signals (MS and QSs) are significant at earlier days in the event window, while those of SS are significant at later days in the event window. This suggests that none of other signals can be considered as an alternative or a counterpart to the single signal with daily data. Second, each signal definition requires certain data frequency. Single signal produces robust results when daily data are used, while those of multiple and quantitative signals are mixed. Monthly data is recommended with multiple signals, whereas both monthly and daily data can be used with quantitative signal.

In the context of EMH, the empirical result of this study shows clearly that the stock exchange is significantly inefficient in terms of the strong level of market efficiency. On the other hand, the availability of abnormal returns to outsiders following the publicly known information, i.e. insiders' transactions, can be seen as a direct test to the semi-strong level of market efficiency. The empirical results indicate that abnormal returns can be earned by outsiders' imitating insiders' transactions. However, taking into account the transaction cost, such returns would end up with zero, if not negative returns.

In terms of the managerial incentive of insider trading, the model states that as the number of insiders in the firm increases, competition to insider trading increases and each insider's expected returns decreases. On the other hand, as number of insiders' increases, the explicit form of director's compensation should increase to offset his insider trading returns decreases. This concept leads to an empirically testable assumption that the director's expected compensation has two forms, (1) an explicit form (salary, bonuses, perks and other ex ante measurable incentives) which is predicted to be positively correlated with the number of insiders; and (2) an implicit form (his expected insider trading returns) which is predicted to be negatively correlated with the number of insiders in his firm.

The empirical prediction, presented in a multivariate model, was tested using FTSE100 chief executive officers (CEO) data. The data and the justification behind using each and every dependent and independent variable in the test is discussed. Also, the variables for the regression model, which is used to explain the relationship between the CEO explicit form of compensation (dependent variable) and the number of insiders in his firm, as well as his personal and job characteristics (independent variables), are analysed and assessed.

The results were very much in favour of the model. The positive relation between the explicit forms of CEO compensation and the number of insiders in the UK FTSE100 firms was found to be quite robust. That is, the significant relation does not depend on (i) whether the model accounts for CEO internal experience and industry sector, (ii) whether the model accounts for CEO's capacity to trade and his actual insider trading returns and (iii) whether an omitted variables problem is accounted for by using panel data. This leads to conclude that insider trading is an integral part of the director's total compensation package, and thus, can be considered as a managerial incentive.

A by-product finding from the analysis indicates that there is an indication that the labour market for top management in FTSE100 might not be competitive. This conclusion is brought about by the positive associatian found between director's pay and his realized insider trading returns. However, this conclusion is subject to the definition of CAR used in the analysis.

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PART I: INTRODUCTION AND INSTITUTIONAL BACKGROUND

Chapter One

Introduction

(1.1) INTRODUCTION

This thesis is organised in four parts and seven chapters. The first part is an introductory one which consists of this introduction (chapter one) and an institutional background to insider trading by directors and managerial incentives which aims at presenting the main economic, ethics, legal and institutional (disclosures) aspects of the research issues (chapter two). Part two presents the main theories and reviews the empirical evidence on both research issues, *i.e.* information content and managerial incentives (chapter three and four). The empirical tests of the research hypotheses are employed and reported in part three (chapters five and six). Finally, part four concludes the thesis and summarises the findings (chapter seven).

This chapter lays the foundation for this thesis. Firstly, it justifies the research in section (1.2), and then it defines the term of insider trading in section (1.3). The theoretical backgrounds to the research issues are introduced in section (1.4). Whilst the research objectives and hypotheses are presented in section (1.5), section (1.6) addresses the data and the methodology used to test the research hypotheses. The research limitations are outlined in section (1.7) and finally the thesis structure is presented in section (1.8).

(1.2) RATIONALE FOR THE STUDY

This research merges two parallels but related tracks. The information content of insider trading which is a Finance subject backed by the EMH and the managerial incentives of insider trading which is a Management subject backed by the Agency Theory. The research problem examined in this study is about detecting the information content and examining the managerial incentive of insider trading by the UK largest firm directors. The information content analysis is motivated by important academic as well as institutional benefits that can be achieved by a marginally developed methodology and most recently set of data; and the managerial incentive analysis is motivated by a research issue that has not been empirically examined by the existing literature. The objectives were (1) to enhance the academic understanding on a persistence phenomenon on individual (director), institutional (firm, shareholders and regulators) and market (the stock exchange and the managerial labour market) levels; (2) to provide the stock exchange investors with beneficial practical implications about following the timing and direction of the director trades; (3) to provide the shareholders with a better bargaining position in contracting their firm's directors compensation and (4) to provide the stock exchange and corporate governance regulators with an affirmative academic backup to their regulation.

(1.2.1) The Information Content of Insider Trading

In the last two decades, insider trading has been the subject of considerable debate in the UK, USA, and Europe [see section (2.2)]. Despite over twenty years of regulating insider trading in the UK and seventy years in the USA [see section (2.3)] and numerous theoretical and empirical research [see section (3.4)], the issue is still intriguing. Not only in terms of the efficacy of prohibition against it, but also, in terms of the interpretation of its meaning and its economic impact on a firm's value, market efficiency, managerial behaviour, and social welfare.

The hypothesis that insiders trade profitably upon inside information is in response to firm-specific factors [the most recent examples are Aboody and Lev (2000) and Chakravarty and McConnell (1999)] and economy-wide information [see, for example, Gregory *et al.* (1997), Kara and Denning (1998) and Seyhun (1988b)] that affect the stock return.

Opponents of insider trading believe that it is inherently immoral, detrimental and illegal. That is so, simply, because of the ability of the insiders to benefit from prior knowledge of, for instance, "bad news". It is widely believed that insider trading results in three types of damage to the economy. The first one is related to the trade's behaviour that is executed in the market, discussed, for example, in Moore (1994), Prodhan (1994a) and Werhave (1994). The second is related to the market confidence [see, for example, Cinar (1999)] and the third is related inconsistently with the strong form of market efficiency, as advocated by, for example, Leland (1992) and Keenan (2000a) and (2000b). This is based on a belief that, despite regulation, insiders do trade upon private price-sensitive information in their own firm's shares. Section (2.2) reviews this point of view. This study examines the information content of such trading on the UK's stock exchange.

Proponents, on the other hand, regard it as a viable, efficient, and beneficial economic means to serve the best interests of shareholders and the market at whole. This view was initially advocated by Manne (1966) and later on supported by Carlton and Fischel (1983). The Manne School argues that insider trading improves managerial incentives, and thus decisions [see, for example, Antle and Smith (1985) and (1986)], and increases the market efficiency as a result of impounding more information in the stock price [see, for instance, Ross (1978)]. In addition, the widespread existence of insider trading and profitability in the most advanced stock exchanges, such as London Stock Exchange (LSE) and New York Stock exchange (NYSE), presents argument against the first two damages mentioned above.

(1.2.2) The Managerial Incentives of Insider Trading by Directors

Agency Theory hypothesises that long-term managerial incentives, through the means of, *inter alias*, performance-related compensation[1] can be used, firstly, to counter the agency problem between managers (agent) and owners (principal) and, secondly, to motivate managers to improve shareholders' value [see section (4.2.2) for managerial incentive theory].

Although there have been many empirical studies examining the various issues of insider trading by directors, few have empirically examined the issue of insider trading by directors as a managerial incentive [see section (4.4) for literature review on insider trading as a managerial incentive]. It is expected that this research will fill the gap and provide a comprehensive review and empirical evidence on this issue in the UK. Moreover, almost all-empirical research has excluded ESOs from their insider trading by directors' samples. This research will examine what is excluded.

This research is therefore focusing on the information content and managerial incentives that can be drawn from directors' trading in their own firm's stocks, with particular reference to the trading signal. The importance of this research lies in the debate on important issues that have ethical, legal, managerial and economic aspects. It also lies in providing up-to-date and new evidence on the currently debated issues of insider trading by directors, and by contributing to the existing paradigm of the top management compensation theory. Finally, it is expected that the results of this research will have many implications not only for the stock exchange regulations, but also for corporate governance and the agency problem.

(1.3) DEFINITION OF INSIDER TRADING

Insider trading literally means the buying or selling the firm's stock by insiders. Since it is widely accepted that the firm's directors are well informed about their own firm's prospects, their trades convey their belief about the future of their firm's stock value. This belief is therefore related to the information they solely possess. If this were the case, trading upon information not publicly disclosed and, thus, not already reflected in the stock prices would, of course, result in a more advantageous position than for the uninformed traders. This information is considered as price-sensitive information because, if it were made public, it would change the stock price significantly. It is a material fact that this information if released will affect the stock price. Therefore, it is material information. In the context of insider trading, this sort of information is inside information.

Insiders are those persons who, by virtue of their duties, have access to the firm's inside information, and are aware of this endogenous possession. Hence, the term insider refers not only to firm's directors, officers, and staff, but also it includes the firm's external advisers, such as bankers, auditors, lawyers, and financial advisers. This study, however, limits its empirical investigation on the firm's directors only. Thus, insider trading implies two distinctive terms: insiders' transactions (buying or selling their own firm's securities) and inside information (price-sensitive, private and non-disclosed information).

To sum up, the term of insider trading can be defined as the transactions in securities by persons who, by virtue of their privileged relationship to the issuance firm (such as

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[1] Other means include appointing non-executive and independent directors in the boards [see Section

directors, officers, staff, and advisers), trade upon price-sensitive, private and not made public information. This can result in achieving more than the average market return, by acquiring more of such securities; or avoiding loss, by disposing or reducing holdings. It can also be used for portfolio diversification, or just for liquidity reasons. Different definitions of insider trading can be seen, for example, in Ashe and Murphy (1992), Hopt and Wymeersch (1991), Moore (1994), Suter (1989) and Viandier (1991).

(1.4) RESEARCH BACKGROUND

The issue of insider trading as a profitable device and its effect on market efficiency in general and as a managerial incentive in particular is increasingly important. This is due to the economic (market efficiency), financial (investment strategy), managerial (incentive-performance), legal (fair game), ethical (fraud), and political (corporate governance) aspects of this issue. In the last two decades, insider trading has been the subject of considerable debate in the UK, USA, and Europe. Despite over twenty years of regulating insider trading in the UK and seventy years in the USA and numerous theoretical and empirical researches, the issue is still intriguing. Not only in terms of the efficacy of prohibition against it, but also, in terms of the interpretation of its meaning and its economic impact on a firm's value, market efficiency, and social welfare. This section aimed at providing a theoretical background on both research hypotheses: the insider trading and the managerial incentive.

(1.4.1) Insider Trading and The Efficient Market Hypothesis

The company's management is commonly assumed to have an informational advantage over outside investors, either current outside investors, such as shareholders, or potential outside investors. This information is related to the company "true" stock value and future prospects. The company's stock price quoted on the stock exchange is assumed to represent the "fair" value of the stock. When the stock exchange values all the stocks fairly, then it is considered as an "efficient" market. Efficiency is a "relative" term. It has to do with nothing but information. So, the more firm specific, industry-related, and economy-wide information reflected in the stock price, the higher the level of the market efficiency.

(2.7)].

In the context of the Efficient Market Hypothesis (EMH), Fama (1970) defines three levels of efficiency. These are weak, semi-strong, and strong forms of efficiency. The difference between these forms depends on the level of information embodied in the stock prices. The first level of information includes historical market trading data, while the second consists, in addition to the first level, all publicly available information about prospects of a firm, and the third, the extreme version, incorporates, in addition to the first and second levels, "inside information" and future economic events. Each of these levels has a distinctive test. Fama (1991) outlines these tests as the Random Walk Hypothesis to test the first level, Event Study for the second, and Multivariate Analysis, in addition to the event study, for the third. Section (3.2) provides a comprehensive review to the EMH. One might argue that the capital market with insider trading is more efficient than without, because stock prices fully reflect all, including inside private, information. This study will examine this *prima facie* as a consequence of considering insider trading by directors as a managerial incentive.

Inside information is, simply, private, non-disclosed, price-sensitive information. It has social attitudes toward dealing with it, *i.e.* it is unethical, and the consequences that follow such dealing are manifested in legal restrictions. In the context of the Agency Theory, this study will question these attitudes. Section (4.4) addresses this issue.

Insider trading is regulated in the United Kingdom by the Criminal Justice Act 1993, Part (V), reviewed in section (2.6). The purpose of insider trading regulation is not to prohibit insider trading completely, but to regulate the timing and the disclosure of such trading. Section (2.4) provides a full discussion of the main theories behind such regulations and section (2.5) reviews these laws. It can be argued, however, that the widespread nature and popularity of insider trading can be regarded, *inter alias*, as an explicit consent to agent trading given by the owners (principals). The *a posteriori* argument is that the principal has provided the agent with the tools (insider trading and/or ESO) and approved his[2] incentives (profit). In this context, insider trading cannot be seen as breaching the fiduciary duties, or as a misappropriation. This study will present more analysis on this argument.

[2] or her. Throughout this thesis, the "masculine" pronouns are used in a generic rather than a gendered sense.

(1.4.2) Insider Trading by Directors and the Agency Theory

Certain aspects of agency theory are particularly important in the context of this research. These are the principal-agent model and the managerial incentives, discussed and reviewed in chapter four.

Agency Theory states that the principal (shareholders)-agent (managers) problem can be reduced by appropriate incentive schemes. Thus, managerial incentives should be related to the increase in shareholders' wealth, which is better measured by market share price. These schemes implicitly encourage insiders trading. In other words, insider trading by directors can be seen as a managerial incentive scheme used to improve not only the alignment of interests between principal and agent, but also the principals' values.

The firm directors act as agents for the shareholders (principals), with a presumably objective function of maximising shareholders' wealth. Cited reasons for the deviation from this hypothesis include the complexity of the managerial decision process and the separation of ownership and management. The latter reason is an agency problem, which can be reduced by designing appropriate incentive schemes, such as the one that relates directors' remuneration to the firm's performance. Two tools can be used to tie managerial wealth with shareholders' welfare. These are share-price-influenced compensation, *e.g.* executive share options (ESO), and/or insider trading[3]. Pay performance literature well documented the former mechanism, which is out of this research boundary.

Agency Theory emphasises the positive relationship between directors' remuneration and the firm's performance. This relationship is referred to in the literature as the pay-performance relationship. Director's compensation includes salary (fixed component), bonus (short-term performance-related), other perquisites (perks, *e.g.* pension and golden parachutes), and ESO[4] (long-term remuneration). The performance-related pay

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[3] ESO plays an important role in this context. It provides the firm's managers with the shares (tool) to trade, while the information they possess provides them with profit (incentive) to earn. However, allowing directors to trade in their own firm's ordinary shares exhibits the same role as those of ESO.

[4] ESO given to the firm's directors are rights to buy shares at some time in the future (usually three years) at today's price. The intention, from the shareholders' viewpoint, is to motivate directors to do their utmost to raise the share price. Therefore directors' gain from the positive difference between the future share price (exercise price) and today's share price (granted price). On the other hand, shareholders gain

is the device used to align directors' objectives with those of the shareholders. Numerous articles in the literature have examined the pay-performance relationship in UK corporations[5] [the most recent examples are Conyon and Murphy (2000), Main *et al.* (1996), McKnight and Tomkins (1999) and Vafeas and Theodorou (1998)].

However, this research is not about pay-performance analysis. Instead, it is about whether a non-counted form of a managerial pay can be considered as part of their incentive scheme. That is whether insider trading by directors can be considered as an implicit part of the compensation package. In the context of Agency Theory, this issue can be re-written as whether directors (agents) trade on private price-sensitive information is beneficial to shareholders (principals), and on what costs, if any.

Manne (1966) was the first to address this issue by arguing that the ability of an agent to trade on his informational advantage could be considered as a part of an explicit or implicit contract between the principals and the agent. In a principal-agent context, Carlton and Fischel (1983), Dye (1984), Easterbrook (1995) and Jensen and Meckling (1976) supported Manne's view and pointed out that agent trades might be socially beneficial and that both shareholders and managers can gain from devices that ameliorate the aligning divergence of interest.

Two relative questions have been addressed in the literature. The first is about when it is beneficial to the manager (agent) and the shareholders (principal) to give the manager discretion in the selection of his compensation. While the second is regarding how insider trading aligns both parties' interests. Dye (1984), for example, addresses these

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from the increase in their wealth, which is better measured by share value. ESO presents no cost to the firm however it is a contingent liability that would result in diluting equity. Black and Scholes (1973) model a formula, commonly used in literature as a B-S option-pricing model, to estimate the value of ESOs and MacBeth and Merville (1979) develop the B-S model. From the directors' viewpoint, ESOs are not taxable income even after selling them. The profit is a capital gain that is liable to a lower rate than income tax. In addition, directors lose nothing except the opportunity cost of such incentives if share prices fall. There are a large number of studies examined this issue, inter alias, Acharya *et al.* (2000), Blasi *et al.* (1996), Bryan *et al.* (2000), Fenn *et al.* (2001), Johnson and Tian (2000), Loderer and Martin (1997), Reitman (1993), Samuels and Lymer (1996) and Yermack (1997).

[5] The topic of the relationship between management compensation and firm performance is the most researched subject in management, with more than 300 researchers over the past seventy years. As part of corporate governance, this relationship is subject to academic interest, as well as regulatory and political interest. The importance of this topic is due to the factors that affect management compensation, such as regulation, investment opportunities, product differentiability, industry structure, demand instability, and capital intensity. Barkema and Gomez-Mejia (1998) provide an intensive review of relevant literature and Demirag *et al.* (2000) suggest a number of areas for further research.

issues and concludes that if the manager is initially compensated with earnings-contingent contracts, then his wealth as well as the shareholders welfare could be improved by allowing insider trading. In addition, Hu and Noe (2001) develop a model that links moral hazard and information asymmetry aspects of insider trading and find that insider trading provides both low-cost incentives for managerial efforts and increases price informativeness, *i.e.* efficiency. Noe (1995) reached the same conclusion and argues that insider trading improves the bargaining position of shareholders relative to managers, thus reduces the willingness of shareholders to provide expensive effort-assuring managerial compensation packages. Furthermore, Zhang (2001) examines this issue but through the role of insider trading in facilitating shareholders' control and shows that with proper regulation, insider trading mitigates the problem of information asymmetry and subsequently allows shareholders to better control their firm. Other researchers have examined the issue from different angles. Bebchuk and Fershtman (1994), for example, examine how insider-trading affect's the manager's choice among different project's risk levels. They exhibit that under certain conditions, the managerial contract that allow insider-trading leads to a relative increase in the degree to which manager's salary depends on the firm performance. In short, literature established two mechanisms per which insider trading might reduce agency costs by improving the managerial incentives. Firstly, by increasing shareholders' welfare, and secondly, by enhancing shareholders' control. Section (4.3) reviews this literature.

As part of corporate restructuring in the UK, managerial compensation has undergone significant change and received increased attention during the last decade, consummating in influential reports by Cadbury (1992), Greenbury (1995) and Hampel (1998) committees [section (2.7)]. Among other things, the reports recommended a framework for setting executives pay, board's monitoring responsibilities and introducing non-executive outside directors in the board, as well as expanding the disclosure requirements for executives' compensation.

(1.5) RESEARCH OBJECTIVES AND HYPOTHESES

This study examines the rationale behind using insider trading by directors as a managerial incentive and its implications on firm's stock performance and shareholders' welfare. The hypothesis that insiders trade upon private and price-sensitive information can earn abnormal returns. Such profit can simply be considered as an implicit part of the managerial remuneration packages.

Stock price reactions to company announcements of price-sensitive information, such as take-overs, equity issues, repurchases, new investments, dividends, are well recognised in the semi-strong form of the EMH. Despite regulation, there is mounting evidence of significant insider trading by directors' profitability. This profitability can be seen as a managerial incentive, not only to reduce the agency problem, but also to improve the firm's performance. Allowing the firm directors to trade in their own firm's share provide them with the tool while their insider trading expected returns are their incentives to function in alignment with shareholders' objectives. Thus, understanding this relationship is important in order to study firm's stock performance as well as to understand effects on the shareholders' welfare.

(1.5.1) Objectives

The main objective of this research is to provide comprehensive but precise answers to the following principal questions:

(1) What is the information content, if any, conveyed by directors trading in their own firm's shares? That is, what sort of private information is not reflected in the stock prices prior to directors' trading? (Profitability of insider trading by directors).

(2) What is the effect of insider trading on the stock returns? To what extent the directors' trade in their own firm's shares affect the stock exchange? (Market efficiency).

(3) In the context of the Agency Theory, can insider trading by directors be considered as a managerial incentive? (Management compensation).

(4) If so, how can insider trading by directors is considered managerial incentives be proven? (A model to link finance issue with management matter).

By answering these basic questions, the research aims at obtaining evidence on (1) the degree of profitability of the directors trading in their own firm's shares on the UK stock exchange, (2) the extent to which insider trading by directors can be used as a managerial incentive.

The main purpose of this study is to examine the managerial incentives of insider trading by directors. This will be achieved by attaining two objectives. The first one is to examine the incremental information content of insider trading in the UK, using a daily security returns in an event study. This study employs different signals definition that might be relevant to an understanding of not only the information content of insider trading, but also the timing with which the market reacts to such signals. Prior UK insider trading based literature defines the event in a number of ways. These are the net number/value of shares traded per month [Gregory *et al.* (1994, 1997)], referred to hereafter as a Quantified Signal (QS), the net number of insiders traded monthly [Pope *et al.* (1990)], referred as a Multiple Signal (MS), or the net transaction type, *i.e.* buy or sell, per month [King and Roell (1988)], referred as Single Signal (SS). This previous research recognised that the method of defining the signal has an important impact on the conclusion drawn because that the market knows that there is an asymmetry in the distribution of liquidity trades of insiders [Gregory *et al.* (1997), p. 340]. In addition, this study argues that the market reactions to different signals are not identical. The current academic interest in the economics of the information content of insider trading [see, for instance, Fenn *et al.* (1991), Park *et al.* (1995) and Udpa (1996)] and the substantial interest of financial market professionals (such as the regulatory bodies and the specialised media), market participants (mainly the market-makers, in addition to the institutional and individual investors) and the management compensation committees [see section (2.7) for managerial compensation policies], together provide the stimulation for the current study.

The second objective of this study is to investigate whether insider trading by directors can be considered as an implicit part of the managerial compensation package. That is by examining empirically the remuneration packages of FTSE 100 directors, namely the Chief Executive Officers (CEOs), during the period (1999 and 2001). The importance of this investigation is two-fold. Firstly, it relates empirically two separate disciplines, *i.e.* managerial incentives (Management) and insider trading by directors (Finance). Secondly, it provides evidence for the first time on the managerial aspects of insider trading by directors in the UK.

(1.5.2) Hypotheses

If insider trading by directors is induced by the possession of private good (bad) news, it is expected that a strong buy and holding (selling) pattern would exist. Shareholders because of their concern of the agency problem motivate their directors to trade for profit in their firm's shares, and provide them with the tool (allowing insider trading) to do so. Despite the regulation, directors must trade if they are to benefit from private information. If this argument is correct, then insider trading by directors conveys private price-sensitive information not already incorporated in the stock price [this represents the first hypothesis of the study]. This will lead to significant changes reflected in the stock price [this is the second hypothesis]. Moreover, the use of different signal definitions will add to the knowledge, based on ex ante expectations of their differential information impact, in the since that additional signals complement single signals so that we expect a cumulative (but perhaps asymptotic) effect in terms of timing and magnitude of market response and that alternatively different signal types substitute for one another applying different signal definitions is expected to produce different level of information content of directors trading [this is the third hypothesis]. In addition, directors trading in different type of shares, i.e. ordinary shares and Executive Share Options are expected to produce different level of information content of such trading [this is the fourth hypothesis].

In addition, this research hypothesises that the director's expected return from insider-trading is an implicit form of the managerial compensation, where as the explicit part consists of salary and bonuses. However, as the number of insiders at the company rises, the competition to use their private information and consequently release their signal increases, the expected trading profit of each insider decreases. Moreover, the explicit form of directors' compensation should be increased to offset the diluted insider-trading returns. Thus, the remuneration committee has to take this into consideration when determining the explicit form of the compensation package for each director. Consequently, as the number of insiders increases, the explicit form of the compensation for each director increases. Thus, the director's total compensation is a function of, *inter alias*, the number of insiders in the firm [this is the fifth hypothesis of the study]. In fact, this hypothesis only becomes testable once there is evidence from the previous hypotheses, *i.e.* directors trading is profitable.

(1.6) RESEARCH DATA AND METHODOLOGY

This section is aimed at providing a brief overview of the data used and methodology employed in this study. Since all the data required testing this research hypotheses are of secondary sources, this research pursues the quantitative research paradigm. A justification for following this paradigm includes the attributes of the research problems to be addressed. That is the information content, *i.e.* signal, of insider trading by directors and insider trading by directors as a managerial incentive, *i.e.* the causal relationship.

(1.6.1) The Data

(1.6.1.1) Insider Trading By Directors

Since 1976, UK listed companies on the London Stock Exchange (LSE) have been required to notify the Stock Exchange of insider transactions in their companies' stocks or debentures. The Companies Act 1989 and London Stock Exchange's "Yellow Book" detail the requirements for UK directors' transactions in their own companies' stocks. The Stock Exchange issues such notifications in its Weekly Official Intelligence. In addition, the Financial Times publishes such transactions weekly in its Saturday issues, while the Hemscott.NET's website (www.hemscott.com) reports these transactions for the last twelve months. Moreover, Datastream provides a summary of accounting statements, financial data, market prices and other data on UK quoted companies. The research will capitalise on the detail provided in these reports and databases to construct company specific proxies for directors' trade.

The sample firms consists of all of the FTSE 100 companies experiencing directors' trading in their firms' ordinary shares and/or executive share options during the period 1/5/1999-1/7/2000, collected from the Hemscott.NET's website[6]. The initial sample consists of 1200 transactions (96,245,713 shares), of which 285 transactions (31,029,571 shares) for the directors exercised their executive share option (BEO), and 152 transactions (23,619,348 shares) of sold executive share options (SSO). In addition, there are 508 transactions (13,683,912 shares) of which directors bought their own firm's ordinary share (Buy), and 157 transactions (19,842,685 shares) of sold ordinary share (Sell). Moreover, 98 transactions (8,070,197 shares) are excluded because these are non-markets and non-executive share options transactions, such as those resulted from inheritance, marriage, divorce, and gifts.

All securities in the FTSE100, with continuous daily trading were chosen. Of the FTSE100 securities, 96 securities satisfied this condition. Market-based data, for each firm during the period 1/1/1997-1/1/2001 was collected from DataStream. These are (1) the share's daily return, (2) the daily FT All Share return, as the market portfolio's return, and (3) daily UK Treasury bond benchmark, as a risk-free security [see section (5.4.2)].

(1.6.1.2) Managerial Characteristics and Compensation

The data set was collected from the Corporate Register for the period (1999 and 2001), which is prepared and updated annually by PriceWaterHouseCoopers[7]. The Corporate Register provides yearly information on the total compensation and personal and job characteristics of the Chief Executive Officer (CEO) in each company listed in London Stock Exchange (LSE). Since the population element of interest in this research is FTSE100, the data base is constructed so as to conform the following criteria:

(1) Availability of firm's number of executives during the period (1999 and 2001).

(2) The CEO's compensations are available during the period (1999 and 2001).

(3) There is enough information about CEOs personal characteristics.

(4) Data availability about the CEOs job characteristics, such as his firm's size [measured by total number of employees and/or market capitalisation] and performance [represented by earnings per share (EPS) and/or price-earnings ratio (P/E)] and industrial category.

(5) The Company was in FTSE100 index and included in the insider-trading database.

These requirements are, firstly, to satisfy the application of the Model outlined in section (6.2). The total number of executives is to serve as a proxy for number of insiders, personal and job characteristics are attributes for CEO's market equilibrium value and insider-trading data is for director's expected returns from insider trading. Secondly, to serve as pre-conditions for other purposes. One rationale behind such requirements, for example, is that FTSE100 firms represent about 80% of LSE market

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[6] Hemscott is a public shareholding investment company, URL: www.hemscott.com.

[7] Published quarterly by *HS Financial Publishing*, London.

capitalisation, and thus the index considered as a leading example for the other 1500 corporations listed in LSE. Consequently, any conclusion made from FTSE100 corporations can be generalised in the markets, either director's labour market or stock exchange market. Another rationale is that the time period under investigation (1999 and 2001) coincided with our insider trading by directors' data base period (1999 and 2001). This is necessary to satisfy the assumption that the firm's director contracts are of long-term basis. Taking the time of conducting this research (2002), it is reasonable to have a three-year period [following Cadbury (1992) recommendation, discussed in section (2.7)] ending with the most recent data (2001) available. Finally, the other variables, firm size and profitability, can be used to serve not only as proxies for CEO job characteristics, but also as control variables in the multivariate regression of the model. Although FTSE100 index represents the largest 100 firms in the LSE, in terms of market capitalisation, the size and profitability among these firms are varied sharply.

(1.6.2) The Methodology

In the following subsections a brief overview of the research methodologies will be outlined. Subsection (1.6.2.1) presents the methodology used to detect the information content of insider trading by directors, and subsection (1.6.2.2) explains the methodology used to test the validity of considering insider trading by directors as a managerial incentive.

(1.6.2.1) The Information Content of Insider Trading by Directors

In order to examine the research hypotheses, the distribution of profitable insider trading by directors will be examined. That is, if insider trading by directors were to take place on price-sensitive private information, stock prices would be expected to change after the announcement of such trades.

Director's return from insider trading, *i.e.* abnormal returns, will be measured by applying the conventional Event Study, using the Capital Asset Pricing Model (CAPM) to estimate the expected returns and the Market Model (MM) to estimate the CAPM parameters [see section (5.2.1.4)].

The research methodology extends prior UK research on the information content of insider trading by using an up-to-date daily set of data. It is hence among the first to incorporate the insider trading effects of the 1993 Criminal Justice Act (CJA). In addition, it uses the security return, instead of share prices used in the prior literature. Also, it used three different definitions of the event itself. These are the single signal (SS), multiple signal (MS) and quantified signal (QS). In line with prior studies, the simple Market Model's (MM) parameters are used in the Capital Asset Pricing Model (CAPM) to estimate expected returns and abnormal returns. Finally to mitigate bias, the study reports the results within a shorter event window than used in the literature.

(1.6.2.2) The Managerial Incentive of Insider Trading by Directors

The conceptual structure of the research hypothesis, *i.e.* considering insider trading by directors as a managerial incentive, is examined and tested in a cross-sectional research technique. In addition, data analysis will be employed to validate the conceptual structure of considering insider trading by directors as a managerial incentive. These include univariate (correlation) and multivariate (multiple regression) analysis.

The operational model used to test this relation such that as the number of insiders in the firm increases, competition to insider trading increases and each insider's expected returns decreases. On the other hand, as number of insiders' increases, the explicit form of director's compensation should increase to offset reductions in his insider trading returns. This concept, formulated in section (6.2), leads to an empirically testable assumption that the director's expected compensation has two forms, (1) an explicit form (salary, bonuses, perks and other *ex ante* measurable incentives) which is predicted to be positively correlated with the number of insiders; and (2) an implicit form (his expected insider trading returns) which is predicted to be negatively correlated with the number of insiders in his firm. This ended-up with two main models. The first one employs insider trading returns indicator, *i.e.* number-of-insiders, only [section (6.5.1)]; while the second category incorporates the actual returns and the director's capacity to trade [section (6.5.2)].

Literature [analysed in section (6.3.3)] provides systematic evidence on the relationship between CEOs compensation and their personal characteristics such as internal experience as CEO and educational and professional credentials. Given that personal and job characteristics are among the variables used in a competitive labour market to determine the market equilibrium for director's compensation level. It is expected that such information can be utilised as proxies in the model. Whereas director's personal characteristics can be represented by the director's experience and education attributes [detailed in section (6.3.3)], and director's job characteristics by his firm size and performance [discussed in section (6.3.4)].

Thus, the Model used assumes that the explicit form of CEO's compensation level is subject to three groups of variables. These are his personal attributes, his job characteristics and the number of insiders in his firm. In other words, the Model suggests that CEO's insider-trading indicator, represented by number of insiders in his firm, can explain, *inter alias*, his compensation level. The full sample of FTSE100 CEOs compensation data of 1999 and 2001 is employed in an empirical version of the Model, articulated in regression equation.

(1.7) RESREARCH LIMITATIONS

Insider trading can be researched from different angles, mentioned below, than those formulated in this thesis. That a boundary has to be established to control for the conceptual structure formulated in this study. This boundary maintains the focus on the research hypotheses of detecting the information content of insider trading by measuring the short-term profitability, and examining insider trading by directors as a managerial incentive by considering the long-term incentives.

This study is placed on a major concept in formulating the framework: the information asymmetry, which is a well-established paradigm in finance (*e.g.* signal theory) and management (*e.g.* agency theory) sciences, and widely empirically examined in the literature. This emphasis, however, does not undermine other issues existing in insider trading literature, such as:

(1) Insider trading behaviour around specific firm-related events

(i) Earnings/dividends announcements: [see, for example, John and Lang (1991), Lustgarten and Mande (1998), Park *et al.* (1995), Sivakumar and Waymire (1994) and Udpa (1996)].

(ii) Merger and acquisition: [see, for instance, Arshadi and Eyssell

(1991), Chakravarty and McConnell (1999), Cornell and Sirri (1992) and Meulbroek (1992)].

(iii) Leverage buyout and self-tender offering: [examples on this literature can be found in Harlow and Howe (1993), Lee (1992) and Liu and Gombola (1998)]

(v) Equity offering: [see, for example, Garfinkel (1993), Gombola *et al.* (1999) and (1997), Hauser *et al.* (2003), Karpoff and Lee (1991) and Lee (2002)].

(iv) Stock split: [for recent example, see Ma *et al.* (2000)].

(vi) Corporate bankruptcy: [see, for instance, Gosnell *et al.* (1992), Iqbal and Shetty (2002/a) and Seyhun and Bradley (1997)].

(vii) Market listing/delisting: [for recent example, see Lamba and Khan (1999)].

(2) The roles, measures and effectiveness of relevant regulations: [see, for example, Bettis *et al.* (2001), Boardman *et al.* (1998), Minenna (2003)), Neihaus and Roth (1999) and Seyhun (1992)].

(3) Insider trading effects on bid/ask spreads: [see for instance, Chakravarty and McConnell (1999) and (1997), Chung and Charoenwong (1998) and Seyhun (1986)].

(4) Insider trading timing, seasonal pattern and distribution: [examples include Anderson (1999), Hiller and Marshall (1998), Seyhun (1988a) and Yermack (1997)].

(5) Ethical views of insider trading: [see, for instance, Moore (1994), Prodhan (1994b), Strudler and Orts (1999) and Werhave (1994)].

Moreover, this research gives no consideration of directors' trades in stock market flotation, *i.e.* initial public offerings (IPO) and unseasoned equity offerings (UEO). Instead, it is limited to those companies listed on the secondary market and ordinary shares, either through open market operations or executive share options. The main reason behind the intuition for not addressing these issues empirically is the lack of publicly available precise data, as specified in section (1.6.2.1) above. This is a technical problem related to the availability of sufficient data for cross-sectional and time-series calculation, and for accurate and timely *data* regarding directors' compensation and dealings.

(1.8) THESIS STRUCTURE

This research is organised as follows:

Part One: Introduction and Institutional Background

(Chapter 1) Introduction: This chapter introduces the research subject in terms of its Rationale, background, objectives and hypotheses, data and methodology, and limitations.

(Chapter 2) Insider trading and Managerial Incentives: Institutional Background: The aim of this chapter is to present a comprehensive review of insider trading issues in terms of their economic essence, *i.e.* debate; regulatory background, *i.e.* ethics, and development, *i.e.* legislation as well as financial implications and disclosure requirements. In addition, it provides an institutional background on managerial compensation policies as well as disclosure requirements in the UK.

Part Two: Theory and Evidence

(Chapter 3) The Information Content of Insider Trading: Theories and Empirical Evidence:

This chapter expands previous chapters with the aim of conceptualising the theoretical foundation of the study. By reviewing the theory (EMH) and empirical evidence on insider trading, this chapter aims at conceptualising the relevant research issues.

(Chapter 4) Insider Trading and Managerial Incentives: Agency Theory and Empirical Evidence: Continuing the theme of chapter 3, this chapter discusses the theoretical background of the research second issue, the managerial incentive of insider trading. That is by discussing the Agency Theory, analysing the agency problem, relating the Agency Theory to insider trading and reviewing the literature.

Part Three: Empirical Tests

(Chapter 5) The Information content of Insider Trading: Signal Methodology and Empirical Results:

This chapter empirically examines the information content of insider trading by directors. By employing the event study methodology on FTSE100 company's directors' trading in their own firm's ordinary shares and/or executive share options, it measures the short-term profitability of such trading and its impact on market share prices.

(Chapter 6) The Managerial Incentive of Insider Trading: Model and Empirical Evidence:

This chapter constructs a conceptualised testable model and provides empirical evidence into the managerial incentives of insider trading by directors. It employs a multivariate model on FTSE100 CEO compensation packages.

Part Four: Summary and Conclusion

(Chapter 7) Summary and Conclusion:

This chapter summarises the study and concludes the main findings in terms of both research hypotheses, *i.e.* information content and managerial incentives of insider trading. Also, it suggests a list of recommendations in terms of further research, current regulations and disclosure requirements.

Chapter Two
Insider Trading and Managerial Incentives: Institutional Background

(2.1) INTRODUCTION

Insider trading has attracted widespread attention not only in the financial and academic communities, but also in the legislative and media communities. It is a phenomenon of the 1990s [Bhattacharya and Daouk (2002)]. Investors are concerned with the effects of such trading on stock prices and returns, while the academics are interested in knowing the private information insiders possess and reveal. Regulators and the legal community, on the other hand, are concerned with the fairness of the likelihood of abnormal returns attained by insider trading. Finally, the media, as always, is looking for breaking news.

This chapter aims at providing a comprehensive review of insider trading issues. The purpose is to demonstrate a broad, but precise, understanding of insider trading issues in terms of its economic essence, *i.e.* debate; regulatory background, *i.e.* ethics, and development, *i.e.* legislation, as well as its financial implications.

This chapter starts with discussing and analysing briefly the economic aspects of insider trading in section (2.2). Section (2.3) raises ethical aspects of the issue. The legal theories and legislation development of insider trading in the UK, USA, and European Union (EU), formerly European Economic Community (EEC), will be reviewed in section (2.4) and (2.5) respectively. Due to the empirical investigation of this thesis being based on the London Stock Exchange, the current law on insider trading in the UK will be detailed in section (2.6). Section (2.7) provides a summary of the latest policy issues addressed, in the context of corporate governance, regarding management compensation and incentives, while section (2.8) describes the regulations governing the corporate informational disclosures. Finally, section (2.9) concludes the chapter.

(2.2) THE ECONOMIC ASPECTS OF INSIDER TRADING:

The purpose of this section is to lay down the economic aspects of insider trading. That is by answering firstly, why insider trading is an economic issue and secondly what are the economic aspects of insider trading.

Information, the essence of insider trading issues, has different economic *characteristics*: (1) it has a private value, such that a one's expectation of future returns of a particular security. This is private information; (2) it has a social value, particularly when it has to be made public. This is public information; and (3) it has a right value, that is the property right of the generating, issuing, source. Private information [discussed in section (3.3.1)] is the property right of that private source, while public information is that of the market, *i.e.* the stock exchange. Fenn *et al.* (1991) provide more details about the economics of information in terms of its characteristics and forms, and relative to insider trading issues.

Opponents debate that insider trading, in terms of economic theory, can be considered as a trading based on an imbalance of information resulting in profit taking (buying), or loss avoiding (selling), by the informed party over a profit losing (selling), or loss taking (buying), by the uninformed counterparts. Cinar (1999) argue that insider trading results in two forms of damage to others. The first one is related to trades behaviour that are executed in the market, by which inside trading may trigger stop loss limits that other investors put there to protect their positions. The second type is related to the market confidence, especially when the publics perceive insider trading in the financial markets, lose confidence and stop investing. Opponents argue that insider trading harms others who engaged, unknowingly, in an unfair playing field. However, identifying insider-trading victims is a rather difficult issue. Starting with the uninformed, *i.e.* the ordinary investor, who sold securities to the insider, one apparently finds that he would however have sold them anyway to informed or uninformed traders. A contrary view would point out that he would not have sold if he knew that there would be significant changes in security prices. This, however, presents a contrary argument to that of King and Roell (1988) presented in this regard. Practically, the market maker, who executed the transaction, would be the direct one to be harmed. But, as he recognises the presence of asymmetric information with the informed trader, he would protect himself by widening the bid-ask spreads of these securities. Based on market equilibrium, risk-neutral competing market makers set prices at which their net expected profit on each transaction is zero. By widening the bid-ask prices, the profits gained from trading with uninformed offset the losses incurred from trading with the informed traders. Thus, the loss would be distributed on all stock market investors. King and Roell (1988) provide a leading example on this process.

Once again, opponents claim that insider trading erodes the market confidence. In its economic sense, information determines prices. Under the Efficient Market Hypothesis (EMH), discussed in more detail in Section (3.2), the ideal market operates in such a way that all investors have equal access to the information needed to make competitive investment decisions[1]. This leads to the Market Equilibrium, by which the stock prices are efficient in reflecting all publicly available related information. An efficient pricing process, of course, removes volatility and speculation, and increases the confidence and attractiveness of the investment in the market. In this context, insider trading undermines that confidence. However, the presence and persistence of insider trading phenomena in the world most advanced financial market, *i.e.* LSE, highlights the weakness of opponents' arguments when it comes to the real world.

Insider trading, in fact, must be evaluated in respect of both the purpose (performance) and function (efficiency) of the stock exchange. The objective performance of the stock exchange is to facilitate the channel, and allocation of savings from surplus units to deficit units, in the primary market, and to provide liquidity to long-term assets and hence reduces risk in the secondary market. The efficient function of the stock exchange is to do the above within a fair price mechanism. Fair pricing helps to efficiently allocate financial sources among various opportunities. An efficient price is that which reflects the intrinsic value of a firm, which incorporates all publicly available information. Thus, market efficiency has three aspects; (1) allocations efficiency, by which the market allocates capital to users in that those who can make the best use of capital are considered for investment first, while those who make the poorest use of capital are the last, (2) pricing efficiency indicates that market prices fully reflect all available information, and (3) administration efficiency (with regard to transaction

[1] Needless to say the ideal market does not imply that all investors should have equal information. Rather, it presumes that investors should have equal access to obtain costlessly relevant information before making investment decisions.

costs) which states that the higher of these costs will discourage trading by investors who keep the market pricing efficient. West (1975), in considering the distinctions between pricing efficiency and administration efficiency, refers to the former as an "external efficiency" and the later as an "internal efficiency".

How much and what type of information reflected in the stock prices determines the level of the functional efficiency of the stock exchange. The EMH is based on a number of unrealistic assumptions; there are no transaction costs, information is costless available to all market investors, all investors value the current information at the current and distribution of future prices (market consensus), and transaction volume does not affect security prices, *i.e.* stock prices are not elastic to supply and demand. Section (3.2.3) defines the three levels of efficiency. In short, the EMH states that if the capital market is strongly efficient then trading on the publicly disclosed and professionally analysed information at the current market price is a non-positive NPV transaction, *unless* the inside information is used and traded upon.

Thus, in addition to Cinar's (1999) forms of damage, mentioned above, a third damage caused by insider trading can be added. According to the EMH, this type of trading is inconsistent with the strong form of market efficiency. Keenan (2000a and b), for example, reviewed and examined relevant literature about the linkage between insider trading and market efficiency. However, the strong form of efficiency is a theoretical level, which is almost impossible to exist. Prohibiting insider trading would not lead the market to be strongly efficient. In fact, opponents could not deny that the stock prices are more efficient after insider trading transactions than before, because of the new information impounded and reflected in the prices, which would not be available otherwise.

Based on the EMH, the Capital Asset Pricing Model[2] (CAPM) holds that investors value securities by considering only their returns discounted by non-diversifiable market risk. Known as Beta, the risk measures the security's return variation. In addition, CAPM states that security prices are the most accurate indicators of the security value as measured by return and risk. In an equilibrium market, risk and return

[2] Although there have been many criticisms about the reliability of the model, CAPM still yields institutional investors' consensus in pricing securities and constructing investment portfolios.

are associated in that "more expected return is associated with more risk". Excluding legal penalty costs, insider's expected returns are more than that of the market, while, at the same time, insider's risk is assumed to be the same as that of the market. In fact, this depends on the type of the insider. While firm's outsiders (e.g. advisers and bankers) can diversify their holdings and reduce the risk associated with their inside trading, firm's directors could not. Instead, they are investing not only their money but also their human capital as well, which makes their risk higher.

To sum up, opponents claim that the effect of insider trading on market efficiency can be viewed in terms of (1) outside investors, who will invest less because of the unfairness of the market ground. This will lower securities' prices and investment as well, (2) market liquidity, which will be reduced as a result of the withdrawal of many outsiders and, hence, harming the remaining uninformed traders, and (3) price volatility, which will become more sensitive to the widening bid/ask spreads.

However, proponents, such as Ross (1978), argue that insider trading will bring more new and related material fact information into security prices, thus reducing risk, improving performance, encouraging more investment, and hence increasing market efficiency[3]. Although it is widely accepted that insider trading may bring more information to the market, there is strong potential that insiders, who trade for their personal profit, have a strong incentive to delay such new information, to avoid being reviewed as illegal trading. Thus, insider trading may slow down the dissemination of new information [King and Roell (1988)]. Baiman and Verrecchia (1996) exhibits that more disclosure leads to greater liquidity and reduces expected insider-trading profits. More recently, Bhattacharya and Nicodano (2001) show in their simulation model that insider trading can improve outsiders' welfare and risk sharing among outsiders, which compensate for their adverse selection losses to insiders.

Another defence presented to support the proponents view, is that insider trading can be considered as a managerial motive for improving managerial incentives and decisions [see, for instance, Friederich *et al.* (2002)]. Manne (1966) has provided the most controversial work in supporting this view. He evaluates managerial incentives and argues that "salaries are inappropriate for stimulating entrepreneurial flair, bonuses are too conspicuous, and stock options are too inflexible"[4]. Thus, he concluded, insider profits are a suitable form of managerial compensation. Antle and Smith (1985) and (1986) and Dye (1984), among others, studied the theory behind using returns to insiders as a compensation component, and this research provides empirical evidence on this conclusion.

To some extent Manne's argument is accepted by most economists, but leaving directors to trade their own securities will give them the opportunity to escape the bad management results, by disposing of their holdings before the market knows the bad news. However, labour market forces, corporate governance regulation and the current level of insider trading regulations would prevent directors from taking such opportunity.

In summary, opponents argue that insider trading is beneficial because it can be considered as (1) a disclosure device, as it increases the quality and lower the cost of information, thus increasing stocks value; and (2) a compensation device, as it creates useful incentive effects. This research will empirically investigate both arguments [in chapters 5 and 6, respectively].

It is obvious; however, that insider trading has benefits and costs. Thus, insider-trading regulations have to take into account when the social costs exceed the efficiency benefits thus criminalizing it.

(2.3) THE ETHICAL ASPECTS OF INSIDER TRADING:

The reason behind addressing the ethical aspects of insider trading in this study come from the fact that insider trading has been viewed since long time ago in the UK as an evil and unacceptable face of capitalism[5]. Thus, it is not unreasonable to theoretically discuss most of insider trading issues without addressing its ethical aspect. However, it

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[3] See Leland (1992), p. 860 and Pope *et al.* (1990), p.360.
[4] See Pope *et al.* (1990), p.360.
[5] The Commercial and Financial Chronicle of 1872, for example, referred to insider trading as "*a very great evil*". In addition, Sir Winston Churchill considered such practice of the Editor of the Financial News as "*downright insulting and libellous*". More recently, Edward Heath, the then Prime Minister, had condemned it and describes it as the "*unacceptable face of Capitalism*". Rider (1991) provides more information about the historical background of the insider trading regulation in the UK [Rider (1991), p. 313-314].

is not the purpose of this study to empirically examine these aspects. Nevertheless, the purpose of this section is to lay down the ethical aspects of insider trading. That is by answering firstly, when insider trading is considered as unethical practice and secondly what are the main theories behind this consideration. Strudler and Orts (1999) argue, "Economic analysis is not the best approach to understand insider trading because the core controversies in the area of law are really about ethics and not economics".

When securities transactions are based on private, non-disclosed, economic-related and price-sensitive information, it can be seen as a value-neutral positive activity promoting profit for the trader, without regard for the social consequences that follow from dealing with it. The social disregard of such dealing is manifest in unethical and illegal practice. The underlying dealing is self-interest and is short-term deal-making rather than long-term investment. Finance, in this context, is simply the investment in the information and opportunities, not in goods, services, or people.

The stock exchange is a marketplace in which there are always winners and losers, and where regulation, mainly information disclosures, is made to enforce the fair-game rules. The fairness game, however, does not imply that there would be no losers, but it ensures that the winners have won according to the rules of the game. By definition, insiders trading breaches the game rules by using a confidential device, *i.e.* not disclosed information, for the purpose of gaining profits and avoiding losses. In case, profit or loss, this would be on the account of the insiders' counterparts, the uninformed outsiders such as market makers and ordinary investors. Moore (1994) argues that insider trading is unfair not because the two parties do not have equal access to information, but because one party deceives the other by not performing his duty to disclose information. For more details about this issue, see, for example, Prodhan (1994/a) and Werhave (1994). This, however, might be the case when the insider has definite positive (negative) non-disclosed information. But would not be applicable when he thinks of the current stock price as undervalued (overvalued).

Another ethical issue in insider trading arises from the fact that information has a value. Thus, it can be considered as a property, and hence has a right. The law protects property in favour of the owner. Inside information is a kind of property that belongs to the firm's shareholders. In the publicly listed firms, it is almost impossible to count and name the shareholders. Therefore, there should be a body, which fairly represents all the changeable names and numbers of the shareholders at any point and all of the time. This body should have the property right of the firm's information[6]. The marketplace, the stock exchange, is the best-fit body to have the property right for the entire firm's information. Moore (1994) argues that the firm's information is the property right of the shareholders and if they allow the insiders to trade upon the inside information, then insider trading, from this viewpoint, might be considered ethical. But, he added, this practice would be harmful to other prospective investors. Hence, regulating the information disclosure is one of the most important roles of the stock exchange. In this context, insider trading misappropriates the information, which belongs to the firm if it has to be abstained; or to the market if it has to be disclosed.

In addition, Moore (1994) points to other ethical issues in insider trading. On one hand, it *harms* the ordinary investors who engage in trades with insiders; and on the other hand it erodes the confidence in the market. Leland (1992), for example, empirically investigates who would be the winners and the losers of the insider trading practice. He finds that, with the existence of insider trading, outside investors and market makers will be hurt, and that the market would be less liquid. These arguments elaborated more in section (2.2). It seems that the ethical view on insider trading is ideological rather than practical one, which makes it difficult to support or to oppose.

O'Hara (2001) subjects the main ethical arguments against insider trading to critical scrutiny, *i.e.* asymmetry of information, unequal access to information, property right and fiduciary duty. He concludes that among these arguments, fiduciary duty is the strongest but still has a problem, and that the ethical notion against insider trading is not clear-cut case against it.

[6] We could not say "inside information" in this statement, because sometimes the firm has to keep some information confidential. Such as R&D results which must be kept from the market and the competitors, in order to take advantage of such information for the sake of maximisation of shareholders wealth, not for trading upon it.

(2.4) THE LEGAL ASPECTS OF INSIDER TRADING:

The purpose of this section is to lay down the legal aspects of insider trading. That is by answering firstly, why and when insider trading is illegal and secondly what are the main legal theories behind insider trading regulations.

Stock exchange regulations arise whenever there is inefficiency that might lead to general market failure. In a perfect strongly informational efficient and allocation optimal market, there would be no place for regulations. Insider trading is but one practice that affects the informational efficiency and needs to be regulated. The purpose of the insider trading regulation is to minimise such trading; and when it has to be made, it should not be made on price-sensitive information. This indeed implies that not every trade by insiders is illegal. Insiders may trade their company's stock for a number of reasons. These include (1) portfolio diversification and liquidity adjustment, (2) corporate control, (3) sentimental reasons, and (4) profit inducements. It can be seen clearly that there is no reason for legal and, of course, ethical concern in the first three categories. Even the fourth reason might be legal if the insiders act on their belief and judgement, not on the inside information they possess; though it is difficult to differentiate between these.

The question of regulating insider trading has been a subject of great debate. There are two opposite schools. The Orthodox School supports such regulation based on two grounds: the public confidence in the stock exchange must be maintained, and the firm's confidential information must be secured. For more information about this view, see, for example, Ashe and Murphy (1992), Keenan (2000a), Keenan (2000b), Kraakman (1991), Moore (1994), Ronen (2000), Strudler and Orts (1999), Viander (1991), Walker (2000), Werhave (1994) and Williams (2000).

The opposite view is placed on the Deontological Moral Theory, which indicates that a penalty is imposed for an act only when it involves committing a wrong against someone. If there is no victim, then, no actionable offence occurs. So, it considers the insider dealing as a victimless crime since it is very difficult to name who actually gets hurt. Ashe and Murphy (1992), Kraakman (1991), Moore (1994), Strudler and Orts (1999), Suter (1989), Viander (1991) and Werhave (1994) review this theory.

As the attitudes toward insider trading have changed from toleration to condemnation to toleration, many legal theories have emerged in the UK, USA, and Europe. Following the importance of the stock exchange in the English speaking countries, mainly the UK and USA, the regulation of the stock exchange is one of the most important economic regulations in these countries. The stock exchanges of Europe are less important due to the domination of the banks on the stock exchange and because they have little to do with the average person (as in Germany). Or because most of the blue-chip companies are in the public-sector (as in France). Or because of the social attitudes toward the stock exchange as a gambling market (as in Japan).

Although they almost seem similar, the legal theories of insider trading in the English speaking countries are much different from those of Europe. Therefore, the legal theories of insider trading can be grouped in two. The first includes those of the UK and USA, and the second are of Europe. These theories have been developed over time. They have been explained below in chronological order. The legal theories of insider trading in the UK and USA [see, for example, Arshadi (1998), Kraakman (1991) and Strudler and Orts (1999)] are:

(1) The Equal Access Theory states that all traders owe a duty to the market either to disclose or abstain from trading on non-public firm's information. It views the unfairness as that to other traders that gives rise to a duty to disclose.

(2) The Fiduciary Duty Theory commonly referred to as the Traditional Theory, bans trading on non-public information when an insider owes a disclosure duty based on a pre-existing relationship of trust and confidence to uninformed traders. It considers insider trading as fraud in which a disclosure duty can only arise from a fiduciary relationship.

(3) The Misappropriation Theory refers to the theft or otherwise improper use of information belonging to another for the purpose of securities trading. It implies that insider trading can be considered as a fraud-on-the-investor as well as a fraud-on-the-source.

In continental Europe the legal hypotheses of insider trading stated chronically [see, for example, Viandier (1991)] are:

(1) Protection of the Company, which states that since the company's value is liable to be affected by privileged information, then it is justifiable to criminalize insider trading. This hypothesis contradicts the Traditional Theory above.

(2) Protection of the Market, which emphasises that banning insider trading, would guarantee the smooth working of the investment security market.

(3) Protection of Information, which claims that information, is a common patrimonial as well as a corporate element, and since it belongs to the firm the insider has no right to use it as long as it remains privileged to the firm. This follows that the insider should disclose this information or abstains from trading upon it. This hypothesis offsets the Equal Access Theory.

Regardless of either group of the above theories, each of the legal theories has its advantages over the others as well as limitations. But collectively, all of these theories have provided a strong ground not only to regulate the legal insider trading but also to criminalize the illegal insider trading.

To sum up, legislation provides two methods for regulating the flow of information to investors, *per se* the stock exchange; (1) Anti-Fraud provisions for false or misleading, provided or omitted, material fact information, and (2) Disclosure of what, when, and how information must be disseminated.

(2.5) LEGISLATIVE DEVELOPMENT OF INSIDER TRADING:

The case for insider trading is a philosophical justice and efficiency view of the workings of capitalism and financial markets [O'Hara (2001)]. The main regulatory framework behind the securities exchange, including insider trading has developed over time from "market fairness" to "market confidence", and more recently to "investor protection[7]". This section reviews the development of insider trading regulation in the UK and USA while appendix (A2.1) exhibits those regulations in other European countries.

Insider trading law evolved firstly in the United States, then, but with a slower pace, in the United Kingdom, and recently by continental Europe. After the Great Depression,

[7] It can be said that "Investor Protection" is the main driving force behind the "*Big Bang*".

the USA Securities and Exchange Commission (SEC) attempted to deal with the issues of fraud and manipulation on the stock exchanges. The SEC made sanctions against illegal insider trading, *inter alias* with the passage of the Securities Exchange Act of 1934 (SEA)[8]. The basic regulation of insider trading is carried out under Section 16[9]. However, the sources of insider trading litigation have been developed through 1960s case law[10], which resulted in the enforcement of Section 10b[11] of the SEA 1934, and most importantly Rule 10b-5[12] of 1942.

As illegal insider trading volume and profitability has increased, the need for more restrictive regulation has become more important. During the 1980s, several steps were taken by the USA Congress to enhance compliance with insider trading regulations. Therefore, the Insider Trading Sanction Act of 1984 (ITSA) was adopted to amend and supplement the remedies available under SEA 1933 and SEA 1934, by which it increased both the civil and criminal penalties for illegal insider trading. This law was followed by the Insider Trading and Securities Fraud Enforcement Act of 1988 (ITSFEA), which aimed at increasing the maximum jail sentence to 10 years, and the maximum criminal penalties from US$100,000 to US$1 million[13]. The enactment of these laws, accompanied by intensification in the SEC's enforcement procedures, constituted significant shifts in the effective insider trading regulations. Boardman *et al.* (1998), for instance, investigates the 1980s tightening of illegal insider trading regulation on the USA corporate take-overs and found that the tightening is effective in reducing illegal insider trading. Allen (1990), Arshadi (1998) and Arshadi and Eyssell

[8] In fact, previous to this SEA 1934, the SEC adopted the Securities and Exchange Act of 1933 (SEA 1933) to establish a higher standard to truthfulness in securities trading than those of the common law fraud. The main difference between SEA1933 and SEA1934, in short, is that SEA 1933 established regulation on new securities (Primary Market), while that of 1934 determined how securities would be regulated after issuance (Secondary Market). [See Laird (1995)].

[9] Section 16 is the only provision dealing specifically with insider trading. It deals with: (a) the disclosure of insider's transactions (b) allows corporations to recover short swing profits made by insider trading in the shares of their own firms, (c) outlaws short sales by insiders. [See Ashe and Murphy (1992), p.36].

[10] Specifically, the legal cases against Cady, Roberts and Co. in 1961 and against Texas Gulf Sulphur in 1968. [See Laird (1995) and Kraakman (1991).

[11] Section 10b of the SEA prohibits persons from employing "in connection with the purchase or sale of securities...any deceptive or manipulative device or contrivance in contravention of such values and regulation as the commission (SEC) may proscribe." [See Zekos (1999), p.24].

[12] Rule 10b-5 prohibits the exploitation of inside information by insiders, which are defined as corporate officers, directors and large shareholders (who owns 10% or more of the firm's issued shares), and requires that firms disclose material information in a forthright and timely manner. However, this Rule enforcement has been left to private litigation, *i.e.* investors, who have been damaged by the lack of disclosure, against insiders. See, for example, Givoly and Palmon (1985), Laird (1995) and Niehaus and Roth (1999).

[13] See Arshadi (1998), Boardman *et al.* (1998), and Gombola *et al.* (1997).

(1991) show that insider-trading regulations have been reasonably effective in deterring illegal insider trading.

Insider trading has been unlawful in the UK since 1980. Such late regulation, however, should not be interpreted as lack of the stock exchange's recognition of this issue, or lack of the existence of this form of market abuse. On the contrary, the English law, since many years ago[14], has recognised the importance of protecting the integrity and fairness of the market[15]. Theoretically, section 13 of the Prevention of Fraud (Investments) Act 1958 (PFIA), now Section 47(1) of the Financial Services Act 1986 (FSA), made it possible to prosecute insider traders. Moreover, insider trading was an offence under the Companies Act 1967 (CA), which prohibited the firm's director to purchase an option to acquire or dispose of securities in his firm, or related firm, for himself or on behalf of his spouse. This provision, however, is aimed at insider speculation or manipulation rather than the misusing of inside private information[16].

In fact, Part V (Sections 68-73) of the CA 1980 was the third attempt to adopt an insider trading law in the UK. Bills introduced in 1973 and 1978 failed to be enacted due to the intervention of the general elections. The 1980 legislation, however, provided no civil remedies. But, by introducing the FSA 1986[17] (FSA), it was possible to prosecute insider trader by either the damaged person or the Securities and Investments Board (SIB) [18]. The enactment of the Companies Securities (Insider Dealing) Act 1985 (IDA), while repeating Part V of the CA 1980[19], vested the power to prosecute exclusively in the hands of the Director of Public Prosecution (DPP) or Secretary of State for Trade and Industry (SSTI). The IDA recognised the different forms of insider trading, particularly trading on inside information by the firm's employees and the firm advisers and creating a false market in the firm's shares in a critical period such as that of take-

[14] In 1696, for example, Commissioners appointed by Parliament reported that the English economy was undermined by, *inter alias*, insider trading in new issues of stock [In Rider (1991), p. 313-314].
[15] Chapters 3, 4 and 5 in Charkham and Simpson (1999) discuss the regulation of the stock exchange, company and the law on directors
[16] Suter (1989), p.314.
[17] The FSA 1986 repealed the Stock Exchange (Listing) Regulation 1984.
[18] Ashe and Murphy (1992), p.41.
[19] Rider (1991) argues that this Act provided nothing new but repeating Part V of the CA 1980.

over[20]. For the purpose of providing the minimum standard of investor protection, the new CA 1989 made amendments to the company law legislation, including FSA 1986.

Insider trading was not illegal in most European countries up until the beginning of 1990s when the then European Economic Community (EEC), now the European Union (EU), adopted in 1989 the public offers Directive 89/592/EEC (the Directive) to co-ordinate the prohibition of and ensure the provision of minimum standards for insider trading throughout the member states of the EEC. The Directive stated that, by 1/6/1992, each member states must prohibit natural persons from taking advantage of inside information by acquiring or disposing, effected directly or otherwise, for his account or for a third party, securities of the issuer to which that information relates. More recent, it has been reported[21] that a new red tape burden on companies will be implemented in 2004. Such that companies will have to maintain complete lists of all directors, staff, advisers, lenders and even rating agencies who could have access to inside information under new European market-abuse rules.

Part V of the Criminal Justice Act 1993 (CJA) has been enacted in the UK to implement the Directive provisions. The main provisions of this Act will be reviewed, separately, in the next section (2.6). Moreover, various Self-Regulating Organisations (SRO), set up under FSA 1986, as well as the Take-Over Code of the Panel on Take-over and Mergers, have made insider trading prohibited. Appendix (A2.1) reviews insider trading regulation developments in the major European countries.

Internationally, Bhattacharya and Daouk (2002) surveyed the world stock markets in 103 countries at the end of 1998 and find that insider trading law existed in 87 countries, but enforcement evidenced by prosecutions, had taken place in only 38 of these countries. Before 1990 the respective numbers were 34 and 9.

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[20] Between January 1987 and June 1993, only 33 people prosecuted under such legislation, and only 16 people were convicted, of which none were went to prison. [Herrington and Glover (1994), p.57].

[21] The Financial Times in 23/05/2003.

(2.6) CRIMINAL JUSTICE ACT 1993, PART V (INSIDER TRADING):

The CJA 1993 enacted and came into force in 1993. Part V (Insider Dealing) of CJA, substituted IDA 1985, and designed to implement the EEC Directive provisions. Insider trading regulations under CJA are based on a number of simpler, but broader and wider definitions. Section 54 of CJA applies not only to corporate securities, but also debt securities, warrants, depository receipts, options, futures, and contract for differences.

The definitions of information, insiders, and dealing are key factors in insider trading offences. Dealing in securities, according to s55, refers to a person who agrees, or enters into a contract, as a principal or agent, for acquiring or disposing of securities; or procures, directly or indirectly, an acquisition or disposal by any other person. For the purpose of the law, s56 states four basic features for information to be considered as inside information. These are (1) it must be related to particular securities or to a particular issuer(s) of securities, (2) it must be specific and precise, (3) it has not been made public, and (4) it must be price-sensitive information, that is if it were made public, it would have a significant effect on the price (value) of the securities. In addition, s57 defines the insider, as a person who has information who knows it is inside information; and has it, knowingly, from an inside source. An inside source is defined as being a director, employee or shareholder of an issuer of securities, or someone having access to the information by virtue of his/her employment, office, or profession. Moreover, s58, s59, and s60 define when the information is made public, the professional intermediary, and the regulated market and the issuers, respectively.

The prohibition of insider trading under s52 of CJA occurs in one of three forms, namely (1) Insider Dealing: a person who has inside price-sensitive information deals in price-affected securities in relation to that information. (2) Insider Encouragement: a person who has inside price-sensitive information and who encourages another person to deal in price-affected securities in relation to that information. (3) Insider Disclosure: a person who has inside price-sensitive information discloses that information to another person in a way inappropriate in the performance of his her employment, office, or profession.

For the purposes of the law, the person has to be a natural person, not an institutional entity, *i.e.* company. The benefit of excluding companies from those persons who are able to commit illegal insider trading is that it enables companies to continue to trade in securities by the establishment of the "Chinese Wall"[22]. This is an internal arrangement designed to prevent information flows from one part of a company's business, *e.g.* stockbroker, to another part of the same company's business, *e.g.* advising on take-over.

As for the penalties and costs of convicted illegal insider trading, s61 of CJA provides imprisonment of up to 7 years and/or an unspecified fine on indictment, and imprisonment for up to 6 months and/or a £5000 fine on summary. However, proceedings of insider trading offences require the consent of either the SSTI or the DPP. Zekos (1999) and Herrington and Glover (1994) provide a more explanatory review on Part V of the CJA 1993.

(2.7) MANAGERIAL COMPENSATION POLICIES:

Insider trading legislation has impacts not only in the stock exchange but also on the corporate governance, including managerial incentives and behaviour. For the later effect, see Maug (2002), who analysed the impact of insider trading on the corporate governance. However, the objective of this section is to review the main institutional background of the managerial compensation policies in the UK companies.

As part of corporate restructuring in the UK[23], managerial compensation has undergone significant change (reform) and received increased attention during the last decade[24], consummating in influential reports by Cadbury (1992), Greenbury (1995) and Hampel (1998) committees[25]. Among other things, the reports recommended a framework for setting executives pay, board's monitoring responsibilities and introducing non-

[22] The legal aspect of this concept is discussed and analysed by McVea (1989) [the only Ph.D. thesis on insider trading in Law].
[23] For more background information about this subject, see, for example, Wright *et al.* (1990) pp.1-28.
[24] This attention is traced back to the early 1990, when the bosses of the newly privatised utilities made headlines as they were accused of being excessively unjustifiably paid. For more information and examples of those pay, see, for instance, Beaver (2000), Black and Coffee, Jr. (1994) and Conyon and Murphy (2000). While Ashburner (1997) and Ogden (1997) study the corporate governance in privatised water industry and in the NHS public sector in the UK, respectively.
[25] Demirag *et al.* (2000) summarise the development of UK corporate governance regulations in one table.

executive outside directors in the board, as well as expanding the disclosure requirements for executives' compensation.

The Cadbury committee, named after its chairman Sir Adrian Cadbury, was formed in May 1991 with initial role limited to preventing financial fraud in the UK listed companies[26], but soon expanded to target corporate governance[27]. The Cadbury report, published in May 1992, with a Code of Best Practice designed to achieve the necessary high standards of corporate behaviour. The report focuses on accountability and risk management aspects of corporate governance. The main recommendations of the report, in terms of the boards, were:

(1) The position of the chairman and Chief Executive Officer (CEO) should be separated, with the board chairman monitoring the performance of the management, *i.e.* executive directors.
(2) Firms should have at least three non-executive directors (NED) with the majority of them independent and free of any business or financial connection with the company or executive directors.
(3) Executive contracts should not exceed three years without shareholders' approval.
(4) Boards should appoint remuneration committees consisting mainly NEDs, and that executives play no act in deciding their own remuneration.
(5) Boards should completely disclose and explain the executives' present and future benefits, including stock options and stock appreciation rights, and how they have been determined. In addition, separate figures should be given for their salary and performance-related elements.
(6) Boards should appoint audit committees composed of NEDs with the majority of independent NEDs.

Many of the committee's recommendations were implemented because key influential institutions supported the committee's efforts, such as London Stock Exchange (LSE), Bank of England and the Confederation of British Industry (CBI). In fact, Cadbury committee established a monitoring sub-committee to review compliance with the Code

[26] The committee was formed in the awake of the Polly Peck scandal; a major British firm went bankrupt after years of falsifying its financial reports.
[27] The committee's role was expanded in the awake of the BCCI bank and Maxwell scandals.

of Best Practice and reported, in Cadbury Compliance Report (1995), that the overall response by companies had been positive.

Cadbury's corporate code was re-enforced by Greenbury Report (1995), a government-backed committee on board pay. The committee published the Code of Best Practice in July 1995. The main objective of this report is to recommend on how boards should set the pay of their executive directors, *i.e.* link pay with firm performance. In addition, the report recommended that the basic pay increases of directors should be in line with those of employees within the firm. Greenbury states that the fundamental principles in relation to directors' remuneration should be accountability (shareholders approval on the board's remuneration report), transparency (remuneration policy) and linkage to performance (ESO). Moreover, the report recommends that the remuneration committee should be set up by independent non-executive directors only. Conyon (1997) reviews the report in the context of the institutional arrangements for setting directors' remuneration in UK companies.

LSE's Listing Rules were amended, in October 1995 and June 1996, so that companies have to show the extent of compliance with Greenbury's recommendations. McKnight and Tomkins (1999) argue that the Greenbury report has had little influence on the remuneration policies and practices of the UK companies. In addition, Hewitt Associates (1996), remuneration consultants, surveyed British companies and found that over half of them were refusing to comply with key recommendations of the Greenbury report[28].

The establishment of Cadbury and Greenbury committees were, in fact, in response to public concerns (corporate failures in the first case and unjustified excessive pay in the privatised utilities in the second case) and to prevent abuse. But not to provide coherent development for corporate governance policy and practice in the UK. Hampel Report (1998) recognised this matter [Hampel (1998), para. 1.7] and differentiated itself by moving away from a set of rules towards applying broad principals of corporate governance in a more flexible way. Thus, the report has a set of principles and code, which embraced Cadbury and Greenbury works, as well. On July 1998, the committee published the Combined Code, which consists of 18 principles and 48 code provisions.

The new substantive change from previous proposals was the requirement for non-executive directors to account for a third of the board subject to a minimum of 3.

Although none of the current regulations of LSE's Listing Rules or the Companies Act makes any reference to remuneration committees. Various studies have shown high levels of compliance with corporate governance recommendations [see, for instance, Black and Coffee, Jr. (1994), Conyon (1997), Dewing and Russell (2000), and Vasfeas and Theodoron (1998)]. However, as Demirag *et al.* (2000) argue, many of the apparent changes recommended by Cadbury, for example, may have been the result of the introduction of internal codes and procedures adopted by the companies themselves. On the other hand, Booth *et al.* (2002) examine whether regulation can be used to substitute for internal monitoring mechanisms to control for agency conflicts in a firm. They find that to the extent that regulations reduce the impact of managerial decisions on shareholder wealth, effective internal monitoring of directors becomes less important in controlling agency conflicts.

Nonetheless, the government, represented by the Department of Trade and Industry (DTI), issued a consultative document on directors' remuneration in 1999[29]. The document welcomed the establishment of remuneration committees in the LSE listed companies and emphasised the independence of its members from executive directors as well as the chairman. In addition, the document set up various proposals regarding the pay linkages to performance, remuneration and service contracts disclosures, and directors' accountability to shareholders. In fact, much of the document's proposals are repetition of the committee's recommendations. However, the document contributed in addressing the technical matters by explaining and defining what were not clear in the committees' proposals.

Despite these reports, however, executive directors' pay, namely Chief Executive Officers (CEOs), increased by more than 18% in 1997[30] and 16% during 1999-2001

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[28] In McKnight and Tomkins (1999), p223-224.

[29] In fact, the government continues to declare its view about the corporate governance issues when there is a public concerns. Such that the Prime Minister Mr. Tony Blair supports the recent (21/5/2003) revolt by GlaxoSmithKline (of FTSE100) shareholders against excessive boardroom pay. In addition, it's reported (Financial Times, 21/5/2003) that the government is about to issue a new consultation paper on the directors' contracts, performance, and service payments and the linkage between them.

[30] Conyon and Murphy (2000), p. 640.

[see table (6.1) in chapter 6], and still breaking the news[31]. On the other hand, if the British government is to increase the performance related portion of the compensation package, it can do so by enacting a tax legislation limiting the deductibility of non-performance related compensation over, say one million pounds. For the effect of such legislation see, for instance, Perry and Zenner (2001).

Although all the corporate governance reports admitted the importance of ESO as a mechanism to align the divergence of interests between management and shareholders, none, however, has come across the terminology of insider trading as another mechanism to align interests or as a managerial incentive. This, thus, providing another rationale for this study.

(2.8) THE REGULATION OF CORPORATE DISCLOSURES:

In the past two decades, information disclosure research in accounting and finance emerged from a handful of studies to a substantial and well recognised body of literature. Verrecchia (2001) surveyed the literature and Healy and Palepu (2001) provide a framework for analysing managers' reporting and disclosure decisions in a capital market setting. However, this section is not about the theoretical aspect of disclosure. Instead it aimed at providing an institutional background on the main regulations govern the disclosure of insider trading transactions and managerial incentives.

Disclosure requirements were modestly increased in response to the 1980s take-over wave. The CA 1989[32], amended the CA 1985, requires that every firm must keep a register of directors' share and debenture interests. This shall be available for inspection by shareholders and the general public. Also, it requires that the directors must notify the firm, within five working days, of a transaction carried out for their personal use and the firm has to make an entry in the Company Register within three working days. On

[31] The most recent example was the dispute over the CEO pay of GlaxoSmithKline (GSK), which made the news, for instance, of the Financial Times over the week 19-24 5 2003 in 12 reports, 5 of which are in one single issue (21/05/2003) [such that Schroder joins investor dissent over GSK executive pay plans, Blair supports investor unrest over pay levels, investors need help to tackle corporate greed, after Garnier: why executive rewards in the US and the UK are unlikely to converge, and pay question goes to heart of capitalism]

the other hand, the Stock Exchange Yellow Book, the Model Code, details the requirements for any listed firm's directors trading in their own firm's shares. It requires that the firm must inform the Stock Exchange of such a transaction by the following day, it is then published immediately. It is also prohibited for the directors to trade their own firm's shares for a "closed period" of two months prior to the announcement of price sensitive information as well as preliminary year-end and half-year results.

Due to the increased attention on the high level of financial remuneration of firm executives, accounting standard-setting bodies have had to reconsider certain aspects of the financial reporting of executives' pay and other forms of remuneration granted to them, such as ESO[33]. The Financial Accounting Standards Board (FASB) issued an exposure draft in 1993 and a statement in 1995 examining the issue of the accounting treatment of ESO. Also, the Urgent Issues Task Force (UITF, 1994) make expressed recommendation on the minimum level of disclosure that should be provided on the ESO to each director[34]. Cadbury (1992), once again, expressed the concern about the quality of financial reporting and that the extent to which executives can manipulate reported earnings[35] can affect the quality of financial statements. In fact, one of the main objectives of Cadbury Code [see section (2.7)] is to re-enforce board effectiveness in promoting high quality (true, fair and reliable) financial statements and disclosures[36].

Moreover, transparency was one of the fundamental principles underlying the Greenbury (1995) Code of Best Practice, and has several provisions relating to disclosure. Such as how performance is measured, how rewards are related to performance, how performance measures relates to longer-term company objectives, how the company performed over time relative to competitors, detailed remuneration report to include each element in the package for each director. While Hampel report

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[32] In fact, this Act consolidated most of the regulation governing company law, including the Business Names Act 1985, the Companies Securities (Insider Trading) Act 1985, and the Companies Consolidation (Consequential Provisions) Act 1985. All of these acts are supplement to the CA 1985.

[33] Conyon and Sadler (2001) examine the impact of information disclosure on the valuation of CEO options and the incentives created by those options.

[34] In Samuel and Lymer (1996), p. 250. A study that deals with the practical problems that needs to be addressed when valuing and accounting for ESO.

[35] Bushman and Smith (2001) note that due to the lack of conceptualised operating figures in published company accounts, directors are able to select earnings numbers in determining their annual bonuses [in Demirag *et al.* (2000), p. 344]

[36] In fact, O'Sullivan (2000) examines, among other thing, the effect of board composition on audit quality in the UK prior to Cadbury (1992) and finds that non-executive directors encourage more intensive audit as a complement to their own monitoring role.

(1998) broadly accepted Greenbury recommendations. it requires that such disclosure be more informative, stating the remuneration policy and be more accessible.
Furthermore, the LSE Listing Rules requires that the boards of listed companies are required to make a report to shareholders on directors' remuneration, disclose the amount of each element in the remuneration for each director, and prior shareholders' approval of long-term incentives. The disclosure requirements in the Companies Act 1989 are designed to underpin these requirements. However, the listed companies are not required to report the linkage between pay and performance.

(2.9) CONCLUSION:

This chapter provided a broad theoretical and institutional background to insider trading issues. Insider trading is simply the firm's insiders' simple buy/sell of their own firm's securities in the market place [section (1.2)]. The issue, which is due to its aspects and effects, is attracting extensive attentions of the financial and academic communities, the regulatory bodies, and the media.

In its economic essence, insider trading represents on one hand a signal of new information (to be) reflected in the stock price. On the other hand, it represents a challenge to the strong form of the EMH [section (2.2)]. Insiders can earn abnormal returns, or avoid abnormal loss, when they trade on their private information. In the context of the financial ethics, this privilege over other players in the market has been seen as ruling out the fairness of the game's rules. In addition, insider trading is also seen, from ethical viewpoint, as a misappropriation of the firm's information, harming outsiders and eroding the market confidence [section (2.3)]. These, in fact, ideological views but not practical ones. Hence, it is rather difficult to have a crystal clear support or otherwise oppose such views.

If insider trading is a crime then it is a victimless one. That's why the legal theories behind the regulation of insider trading have been changed over time, either in the UK and USA, or in continental Europe. It was the equal access theory behind the regulation, and then changed to the fiduciary duty and finally the misappropriation in UK and USA. While that in Europe it was about protecting the company, then the market and finally the information itself [section (2.4)].

Insider trading regulation developed over time [section (2.5)]. In the UK, it started in 1980, while in the USA it started in 1933. The latest CJA (1993) was enacted to implement the 89/592/EEC Directive. In comparison with European counterparts [appendix (A2.1)], the UK's CJA (1993) is the most sophisticated act, not only in terms of its way of dealing with the incidence, but also in terms of its coverage of the various aspects relating to the issue [section (2.6)].

In addition, this chapter provides some institutional background on corporate governance issues that are related to this research hypotheses. These are the board remuneration [section (2.7)] and financial information disclosure [section (2.8)]. It shows that Cadbury report (1992) is the most influential document in corporate governance aspects of the British companies, such as board remuneration, structure, control, practice and monitoring. Other committees formed and reports were published to re-enforce Cadbury committee's recommendations, such as Greenbury (1995) and Hampel (1998). Two main conclusions can be drawn from these reports, which are related to this research, are: Firstly, managerial remunerations have to be decided by independent non-executive directors, and secondly the boards have to disclose not only the components of the compensation for each director, but also to justify and explain the measures of those performance-related components. However, none of these reports have come cross the concept of insider trading and its place in the corporate governance, as an implicit incentive component of the managerial compensation.

PART II: THEORY AND EVIDENCE

Chapter Three
The Information Contents of Insider Trading: Theories and Empirical Evidence

(3.1) INTRODUCTION

Chapter one established the foundation of this research in which section (1.3.1) briefly introduced the relevant body of literature, and chapter two provided a comprehensive overview for the institutional background of this research. This chapter expands that section with the aim of conceptualising upon the theoretical foundation of this study. That is by discussing relevant theories and reviewing the current body of literature.

There have been numerous studies examining the various issues of insider trading in general and in terms of its outcomes (profitability) and consequences (market efficiency) in particular. Relevant literature, however, will be reviewed not only to shed light on the dominant paradigm in this stream, but also to point out the current *gaps* in the literature.

This thesis examines two specific research issues (1) detecting the information content of insider trading and (2) the managerial incentive of insider trading. This chapter is concerned with the theory of and evidence for the first issue, while the second issue will be the subject of chapter (4). Hence, section (3.2) introduces the parent discipline in relation to insider trading. That is the market efficiency theory. Section (3.3) outlines the theories that explain insider trading. The pioneered and early research is reviewed in section (3.4.1), whilst the recent empirical evidence on insider trading is discussed in section (3.4.2). Finally, section (3.5) concludes this chapter.

(3.2) EFFICIENT MARKET THEORY

This section presents the theory and reviews the relevant literature on the parent discipline of the first issue of this study. It aims at showing the major fundamental concepts of efficient market theory and its relation to this research. Chronologically, this section will introduce the Efficient Market Hypothesis (EMH): definition and development [section (3.2.1)], sources and determinants [section (3.2.2)] levels [section (3.2.3)], issues and relation to the thesis [section (3.2.4)] and summary of the EMH [section (3.2.5)].

(3.2.1) Conceptual Development of Efficient Market Theory

The development of the Efficient Market Hypothesis (EMH) as a successor of the Random Walk hypothesis, is the outcome of pioneering theoretical contribution and empirical research traced back to as early as 1900[1]. At the time, researchers were concerned with price movements and prediction[2]. They concluded that if the market is efficient, then price changes couldn't be anticipated. That is because price movements follow a random walk with no predetermined direction. Thus, market efficiency indicates that price changes fully represent the information and anticipations of all market participants.

Rees (1995) characterised the EMH as "the gradual triumph of academic evidence over conventional practice"[3]. In fact, the empirical work has contributed to the development of the theory (Fama, 1970). The EMH has become a well-established conceptual paradigm in the economics of the financial markets. Fama (1970) summarises the conceptual framework of previous literature, and Fama (1991) discusses the developments in testing the theory.

Efficiency is a relative term. It has to do with nothing but information. The term becomes informational efficiency to indicate that stock returns fully reflect[4] all available information. This implies a precondition that information and transaction costs are always zero (Grossman and Stiglitz, 1980). Since there are always transaction costs and informed traders, such as insiders, this definition presents the extreme version of EMH, which Fama (1991) and Grossman and Stiglitz (1980) recognised as impossible to exist, though it can be seen as a benchmark. However, since the term "fully reflect" has no empirical testable indications, three models have been used not only to test but also to precisely define this term. These, detailed in Fama (1970) and discussed in Strong and

[1] Such those works of Bachelier (1900), Kindall (1953), Roberts (1959) and Samuelson (1965), reviewed in Fama (1970).

[2] In addition to Fama (1970), Bernstein (1992) provides a comprehensive review of many early contributions, such as those mentioned in footnote (1) above.

[3] Rees (1995), page 178.

Walker (1987), are (1) expected return or "fair game" models, (2) the sub-martingale or "trading rules" models, and (3) the Random Walk model.

Jensen (1978), however, introduces a weaker but more sensible version of EMH, which states that prices reflect the information that their marginal benefits do not exceed their marginal costs. Accordingly, the efficiency level depends on the information set incorporated in stock prices. In other words, a market is efficient in relation to certain information set ($\acute{Ø}_t$) available at a point in time (t), if it is not possible to profit by trading on this specific set ($\acute{Ø}_t$) (Jensen, 1978). Thus, the market is relatively efficient depending on the relative proportion of information fully reflected in the stock prices at a certain point of time. In addition, an efficient market is the market that is efficient in processing information (Fama, 1977). That is how quickly prices respond to information. Recently, Busse and Green (2002) study the segments report analysis' view about individual stocks and are broadcasted when the market is open[5].

How much and what information set reflected in the stock prices determines the level of the functional efficiency of the stock exchange. The EMH is based on a number of unrealistic assumptions, such as there are no transaction costs, information is costless available to all market investors, all investors value the current information at the current market prices and distribution of future prices (market consensus), and transaction volume does not affect security prices, *i.e.* stock prices are not elastic to supply and demand.

In modern literature, there seems to be a general agreement about the definition of market efficiency. That is the market is efficient if (1) stock prices act as they fully reflect all available information, and (2) they react spontaneously and unbiased to the new information. This definition can be found, for example, in [Begg (1982), Dykman and Morse (1986), Keane (1983), Minford and Peel (1983), Sheffrin (1983)][6] and Fama (1970).

[5] In fact, Bussie and Green (2002) study the morning call and midday call segments on CNBC TV in the USA, and find that prices respond to reports within seconds of initial mention, with positive reports fully incorporated within one minute.
[6] In Strong and Walker (1987), p. 122.

(3.2.2) Sources of Information and Determinants of Market Efficiency

In the context of EMH, stock returns fully reflect all available information. As a new set of price related information becomes available, market participants would buy or sell using this new information. Stock prices instantly, or sometimes gradually, adjust to the new level of price equilibrium, *i.e.* to reflect the new level of expected returns and its associated risk level, to end up with a zero net present value (NPV) trading.

Individual and institutional investors, financial analysts, brokers, and the media, all create a competitive market environment, by which the concern is searching for profitable investment opportunities. Not only by looking for a new set of price-related information, but also by developing new models and using information technology to identify mis-priced stocks. All of which results in constant pressure on prices to reflect the intrinsic value of the stocks.

It seems that information availability, however important, is but one determinant of market efficiency. Rees (1995) states six features of market efficiency. These are[7]:

(1) The number of market participants. LSE, for example, is made up of many thousands of participants. It is almost impossible that one participant would likely be able to influence prices deliberately and effectively. This indicates that there exists perfect competition in the market [Laffont and Maskin (1990)].

(2) Information availability. In addition to that discussed above, it is worth stating that information availability does not necessarily indicate a full set of data. In such a developed and well-organised LSE, the concern is about how quickly stock prices adjust to a new set of price-related information.

(3) Low transaction costs. These consist of commission, stamp duties, and market spread. However, these costs do not exceed a few percentage points of the total value of the transaction[8].

(4) Location independence. Regardless of the geographical location of investors, trading in the stock exchange can easily be made by fax, telephone, or through the Internet.

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[7] Rees (1995), section 5.5.2, page 175.

(5) Homogeneity. The main consideration of all market participants is about the expectation of future returns of the stocks at an equilibrium[9] level of risk.

(6) Competitive analysis. Market intelligence always tries to identify mis-priced securities. Human error is always there, but it is almost impossible that all analysts make the same error regarding the same set of information.

(3.2.3) Levels of Market Efficiency

In an efficient capital market, stocks are fairly priced, and trading in these stocks will have an expected zero NPV. Evidence of market efficiency for one set of data category does not necessarily mean efficiency for another set of data or even the same set of data at a different time. Thus, it is almost impossible to test every set of data at different times (Rees, 1995). Therefore, it is widely accepted that capital markets are efficient unless proved to be otherwise.

According to the category of the information set reflected in the stock prices, Fama (1970) suggested three categories of market efficiency[10]. These are weak, semi-strong, and a strong level of efficiency. While the terms and concepts of these levels have not been changed, Fama (1991) has suggested new tests for each of these categories, as explained below.

The *weak level* assumes that the information set $Ø_t$ represents only those data that are incorporated in the historical returns. In other words, stock returns fully reflect all past price changes and dividends. Under this form of efficiency, future stock returns cannot be predicted by using the past stock returns. That, trading on this information will lead to a "non-positive Net Present Value (NPV)", because the price of any given stock is moving stochastically, randomly, and hence, unpredictability. Thus, the test for this form of efficiency should not be only about "how well do past returns predict future returns, [that is the test of] the forecast power of past return, [but should cover also] tests for return predictability" [Fama (1991), p. 1576]. The Random Walk, filter trading rules, runs test, and serial correlation of successive price movements models are used to test this level of efficiency.

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[9] An equilibrium level of risk that is agreed upon by all market participants, and almost always defined by the Capital Asset Pricing Model (CAPM).

The semi-strong level assumes that the information set $\acute{\O}_t$ represents not only historical but also all publicly available information, such as announcements of annual returns, stock splits, stock dividends, fundamental data of the firm's product/service line, management quality, ownership structure, balance sheet composition, accounting methods and classifications, and most importantly, earnings forecast. That stock returns fully reflect past and publicly available information. This indicates that, using publicly available information would not help in predicting future returns. Thus, the test of this form has to be concerned with "how quickly do stock [returns] reflect public information announcements [and] event[s]" [Fama (1991), p. 1576]. Event study methodology is a well-established test for this level of efficiency. The event is the disclosure of any price-sensitive information, such as earnings announcements, accounting information disclosure, and merger and acquisition news. A substantial body of empirical evidence strongly supports the notion that LSE is efficient both at the weak and semi-strong levels.

Finally, the extreme version of market efficiency is the strong level. It assumes that the information set $\acute{\O}_t$ represents all historical, publicly available information and, most importantly, private information. That stock returns fully reflect past, publicly available and private information, such as "inside information", and future economic events, such as company bankruptcy. This indicates that, future returns cannot be anticipated by using private information. Thus, the test of this form has to be concerned with is there private information that is not yet reflected in the stock returns. In this context, insider trading based on private price-sensitive information can be seen as a challenging incidence of this level of market efficiency. A large body of literature, reviewed in section (3.4), provides strong evidence that insider trades are firstly, based on private price-sensitive information, thus revealing information not disclosed to the market or reflected yet in stock returns, and secondly, achieve abnormal returns, *i.e.* more than expected by the market. Event study and multivariate models are widely used in the literature to detect the information content of insider trading, and to measure the abnormal returns.

[10] In fact, Fama (1970) recognised that Roberts (1959) was the first to suggest the distinction between weak and strong categories.

(3.2.4) Issues in the Efficient Market Hypothesis

As the EMH has become a dominant paradigm in the economics of financial markets, the academic society is concerned with what makes the markets inefficient. As there is general consensus about the assumption that the capital market is efficient unless found to be otherwise, this section is concerned with elaborating the cases in which the market is inefficient. These are the problems of asymmetric information and the principal-agent problem. The importance of this section concerns both this research issues, *i.e.* insider trading and managerial incentive. In fact, this section can be seen as an introduction to section (3.3) as well as section (4.3).

The EMH is based on an assumption that all market participants, economic agents, have access (costless) to the same level of information. This indeed does not rule out uncertainty in the market, provided that all participants have the same level of uncertainty [Postlewaite (1990)]. Despite accounting information disclosure requirements and insider trading regulations, the assumption of symmetrically informed market participants does not hold in the real world. In this context, it is reasonable to expect that a company's directors have information asymmetry about the true value of their company. In fact, not only the directors, but also other insiders, who are in business with the company, have access to privately non-disclosed firm-related information. These parties are called insiders, such as the firm's bankers, legal advisers, accounting auditors, employees, and large and institutional investors.

In order to overcome the problem of asymmetric information in the market place, one might learn from adverse-selection literature. Akerlof (1970) explains the problem of adverse selection within a used-car market with asymmetric information, and Wilson (1980) and (1990) generalises the Akerlof analysis by examining market equilibrium with adverse selection. An adverse selection problem occurs in a market with asymmetrically informed participants, which results in a less than average product, compared with a market with symmetrically informed participants. To overcome this problem, Spence (1973) shows that the informed seller can send a signal[11] to the buyers to help identify above average products.

[11] In the used-car markets, this signal might be a warranty and/or a test before buy.

In the context of EMH, insider trading can be seen as a signalling device that helps other market participants to identify asymmetrically informed trades and/or assess the current market value of the stock prices. The insider signal, however, differs from the seller signal in the adverse-selection context in that it cannot be manipulated independently by insiders [Strong and Walker (1987) p.165]. However, both signals are costly. Being caught by law is the cost of the insider signal and warranty and testing failure is the cost of the seller signal. Another cost of insider trading signal is reflected in a widening bid-ask spread. The intitution behind this is to compensate market makers for the increased level of uncertainty resulted from informed traders. Cornill and Sirri (1992) argue that the greater the informational advantage the insiders have over the market, the greater the adverse selection problem and the wider the spread. Section (3.3.1) provides the theory behind the cost of the insiders' signal and section (3.4.2.1.2) reviews the empirical literature, which examines the effect of insider trading on bid-ask spreads.

The second issue in the EMH continues the theme of the first one discussed above, but from different view. That is the problem of controlling the behaviour of the well informed by the less informed. This is, in fact, the subject of the Agency Theory, which is concerned with the contractual relationships that exist between a party (principal) that hires another party (agent) to undertake certain activities [more about this source of asymmetric information and the principal-agent problem can be found in chapter 4].

(3.2.5) Summary of the EMH

The market efficiency theory has developed through different phases. Firstly, it was believed that the market is not efficient, and that using technical and/or fundamental techniques[12] would enable investors to anticipate future price movements. The Random Walk model, run test, and trading rules are empirically employed and provide strong evidence that taking into consideration the transaction costs and serial dependency of successive price changes does not provide investors with abnormal returns. As a result, that view has changed dramatically in the second phase. The market is viewed as efficient, but in the weak level sense. Financial analysts and trust fund managers as well as academic researchers have tried to anticipate stock returns using publicly available

[12] For comprehensive details about these techniques, see Rutterford (1993), chapter 10, pp. 291-303.

information, such as earnings announcements, accounting information disclosures and firm-related news. The conclusion is that the market is efficient in the semi-strong level sense. In the third phase, using private information, many studies find anomalies that contradict the strong level of EMH. Information asymmetry is the main cause of inefficiency. Insiders and more specifically agents are most likely to have informational asymmetry over outsiders and more importantly principals. On one hand, insider trading based on private price-sensitive information anticipates stock returns, thus reducing the market efficiency. Fishman and Hagerty (1992) show two adverse effect of insider trading on stock price efficiency: firstly, the presence of a better-informed insider deters outsiders from acquiring information and trading and secondly, the information in the market is not evenly distributed across traders. On the other hand, more insider trades taking place, more private information revealed and reflected in the stock prices, thus increasing the market efficiency [Ausubel (1990), p. 1025]. In the context of the strong level, the market is inefficient before the insider trading and efficient thereafter.

(3.3) INSIDER TRADING THEORIES

Section (3.2) introduced the first parent discipline of this study. This included market efficiency theory and information asymmetry. In this section, the concern is with the theoretical aspects of insider trading. In a market with symmetric information, it is expected that the true stock value is an unbiased estimate of the stock market price. Insider trading would not be an issue of interest if all market participants were symmetrically informed. The EMH, discussed in the previous section (3.2), indicates that markets with asymmetric information would allow the informed trader to earn abnormal returns. By definition, insider trading indicates the stock true value is not the current stock price. Thus, insider trading can be seen as an informational signal about the true value of the stock, and as evidence on the impossibility of market efficiency. The theoretical explanations offered by the literature to these two issues are subjects of the following two sub-sections (3.3.1) and (3.3.2).

(3.3.1) The Economic Theory of Insider Trading: The Rational Expectations Equilibrium

In an efficient market, the stock price represents the present value of the future cash flows, *i.e.* dividends and capital gains, from the stock over a period of time. Future cash flows, however, are uncertainly valued[13]. Thus, the market price is based upon each trader's expectation on future cash flows, which depends on information available to him. As Fenn *et al.* (1991) point out; information about the expected future cash flows may be obtained in three different ways:

(1) Publicly available information is costless information and, thus, automatically allocated to every market participant. It indicates that *ex-ante*-trading strategies are limited to those concerned with the anticipation of disclosure of new information. That is the timing of the next disclosure. A recent example on this can be found in Tan and Gannon (2002) who investigates the information effect of economic news on the share price index.

(2) Privately acquired information by financial analysts through efforts to uncover facts. It is costly to acquire but less than that to disseminate. Thus, *ex-ante*-trading decisions are concerned with the appropriate level of effort. Kothari (2001), for example, provides an extensive survey on the empirical research on the relation between capital markets and financial statements.

(3) Privately owned information by corporate insiders, who are engaged in tasks and decisions that may have an effect on the firm's future value. It is free information to insiders, but costly to disclose. The ex-ante trading strategies are concerned with the current market equilibrium for the firm's stock price. That is the quantity of trading. See section (3.4) for literature review on this sort of information disclosure.

Different market participants have different expectations, *viz.* different information about the state of the world and the future cash flows expected from certain stock. Equilibrium in this market has been subject to a body of literature that defined, analysed and termed this problem as the Rational Expectations Equilibrium (REE). See, for example, Ausubel (1990), Bernhardt *et al.* (1995), Fishman & Hagerty (1992), and Glosten (1989). One characteristic of REE is that market participants are assumed to consider the market stock price as an additional source of information. That is so because prices are a product of aggregate demands and supplies equilibrating the process. With different non-price information among different participants, it is natural to infer some information from stock price changes, and to consider the stock price itself as an additional source of information.

[13] Both in terms of the expected amount of future payments and in terms of the discount factor used to compute the present value of these payments.

REE has two versions. Firstly the fully revealing REE (FRREE), which is a state when the REE price reveals to each market participant the non-price information of all agents collectively. Secondly, partially revealing REE (PRREE) is the case when the REE fails to be fully revealing. It is partitions observable events and non-price informational differentials [Strong and Walker (1987)]. Laffont and Maskin (1989), however, show in their model that as the number of traders grows, the equilibrium moves towards the fully revealing competitive equilibrium.

In such an economy, uninformed rational traders, *i.e.* outsiders, must learn from the relationship between stock prices and the private information available to informed traders, *i.e.* insiders. Ausubel (1990) argues that in order for insiders to profit, the equilibrium price in this competitive economy has to be partially revealing (PRREE). That is so because, with asymmetric information, the equilibrium price is that of a price function, as a random variable. Otherwise outsiders, by observing the market-clearing price could infer the precise set of insiders' private information. This conclusion, in fact, is supported by the informational signalling theory, introduced in the following sub-section (3.3.2).

More recently, Levine and Smith (2003) generate an equilibrium explanation for partial revealing of information by an insider to privileged associates (such as institutional investors and analyst). They find that because profits from liquidity traders are bounded, the equilibrium depends on the balance between the number of associates, the quantity of information and the number of liquidity traders. Partially revealing information adjusts this balance by restricting the informational advantage of individual associates.

(3.3.2) The Informational Signalling Theory of Insider Trading

Theoretical literature on insider trading and asymmetric information in the marketplace focuses on the signal of information for the market maker and, in particular, the total noisy order flow. See, for example, Damodaran and Liu (1993), Jain and Mirmam (1999), Kyle (1985), Laffont and Maskin (1990) and (1989) and Rochet and Vila (1994).

The EMH indicates that in a market with significant asymmetric information, equilibrium prices aggregate information effectively. A signalling equilibrium in the market can be defined as a set of conditional probabilistic information for the market maker which, when translated into prices, noisy traders response instantly, are confirmed by the new level of noisy order flow[14].

One possible informational signal[15] about the true value of a stock could be realised from insider trading. In a pioneering work, Kyle (1985) constructs a model for the effect of insider trading on the stock price when the market maker observes the insider's signal. He shows that a risk-neutral and perfectly informed insider can strategically trade on his unique access to private information about the *ex-post* liquidation value of the stock, and can earn abnormal returns. Moreover, the equilibrium examined features that this signal, insider's private information, is incorporated gradually. Kyle, in fact, based his model (1) on one signal, and (2) upon assuming that (i) the *ex-post* liquidation value and the quantity traded by noisy traders, *i.e.* uncertain variables, are normally distributed and (ii) the prices and quantities are simple linear functions of the observations defining the relevant information sets, *i.e.* linear equilibrium.

In fact, Noldeke and Troger (2001) show that the normality is not only sufficient but also necessary for the existence of linear equilibrium in the Kyle model. However, on one hand, it is not evident that the normality assumption holds in the stock market. On the other hand, signalling literature, such as Laffont and Maskin (1990) and (1989), shows clearly that the multiple, not the simple linear, equilibrium is the rule.

Rochet and Vila (1994) investigate Kyle's model under non-normality and multi-equilibrium assumptions and found that there exists a unique equilibrium independently of the distribution of uncertainty and that the expected profits of insider decrease under incentive constraints. However, they confirm Kyle's findings that the *ex-post* stock price reveals half of the private information. This conclusion is consistent with the economic theory, introduced in the previous sub-section (3.3.1.1).

Both Kyle and Rochet and Vila build their models upon one signal. It is typical, however, to expect that the market maker, who observes the insider trading, *viz.* the first

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[14] This definition, in fact, is based upon Spence (1973) definition of the signalling equilibrium in the labour market.
[15] Other possible signals include the firm's choice of the capital structure, dividend decision, and investment decision.

signal, gathers more information from various publicly available sources relevant to the stock value, *viz.* the second signal. By extending Kyle's model, Jain and Mirman (1999) examine the effect of two correlated signals, related to the value of the stock, observed by the market maker on stock price and insider trading profitability. They show that under the linear-normal equilibrium of Kyle, the stock price varies positively with positive realisation of both signals, and negatively when the realisations are negative. That, stock price becomes more informative in that it reveals more than half of insider's private information. Moreover, they find that the level of insider trading remains unchanged while the information content of trade changes. Insider's profits are lower than those of Kyle's are[16].

Two conclusions can be drawn from the theoretical literature on insider trading and informational signalling. Firstly, modelling price changes, as a function of new information, is consistent with modelling price changes as a function of quantities traded. Secondly, trading upon private information by insiders does not contradict with prices being set efficiently in the semi-strong sense [Kyle (1985), p. 1335].

Kyle's model assumes that insiders are risk-neutral, while, in fact, they are risk-averse. Baruch (2002) extends Kyle model by introducing risk-aversion insiders and allowing for the liquidity traders spontaneous demand to depend on cost of trading and stock's risk. He finds that the price pressure decreases with time (which is consistent with Kyle model) because insiders care about the impact of liquidity trading on future prices.

(3.4) EMPIRICAL EVIDENCE ON INSIDER TRADING

Despite the legislator restrictions, much empirical evidence indicates that insiders continue to trade on inside information and, consequently, earn abnormal returns. Academic research supports the widely held belief that insider dealings do have access to private information of the *ex post* liquidation value of their company's stock.

[16] In a recent work, Jain and Mirman (2002) study the relationship between the market structure in the real sector and the effect of insider trading. They find that, in a monopoly market, when insider chooses the price of the real good, insider trading increases the price not the quantity. While in a competitive market, where insider competes with another company in the real sector, when he chooses quantity, the output increases due to insider trading but by less than in a monopoly market, and the stock price becomes more informative.

Due to the lack of a comprehensive review of the empirical research concerning insider trading issues in any single reference. This section aims at providing a review to help future research in recognising the different aspects, issues and methods addressed in insider trading literature. Heuristically, one might detect a new way to investigate this subject. This study, as well as all relevant literature follows the positivism approach. A broader view of the issue might help in establishing not only a different way to address the issue, *i.e.* phenomenological approach, but also a different methodology to analyse insider-trading aspects, *i.e.* qualitative techniques.

This section will be organised as follows: Section (3.4.1) provides a short review of the early empirical research, through academic theses, during the 1950s and 1960s (3.4.1.1) and the pioneering articles, which examined the issue during the 1970s (3.4.1.2). The recent empirical literature, with particular emphasis on UK literature, will be reviewed in section (3.4.2).

(3.4.1) Early and Pioneering Research

This section outlines the early and pioneering research on insider trading. The significance of this section is to provide a one-stop-shop to the relevant literature for future reference. The intuition behind separating these studies from the recent literature is, in fact, due to methodological and data availability issues. Due to the significant developments in the firms and market disclosures and the development of research methodology it is expected that the results of these early researches are very likely to be influenced by the lack of accurate and timely data as well as the early-stage methodology.

(3.4.1.1) Early Research

It is worth noticing that early research investigating insider dealing issues were conducted through the means of academic theses. Driscoll (1956)[17] was the first to investigate some aspects of insider dealing. He examined the insiders' transactions prior to dividend changes, and found that insiders buy more than they sell in the six months

[17] "*Some Aspects of Corporate Insider Stock Holdings and Trading Under Section 16b of the Securities and Exchange Commission Act 1934*". An MBA Thesis, University of Pennsylvania, USA. [In Jaffe (1974a), p. 411].

before dividend decreases. This followed by Wu (1963)[18], who studied the price movement of stocks one-month after the month of insider dealings. It concluded that there is no relationship between price changes and insider dealings. Then, Rogoff (1964)[19] examined the forecasting properties of insider dealing, and found that after six months of trading, insiders earn more than the market return. This issue also examined by Glass (1966)[20]. The overall results support those of Rogoff's, but insiders earn more returns than in Rogoff[21] after seven months.

Driscoll and Wu found no significant information contained in insider trading, while Rogoff and Glass found evidence on insiders' forecasting capability and, thus, profitability. Such contradicting results might arise due to the difference in the sample size, period length, data manipulating, or methodology used.

Driscoll, for example, used two signals, the event month and the dividend announcement date. He defined the event month by the quantity of shares bought/sold by insiders of a given company during a calendar month. The others used one signal, *i.e.* the event month by which the number of insiders' buy/sell quantities of shares of their own company within a calendar month. Wu classified the event month as a net buying month if the insiders buy specific stocks more than they sell in that month, referred to in this study as a quantified signal; while Rogoff and Glass used the number of inside buyers/sellers to classify the event month, termed as a multiple signal.

As for the length of the insiders-profitability-investigating period, *i.e.* event window, Driscoll used six months period between insider trading date and dividend signal date. Wu investigated the insiders' profitability after one month of the event month, while those of Rogoff and Glass were after six and seven months, respectively.

Finally, as pointed out by Jaffe (1974a), all the earlier studies failed to control adequately the potentially confounding effects of systematic risk differences between

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[18] "*Corporate Insider Trading Profitability and Stock Price Movement*". A Ph.D. Dissertation, University of Pennsylvania, USA. [In Jaffe (1974a), p. 411 and Lorie and Niederhoffer (1968), p. 37].
[19] "*The Forecasting Properties of Insider Transactions*". A DBA Thesis, Michigan State University, USA. [In Jaffe (1974a), p. 410 and Lorie and Niederhoffer (1968), p. 48].
[20] "*Extensive Insider Accumulation as an Indicator of New Term Stock Price Performance*". A Ph.D. Dissertation, Ohio State University, USA. [In Jaffe (1974a), p. 410 and Lorie and Niederhoffer (1968), p. 44].

securities. Dimson and Marsh (1986) demonstrate that the size effect can distort long-term performance measures. In fact, none of these earlier researches had taken into consideration the size effect in the sample data. Other shortcomings, which have to be taking into account when considering these studies, are data availability and methodology employed.

(3.4.1.2) Pioneering Research

The first published article in this context is that of Lorie and Neiderhoffer (1968). Table (3.1) summarises their work. They examined stock performance of a random sample of 150 New York Stock Exchange (NYSE) companies following months of insider trades during the period 1950-1960. The number of insiders who trade monthly defines the event. They constructed buy and sell portfolios, by which the buy (sell) portfolio consists of those firm transactions where the number of buying (selling) insiders is more than the number of selling (buying) insiders by at least two per firm-month. They found that a stock price of a company experiencing an extensive buying month is more likely to increase, relative to the market, by at least 8% in the six month following the event month; and vice versa. They concluded that insider dealings are a significant predictor of large price changes.

Jaffe (1974a), in the second pioneering research, reached the same conclusion of Lorie and Neiderhoffer. As shown in table (3.1), he tested the information content of 952 insider dealings in 200 large companies published in the Official Summary[22] of the SEC during the period 1962-1968. By taking account of the systematic risk and transaction sizes, he found that the monthly cumulative average residuals for the whole sample were significant at 11.8% and 13.6% after two and eight subsequent months respectively. For the large transaction sample, the results were 13.4% and 18.4%. He concluded that insiders could forecast returns in the near term better than that in the long term. Obviously, such abnormal return covers the 2% transaction costs, assumed by Jaffe. Also it encounters, we argue, the higher risk associated with non-diversified insider portfolios as well.

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[21] See Jaffe (1974a), p.410-411; and Pope *et al.* (1990), p.363.
[22] U. S. Securities and Exchange Commission: *Official Summary* of Stock Transactions and Holdings of Officers, Directors, and Principal Stockholders. (Referred hereinafter as the "*Official Summary*").

Moreover, as stated in section (2.6), the source of insider dealing litigation in the USA was developed through 1960s case law. Jaffe (1974b), summarised in table (3.1) examined the effect of three important legal decisions concerning insiders[23], during the period 1962-1968, on the volume and profitability of insider dealings. He found no evidence of any cumulative effect of the three events neither on profitability nor on the volume of insider trading. Instead, the volume increased slightly. So, he suggested, "the SEC must prove not only that an insider made abnormal profit but also he traded on material information"[24]. Finally, he concluded that changes in regulation had no effect on the properties, *i.e.* profitability and volume, of insider trading.

The overall results of "Lorie and Neiderhoffer" and "Jaffe" provide evidence that insider dealings do have special information used to attain abnormal returns, which persist several months after the transactions are disclosed. Outsiders, thus, who follow the Official Summary Insider Transactions, can also earn abnormal returns. This contradicts the semi-strong form of the EMH, which states that all publicly available information is fully reflected in the stock prices immediately.

Finnerty (1976b) noticed that the previous research mentioned above had a major shortcoming. That is the data availability. Before 1965, neither precise stock price nor the date of insider transactions was reported to the SEC and thus not available in the Official Summary. With time the publication of insiders' transactions becomes more detailed. It incorporates the actual stock price paid (received) by the insider transactions, as well as the date of reporting such transaction to the SEC. Also, Finnerty argued that previous research suffered from the bias resulting in selection of samples based on intensive insider trading, *i.e.* ignoring the average insider[25]. He admitted that such bias while not affecting these studies' results relative to the semi-strong-form would, however, invalidate the findings for a test of the strong form of the EMH. To counter these problems, Finnerty, as shown in table (3.1), examined the whole population[26] of the insider transactions reported in the Official Summary, for NYSE companies, during

[23] These are: (1) The Cady, Roberts decision (Nov. 8, 1961), (2) The Texas Gulf Sulphur indictment (April 19, 1965), and (3) The Texas Gulf Sulphur decision (Aug. 19, 1966).
[24] Jaffe (1974b) page 114.
[25] "Average Insider" means those insiders' transactions excluded, by previous research, due to the definition of the event, such that the number of insiders buy (sell) their own company's shares, in a given month, should be three or more.

the period 1969-1972. He constructed monthly insider buy (sell) portfolios. Each of. which comprised the securities bought (sold) during a given month. The number of insiders bought (sold) that particular security in the given month weights each security in the portfolio.

By using CAPM, Finnerty found that the buy portfolio returns are significantly above the market returns, and the sell portfolio have not only negative returns but are also below the general market decline. Thus, he concluded, insiders are able, in the short term, to identify profitable situations in their own companies. Hence, the strong form of the EMH is refuted. It is clear that Finnerty results and findings are consistent with the previous research.

It might be argued that insiders are induced not by past or current information but, instead, by future expectation of accounting and financial variables. Finnerty (1976a), once again, addressed this issue by developing a Multiple Discriminate Analysis (MDA) model to examine the relationship between insider trading and the subsequent announcement of six sets of accounting and financial variables. These are the size, financial leverage, earnings, operating leverage, capital intensifies, and dividends. Table (3.1) summarises this work. It shows that by employing the MDA on insider transactions for 854 companies from NYSE during 1971, Finnerty found that insider buying occurs in the companies characterised by smaller size, large earnings, and larger dividends. While insiders selling occurs in companies characterised by the opposite. Thus insiders rely on their expectations of future values of these variables when they are deciding to trade. Moreover, their decisions rely on the relative magnitudes of the information. Finnerty concluded that the systematic identification of the characteristics of the buying and selling groups is an important step in identifying the information content of insider trading.

On the other side of the Atlantic, King and Roell (1988) were the first to examine insider trading in the UK. Much of their work, in fact, was about the rationale for insider trading regulation, effects on prices and participants and the economic and social value of the information. King and Roell employed the Market Adjusted Returns

[26] As in previous research, Finnerty excluded the stock acquired by the exercise of options or through compensation plans, as well as gifts and private sales.

(MAR) to estimate the expected returns in event study methodology. They constructed two portfolios, one for insider buying and another for insider selling. Table (3.1) summarises the empirical aspect of their work. The results show that the buying portfolio outperformed the market significantly over 1, 3 and 12 month following publication, while the selling one was not. Thus, they concluded that the market is not efficient in the semi-strong level. However, they admitted that the market respond promptly and efficiently to insiders' sales but to neglect the information content of insiders buying. In fact, Gregory *et al.* (1994) investigates King and Roell findings by re-examined their data using the Market Model instead of MAR in the event study and Dodd and Warner's (1983) *t*-test instead of the standard errors[27]. They found varied results than that of King and Roell. For buying portfolio, Gregory *et al.* show that the results are significantly positive during the month of publication and after 12 and 24 month but not during the third month. For selling portfolio, strangely enough, they found positive (negative) but insignificant results during the month of publication and one month (3, 6, 12 and 24 month) after publication.

More elaborations about the findings of these pioneering studies and comparisons with recent literature are introduced below [section (3.4.2)].

(3.4.2) Recent Empirical Literature

Although numerous studies have examined the issue of insider trading in USA's stock exchange markets, only few studies have examined this issue in the UK. Friederich *et al.* (2002) and (1999), Gregory *et al.* (1994) and (1997), Hillier and Marshall (2002 a, b and c) and (1998), King and Roell (1988) and Pope *et al.* (1990) examined the information content and the share price reaction following UK directors' dealing in their own company's shares.

Empirical research can be classified into various types of categories and proposed by Pope *et al.* (1990) into two main categories. The first examined the information content of inside information, while the second examined the market reaction to the information revealed and inferred from insider dealings. Or that, proposed by Pettit and Vankatesh (1995) where the first examined insider trading as a one-signal event, and the other

[27] In fact, the main intuition behind this is to compare their data results with other UK literature, on one

investigated insider trading around different pre-selected announcements, *i.e.* multiple signals event.

Such classifications, however, do not capture the various aspects of insider trading issues, which are covered by numerous studies. Therefore, an *ex post* approach has been employed, for the purpose of this section, to classify these studies. This classification comprises of four categories[28]. The first two categories include the immediate literature on this area, while the rest of the categories are those, referred to in section (1.6), of different issues. The categories are:

(1) The information content of insider trading:
  (a) Firm-specific information, and
  (b) Economy-wide information.
(2) Insider trading effects on stock prices and market efficiency.
(3) Insider trading activity around specific firm-related events:
  (a) Earnings/dividends announcements,
  (b) Merger and acquisition,
  (c) Leverage buyout and self-tender offering,
  (d) Equity offering,
  (e) Stock split,
  (f) Corporate bankruptcy,
  (g) Market listing/delisting,
(4) The role and effectiveness of relevant insider trading regulations.

Accordingly, the relevant empirical research (categories 1 and 2 above) will be reviewed in this section. Table (3.1) provides a summary of empirical literature on the information content of insider trading as well as insider trading effects on stock market. One purpose of the table is to lay down the structure of the insider trading issues analysed in the current literature. The table cites the literature according to the year of publication where the most recent is reported first. Column (1) names the author(s), the publication year of the study and the country in which the study was conducted. It can be seen that insider-trading issues are investigated less in the UK (9 out of 42 studies),

hand, and to examine the effect of size and risk factors on the empirical results.

[28] This classification depends only on the literature available to the researcher.

and in Europe (1 in each of Czech, Norway and Spain) and Canada (1 study), compared with the USA (28 out of 42 studies). Column (2) indicates the subjects examined within insider trading issues and the specific event. That is the information content of what type of insider trading.

The test period, the numbers of transactions and number of firms in the study sample are reported in column (3). The test period indicates the period of insider trading transactions, over which the abnormal returns are measured. Despite the latest regulations, *i.e.* CJA 1993, governing the insider trading, in general, and director dealing in particular, these incidences have only been investigated by few studies in the UK since 1990. In addition, all of the UK studies, except for King and Roell (1988), used very old data relative to the publication year. For example, Hillier and Marshall (2002/a), which is the most recent study, used data that was five years old (1991-1997). While Hillier and Marshall (2002/b) is the only work examined the effectiveness of the LSE Model Code "Close Period"[see section (2.8) about this regulation].

Moreover, given the data availability and the breadth of the market, *i.e.* number of securities listed on the market, it is obvious that the USA literature often uses a larger number of transactions than their counterparts in the UK. It can be deduced from the table that the average number of transactions per firms examined in the USA literature is more than 32 transactions [29000 / 901]. While that in the UK are less than 4 transactions [4602 / 1061]. This is due to data availability in the USA where there are many institutions [*e.g.* the Official Summary of Insider Transactions Tapes supplied by the Securities and Exchange Commission (the Official Summary), the Center for Research in Security Prices (CRSP), CDA/Investnet database, the Annual Compustat Industrial tape (COMPUSTAT) and Institute for the Study of Security Markets database (ISSM)] which gather, classify, update and make available to the researchers insider trading transactions, using the latest information technology; while it is a commercial service in the UK [Hillier and Marshall (2002/a), p.103]. Another reason might be that UK director and other insiders' trade less frequently than their counterparts in the USA. Column (4) shows the control variables investigated, either to control other factors that might affect insider-trading returns. Such as the firm's financial position quality (Tobin's Q) [see, for example, Roth and Saporoschenko (1999)], risk factors [as examined by Eckbo and Smith (1998) and Hillier and Marshall (2002/a)], market overreaction [see, for instance, Rozeff and Zaman (1998)], earnings price ratio (E/P) [see, for example, Rozeff and Zaman (1988)] and January effects [see, for instance, Hillier and Marshall (2002/c) and Seyhun (1988/b)]. Or to validate the event study findings, *i.e.* cause relationship between insider trading returns and such factors. Such as the type of insiders [see, for example, Seyhun (1986)], the firm size [Hillier and Marshall (2002/a), Gregory *et al.* (1997) and Lustgarten and Mande (1998) provide good examples on this], insider trading portfolio weight [see, for instance, Eckbo and Smith (1998)], uninformed portfolio [see, for example, Chakravarty and McConnell (1999) and Friederich *et al.* (2002 and 1999)], earnings and dividends ratios [Finnerty (1976a)] and firm industry sector [as in Iqbal and Shetty (2002/b)]. Column (5) defines the event and event window(s). Such definition is an important factor in conducting the event test. It can be seen, however, that there is no consensus among the literature regarding one single definition of the insider-trading event. Column (6) refers to the methodology/model used in computing the expected returns. The majority of cases [7 out of 9 in UK, 13 of 28 in USA and 4 out of 5 other markets] used event study methodology. Finally, column (7) shows the empirical results of insider trading transactions during the specified event window(s).

Table (3.1/A) Summary Review of Empirical Literature on the UK Insider Trading:
Each study is summarized according to the subject examined, the sample used, the model used to test the hypotheses and the the focused event and main results. The most recent studies reported first while the oldest are reported last.

No.	Study (Publication Year)	Subject Examined within insider tradi[ng] & *Specific Event*	SamplePeriod No. of Deals No. of Firms	Control Variables	Focused Event & Period	Model Used	Main Results
1	**Hillier & Marshall (2002/ a) JBFA**	Info Content *from outsiders viewpoint*	17/9/91 to 31/03/97 Buys 4088 Sales 3708 1350 Firms	Firm size & risk	Trading month	Event Study & Multivariate	Directors outperform the market Subsequent INT ARs are related to large increas in directors holdings & number of directors tradin[g] Info content of sales are not related to trade characteristics. Directors sell after abnormal performance
2	**Hillier & Marshall (2002/ b) JOCF**	Info Contents *INT around Earnings Announcements "timing"*	1/1/92 to 31/12/96 3871 Buys 3521 Sales	Close Period "2 months befo[re] Earnings News	Interim & Final Earnings News 60 days prior Earnings News	Event Study	The ClosePeriod affects timing of directors trades but not their trades performance or distribution. Directors earn AR regardless the period they trad[e] They Buy after bad Earnings News & Sell after good Earnings News.
3	**Hillier & Marshall (2002/ c) IRFA**	Info Contents *INT & Jan Effect*	29/9/91 to 31/03/97 4088 Buys 3708 Sales	Tax-loss selling effect	Turn of the yea[r] "January"	Multivariate	There is a Jan effect in firms returns that is unrelated to either INT activities orTax-Loss selling.
4	**Friederich, Gregory, Matatko & Tonks (2002) EFM & (1999) FMG-DP**	Info Contents *Stock Returns Around INT*	1986-1990 1991-1994 1887 Buys 1522 Sales 196 Firms	No FTE100 Thin Trading Larger AR TransCost	Net Quantity of shares traded in an event day.	Event Study	Directors sell after positive price changes & ARs are negative after directors sale. Price reversal starts occuring on the day before directors trade but not caused by that trade Large stock price changes occur around INT purchases than sales. After transaction cost, no positive AR for outsiders imitating INT.
5	**Hillier & Marshall (1998)**	Info Contents *INT around Earnings Announcements "timing"*	17/9/91 to 31/12/94 Buys 3006 Sales 2691 1350 Firms		Earnings Announcement. 160 days around Announcement -80 to +80	Trading Distribution	Directors abstain from trading 40 days before Earnings announcement. But INT increases on event day up to +10 days. Directors Buy in the event day & one day after, but sell over 1 month thereafter.
6	**Gregory, Matatko & Tonks (1997)**	Info Contents. *Size effect*	1/86-12/90 6756 deals 1683 firms	Firm's size.	No. of traders, Volume of trade, Value of trade, monthly. 0 to 24 months	Event Study DW83 MM	Size effect is important where CAR is long post-event window & where large no. of small firms is in the sample. The appropriate benchmark return model must be one that control for size. Signal definition has important impact on results. CAR of volume buy are +small but significant for 24 months. Sell are negative and significant but for short period. If transaction cost counted, ARs are not attractive. Thus LSE is semi-strong efficie[nt]
7	**Gregory, Matatko, Tonks & Rurkis (1994)**	Info Contents. *Size effect*	1/84-12/86 1440 deals 150 firms	Firm's size, Thin tradings, & overlaps.	Net volume of buy-sell monthly 0,3,6,12 & 24 months holding period.	Event Study: DW83 MM	Significant CAR of buy(sell) for after 6(3) months No significant CAR at 0. CAR of buy for small & medium firms are > large firms, & vice versa for sell. All control variable reduce CAR, but size has the greatest effect.
8	**Pope, Morris & Peel (1990)**	Info Contents & *market efficiency Market reaction around INT*	4/77-12/84 564 deals	Similar buy & sell sample	Net no. of buyers/sellers = or >2 -6 to +6 months	Event Study: MAR, MM & MM adjusted.	CAR (1 to 6) of sell(buy) is negative(positive) & significant(not). Sharp reaction around INT date. No evidence on market inefficiency in semi & strong levels.
9	**King & Roell (1988)**	Info Contents & *market efficiency Price effects*	1/86-8/87 564 deals		Publication date 1,3 &12 months	Event Study: Market & Mean Adjuted Returns	Buy(sell) portfolio outperformed the market significantly(insignificantly). Thus, the market is not semi-trong effeecient. The Market respond promptly & efficiently to insiders' sales but not to purchases.

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Note: Literature are listed according to the publication date, per which the most recent ones first

Table (3.1/B) Summary Review of Empirical Literature on USA Insider Trading:

No.	Study (Publication Year)	Subject Examined within insider trading & Specific Event	SamplePeriod No. of Deals No. of Firms	Control Variables	Focused Event & Period	Model Used	Main Results
1	**Iqbal & Shetty (2002/b)**	Info Contents. *Causality with Stock Returns*	1/88-12/98 2521 Firms	Firm Size Firm Sector	INT month Net No of Deal Net Vol of Deal Buy Deals Sell Deals	Granger Causality (AutoRegressive Models)	Large impact of stock returns on subsequent INT However, the adverse relation is weak. Insiders Buy after stock price decreases & Sell after stock price increases
2	**Carpenter & Remmers (2001)**	ESO Exercise *Timing*	1/84-12/90 1/92-11/95 201003 Exercises 7560 Firms	Firm Size Before May 1991 Regulation (ESO to be held for 6 months)	A month of exersice -120 to +12 day	Distribution & Pattern	Exercises occur after strong stock performance ARs are sig. negative after exercises, thus no inside info. Before May 1991, ARs were sig positive suggesting the use of inside info.
3	**Aboody & Lev (2000)**	Info Contents. *R&D Expenditures.*	1/85-12/97 104547 deals 3818 firms	1.Small Stocks 2.BV/MV 3. Non-R&D 148491 '(6195)	No.of shares bought/sold monthly Deal's day to 1day before filing day	Fama&French 1993- 3 factor model	INT in R&D firms gain MORE than those in non-R&D firms
4	**Chakravarty&Mc Connell (1999)**	Effects on Price. *Acquisition Offer*	6/84-8/84 & 9/84 1711200 Carnation shares	Uninformed buy/sell, volume, 7160400 Carnation shares.	Seller/Buyer Initiated (Trades near Bid/Ask). Boesky's buys to Nestle offer of acquisition	Regression of hourly returns	The market does NOT distinguish the price effect of informed from the uninformed purchases
5	**Roth & Saporoschenko (1999)**	Info Contents. *Large stock purchases*	1993-1995 142 deals 139 firms	Tobin's Q, P/BV, P/E, & log TA (size) $ of purchase	WSJ published Published day, -14 to +14days, 0 to +90, +252day.	Event Study: Market Adjuted Returns & regression	Significant CAR for (-7 to 0) (-7 to +7) (0) & (0 to 252). INT leakage before publication. Initial + reaction to event is not revised within a year. Thus, info content of large INT are not temporarily. Small & undervalued firms & managers (who are not aligned with their owners) convey more info (about future incentive). Info content are not captured by market at time of INT. Negative relation between P/E and stock price performance. INT decrease info asymmetry.
6	**Anderson (1999)**	ESO Exercise *Timing*	992 and 1993 199 Directors 373 Exercise 65 Large Firms		When IV/BS=1	Distribution of Intrinsic Value/ Black-Scholes	Top 5 Executives at large firms exercise their ES(when theIV/BS is about equal to one. Subsequent sotck price performance is sig. poorer for exercis(that are made when the IV < BS value.
7	**Chang & Suk (1998)**	Info Contents. *Large stock purchases & sales*	8/88-12/92 707 deals	Sensitivity: confounding news announc, price changes in unchanged bid/ask spread, slow price adjustment.	INT date, SEC filing date WSJ published -19 to 22 days	Event Study: DW83 MM	Insiders' sales(buys) are preceded by unusually good(poor) stock performance. INT info gets partially revealed to the market via private channels as soon as insiders trade. WSJ has info contents but not SEC. Results are NOT due to confounding effects, or bid/ask spreads, or the slow price adj to the SEC filing date. Trading volume supports the above results that release INT info is associated with an increase in trading activity.
8	**Chung & Charoenwong (1998)**	Effect on Bid/Ask Spreads. *INT intensity.*	1988 11522 deals 1001 firms	1. Size (MV) 2.DealVolume 3.TradeSize 4.Price 5.No.ofExchs	No. of NET insider deals 5 days before & 5 after INT	Event Study for spread & cross-sectional & time series regressions	Spread is greater with INT in cross-sectional, but NO evidence with time series regression.
9	**Kara & Denning (1998)**	Profit Determinants & Strong-form of EMH. *INT Transactions.*	3/79-7/80 36134 deals	1.Risk Aversion 2.Transaction Costs	Transactions, & + returns & - returns. 6 mnths & 1day holding period	Regression	60% of deals are profitable. Insiders' profits are subject to transaction costs & risk aversion degree. The market is NOT strong-form efficient.

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10	**Lustgarten & Mande (1998)**	Effect on Forecasts' Accuracy & Dispersion. *Future earnings.*	7/86-12/90	1. Firm Size, 2 Earnings' Announcement	No of NET insider buying/ selling Month of INT	Time-series regression	More insider buying is link with less forecast error, & strongly affects forecast accuracy in large than small firms. Selling has little effect
11	**Rozeff & Zaman (1998)**	Info Contents & Over-reaction. *Growth & Value Stocks (defined by CF/P ratio).*	1978-1991 6442 deals 1216 Firms	CF/P deciles	10 deciles of CF/P & BV/P. 12 months through May each year.	Regression no.of insiders purchases/ all firm-year transactions	Insider buying intensified in value than growth stock, & greater after low returns & lower after high returns. Value stocks lie below fundamental value & growth stocks lie above.
12	**Summers & Sweeney (1998)**	Misstated Financial Statements. *Discover fraud.*	1980-1987 51 deals	Same size & industry no-fraud firms (51)	Fraud occurance From perpetration fraud to its discovery	Cascaded logit analysis	Pre-fraud financial statements explains fraud before occur. Insiders sell intensively in fraud firms compared with no-fraud firms.
13	**Chakravarty&McConnell (1997)**	Effects on Price, Bid/Ask Spreads & Depths (Market Liqu *Acquisition Offer*	6/84-8/84 & 9/84 1711200 Carnation shares	7160400 Carnation shares	Boesky's buys. Boesky's buys to Nestle offer of acquisition	Regression of hourly returns	Boesky large purchases increase stock prices. No adverse effect on bid/ ask spreads (market liquidity)
14	**Yermack (1997)**	ESO Exercise timing	620 ESO 1992/1993-1993/1994	Predictable award. Member of award committee Earnings Announcement Leaking award date.	Award Date -20 to +120days	Event Study BW1983	The timing of awarding ESO is sig associated with stock price movements than trading OS by CEO. He receives ESO shortly in advance of favourable news.
15	**Toutkoushian (1996)**	Determinants of Abnormal Returns & Semi-Strong EMH. *Outsiders follow Insiders.*	1/75-12/81 22695 deals		1director buys/ sells in month without opposite deal by any director. -20 +59 days	Event Study (MM) & regression	Factors affect outsiders returns are # of INT deals, size of deals, & delay in disclosures. However, the market is semi-strong efficient
16	**Pettit & Venkatesh (1995)**	Info Contents. *Long term firm-specific & market related stock performance*	1/80-8/87 100000 deals 1718 firms	Year -1 CAR as base year	Net insiders purchases. -1, 0, +1 years	Event Study MM & abnormal INT activity	Strong tendency for insider net purchases to be related to subsequent & prior performance. Also, insiders reverse their positions in after good performance period. Thus insiders can anticipate future return path reasonably well & act on these forecasts.
17	**Cornell & Sirri (1992)**	Effects on Price Bid/Ask Spreads *Acquisition offer.*	07/1982 & 12/81-11/82 265600 deals 78 trades		1/6/80-2/11/82 1/12/81-2/11/82	Augmented MM for daily returns. Roll(1984) model for spread. Glosten&Harris(1988) for liquidity & costs.	Prices rise in INT-buy day But no impact on spread or adverse selection.
18	**Meulbroek (1992)**	Effects on Price. *Illegal INT.*	1980-1989 229 deals 218 firms	ARs without INT or news	INT & news. Transaction day	Event Study to AR & CAR & regression to price changes	INT increase stock price accuracy. INT volume constitutes most of unusaul trade volume.
19	**Rozeff & Zaman (1988)**	Info Contents & market efficiency. *Outsiders after insiders & transactions cost.*	1/73-12/82 698 INT 622 OUT	Size & E/P	3buyers(sellers) with no 1 sell (buy) monthly 0,3,6& 12 months holding period.	Event Study: MM	AR of OUT is profitable. But with 2% transaction cost & E/P effect, AR is not. This suggests INT AR is a sign of return differentials due to low price of high E/P ratio. Reject strong level EMH, but do not support that insiders have more info & they trade on it
20	**Seyhun (1988b)**	Info Contents & Seasonal Patterns. *January effects.*	1/75-10/81 59148 deals 769 firms	1. Size (MV) 2. Risk	1.Net no. of Transactions Month of INT	Keim1983 seasonal patterns & regressions	Insiders in small firms increase their net purchases in December to capture January returns, opposite to those in large firms INT does not affect Jan prices
21	**Seyhun (1988a)**	Info Contents & Market Efficiency *Economywide fac*	1/75-10/81 59148 deals 769 firms	1. Size (MV) 2. Risk	Net no of transactions in a month-firm Month of INT	Regressions	Aggregate INT positively correlated with market returns. In risky & large firms, insiders observe economywide factors. In small firms, insiders trade on firm-related
			Page 3/5		**TO BE CONTINUED**		

22	**Seyhun (1986)**	Info Contents & market efficiency. *Outsiders & bid/ask spreads*	1975-1981 59148 deals 769 firms	Firm's size & type of insiders	Net number of buyer(seller) monthly (last INT date) -199 to +300 days.	Event Study: DW1983 MM & regression CAR to firm size	Insiders purchase(sell) prior to (un)favourable info releases. Insiders refrain from purchasing until after unfavorable info is released. Results are not sensitive to model used. CAR & $volume ratio are related negatively with firm size. INT impose significant costs on uninformed traders reflected by bid/ask spread, which rises as the $value of INT increases. The $value of INT is not related to insider info CAR increases with the number of net insiders in small firms. Outsiders cannot earn AR following insiders.
23	**Givoly & Palmon (1985)**	Info Contents. *Effects of disclosure of specific news*	1973-1975 1531 deals 68 firms	Firm size	Good, bad & neutral news. 0 to 239 days (10 days intervals)	Event Study: MM	Insiders able to identify profitable & unprofitable in their firms. No tendency for insiders' purchases (sales)to precede good(bad) news. No relation between deal $size & inside info or subsequent disclosure of news. INT superior performance is not due to inside info, but to assessment of their firms' affairs & tendency of outsiders to follow.
24	**Finnerty (1976b)**	Info Contents & market efficiency. *Strong form of EMH*	1969-1972 31089 deals		Buy / sell deal monthly portfolio. From 0 to 11 month holdings.	Event Study: CAPM	Insiders purchases(sales) earn(avoid) AR(loss) Insiders can identify profitable & unprofitable in their firms. Thus, refute the strong level of EMH.
25	**Finnerty (1976a)**	Info Contents. *Future Financial & Accounting Variables.*	1971 854 deals	1. Size 2. Fin Leverage 3.Earnings 4.Oper Leverage 5. Capital Intensity 6.Dividends	Net No. of transactions & shares held. Months in 1971	MDA & multivariate analysis	Insiders rely on future fin & acc. info. Insiders' buy intesified in small, large earnings & dividend firms. In average firms, insiders sell.
26	**Jaffe (1974b)**	Profitability arounc law decision. *Regulation effect*	1962-1968 362 deals 200 firms 08/11/61 Cady,Roberts decision 19/04/65 Texas Gulf Sulphur indictment 19/08/66 Texas Gulf Sulphur decision		Net number of buyer(seller) in month 1,2 & 8 months	Event Study: CAPM	Insiders earn AR. Intensive trading sample has special info & can forecast up to 8 months. No difference was found between INT profits & INT volume before & after regulatory events.
27	**Jaffe (1974a)**	Info contents. *Stock prices*	1962-1968 362 deals 200 firms	Transaction's size, 1950s, & 1960s & 2% transactions costs.	Net number of buyer(seller) month. Publication date. 8 months.	Event Study: CAPM	Insiders possess & exploit special info. But with 2% transaction cost, only intensive INT have + CAR. INT publication has info. But outsiders could not earn AR after transaction cosst, except intensive trading portfolio.
28	**Lorie & Niederhoffer (1968)**	Info Contents. *Good or Bad News.*	1/50-12/60 1305 deals 105 firms		No. of same type deals Month of INT	Advance / Decline (price changes to the market).	Insiders predict large price movements within 6mnths. Insiders accumulation indicates stock will outperform market

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Note: Literature are listed according to the publication date, per which the most recent ones first

Table (3.1/C) Summary Review of Empirical Literature on Insider Trading in the Rest of the World:

No.	Study (Publication Year) & Country	Subject Examined within insider tradi & *Specific Event*	Sample Period No. of Deals No. of Firms	Control Variables	Focused Event & Period	Model Used	Main Results
1	**Anand, Brown and Watson (2002) Australia**	Info Content *INT as Signal for Future Performance (FP)*	380 Buys 186 Sales 642 Firms	Firm Size Industry Timeliness	FP Measures: Future Earnings Dividends Cash Flow per Share	Event Study	No sig market reaction to directors buys, while strong for sales Thus more info in INT sale than buys. Weak direct relation between market reaction and future performance Directors buy (sell) after price fall (rise). Large size sales are strongly related to FP in small sized firms.
2	**Brio, Miguel and Perote (2002) Spain**	Info Content	1/92-12/96 88 Firms 589 Buys, 406 Sales 499 by Directors 548 by Large Shareholders		INT day Event Period -10 to -1 & +1 to +60	Event Study	Insiders earn Excess profit. Outsiders mimicking insiders failed in earning AR.
3	**Hanousek and Podpiera (2002) Czech**	Extent of Informe(*Trading in Emergin, Market of Transition*	Aug to Nov.1999 10 Firms		No. of Buys and Sells in a day Best bid-ask spread	Patterns	The probability of informed trading is higher in DC At info event, probability of informed trading is mc than probability of uninformed trading. Thus, spread increase and so trading costs. Informed traders might trade legal trading or on inside info, but the data cannot deffirentiate between these
4	**Eckbo & Smith (1998) Norweg**	Info Contents. *Conditional performance of* INT	1985-1992 18301 deals 131 firms	Risk factors, info variables, INT portfolio weights & size January effect.	No. of buyers less no. of seller 7 months. calculate AR th regress to contr variables, one b: one.	Event Study: Seyhun1986 (MM) & regression AR to each of control variables.	In conditional event study, net insiders sales underperform in month 0, but not thereafter. In constant conditional betas or time-varying beta, value & ownership INT portfolio earn not significant AR. Neitherr INT nor mutual funds earn superior AR. Thus, INT literature's AR is a result of event study not form INT itself.
5	**Baesel & Stein (1979) Canada**	Info Contents *market efficiency Timing of performance.*	1968-1972 580 deals 111 firms	No INT sample	INT by Bank directors & ordinay insiders From 1 to 12 months holdings.	Event Study: CAPM	Bank directors & ordinary insiders have +CAR over 12months holding period. But CAR of bank directors>insiders of buy portfolio. However, CAR did not occur till (month 7th) info becomes public, which contradicts the semi-strong EMH.

Note: Literature are listed according to the publication date, per which the most recent ones first

Notes on Abbreviations:

AR:	Abnormal Returns.	MM:	Market Model.
(BV/MV):	Book Value / Market Value of Equities.	MV:	Market Value.
CAPM:	Capital Asset pricing Model.	OS :	Ordinary Shares
CAR:	Cumulative Abnormal Returns.	OUT:	Outsider Tradings.
(CF/P):	Cash Flow to Stock Price.	P/BV:	Market Value/Book Value of Equities.
DW83:	Dodd and Warner (1983)	P/E:	Price/Earnings Ratio.
EMH:	Efficient Market Hypothesis.	R&D:	Research and Development.
E/P :	Earnings Per Share.	SEC:	Securities Exchange Commission.
ESO :	Executive Share Options.	Sig.	Significant
INT:	Insider Tradings.	Seyhun1986:	Seyhun (1986).
LSE:	London Stock Exchange.	TA:	Total Assets.
MAR:	Market Adjusted Returns.	WSJ:	Wall Street Journal.
MDA:	Multi-Discriminant Analysis.		

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(3.4.2.1) The information content of Insider Trading

In an ideal world of perfect information, it is expected that the value of a firm's security would not be affected by anyone's trading, and that the market is strongly efficient. Directors and other firm-involved professionals would not be able to detect the over/under value of their own firm's securities. Thus, they would not be able to attain abnormal returns, because they do not have more information about their firm's current status and future perspectives than any other market participants.

The academic research reaches a general consensus about the insiders' profitability, resulting from their ability to identify the mis-pricing in their own firms and, thus, trade on their private and material information. Hence, the question to be addressed is concerning the type of information revealed by insider trading. Stock returns are a function of three sets of information. These are:

(1) Firm-specific information [*e.g.* financial leverage, mix of products, operating leverage and business line],

(2) Industry-related information [*e.g.* regulation, competition and significant technology development], and

(3) Economy-wide information [*e.g.* inflation, interest and exchange rates].

Obviously, the first type of information affects the firm itself only, while the second influences all the firms in a given industry, and the last shapes the whole economy and, thus, affects all firms in that economy.

The empirical literature, outlined in table (3.1), detects the information content of insider trading by using different indicators. Such as:

(1) Number of transactions [see, for example, Chung and Charoenwong (1998), Finnerty (1976a), Hillier and Marshall (2002/a&b), Jaffe (1974a) Kara and Denning (1998), Lorie and Nirderhoffer (1968), Meulbroek (1992) and Seyhun (1988b)],

(2) Number of insiders [see, for instance, Eckbo and Smith (1998), Gregory *et al.* (1997), Jaffe (1994b), Lustgarten and Mande (1998), Pettit and Venkatesh (1995), Pope *et al.* (1990), Rozeff and Zaman (1988), Seyhun (1986) and Toutkoushian (1996)],

(3) Volume of transactions [see for example Aboody and Lev (2000), Chang and Suk (1998), Friederich *et al.* (2002) and (1999) Gregory *et al.* (1997) and (1994) and Roth and Saporoschenko (1999)],

(4) Disclosure of insiders' transaction in the publications [see for example Baesel and Stein (1979), Chang and Suk (1998), Jaffe (1974a), King and Roell (1988) and Roth and Saporoschenko (1999)] and

(5) Firm's size [see for example Givoly and Palmon (1985), Gregory *et al.* (1997) and (1994), Rozeff and Zaman (1988) and Seyhun (1986)].

In fact, these indicators are of the signal definition matters. That is the event definition in the event studies methodology, which will be discussed in detail in section (5.3) of chapter 5.

This section, however, reviews the literature according to the types of information content detected from insider trading. These are firm-specific information in the subsection (3.4.2.1.1) and economy-wide information in the subsection (3.4.2.1.2).

(3.4.2.1.1) Firm-Specific Information

The pioneering researchers, reviewed in section (3.4.1.2), have found that insiders do outperform the market, particularly in the short run. One argument presented, in the context of the firm-specific information content, is that abnormal returns earned by insiders might be realised by subsequent disclosure of specific news about the insiders' company, and not from the disclosure of the insider transactions itself. Empirical literature, outlined in table (3.1), shows no consensus about this argument. In fact the literature provides contradicting evidences. On one hand, Pettit and Venkatesh (1995) and Seyhun (1986) found that insiders do buy (sell) before favourable (unfavourable) events or performance. This indicates that such transactions might be considered as illegal. However, this depends on a block-out period, by which insider trading is prohibited within a certain period, *i.e.* prior to an event (news) date. None of these two studies report whether this is the case or not.

On the other hand, Chang and Suk (1998), Hillier and Marshall (2002/a) and Freiderich (2002) and (1999) concluded that insiders' buys (sales) are preceded by unusually poor (abnormal good) stock performance. This behaviour, in fact, provides an adverse signal to the market, which contradicts adverse selection and signal theory discussed in section (3.2.4) and (3.3.2) respectively. One explanation for these findings can be detected from the sample used, as in Chang and Suk, which is limited to large transactions. Or because of the large increases in the directors holdings, as in Hillier and Marshall (2002/a), or because of the regulation which bans directors from trading in a certain (close) period such that in Hillier and Marshall (2002/b). It is very likely that large transactions easily attract the attention of not only the regulatory body of the stock exchange, but also the shareholders and outsiders as well as the media. Thus, this sort of transaction should be executed during a non-suspicious time to avoid illegality. Another interesting matter found by Chang and Suk is that there is a leak about large transactions before publication. One might expect that this leak be due to the transaction filing in the stock exchange. Roth and Saporoschenko (1999) investigate the information content of large transactions at the filing date and the date of publishing in the Wall Street Journal (WSJ). They found that such leakage is due to private channels. Consistent with Jaffe (1974a), both studies find that SEC filing has no information content while WSJ publication has, and this information content is not temporary.

On the contrary to the above, Givoly and Palmon (1985), Hillier and Marshall (2002/b) and (1998) and Iqbal and Shetty (2002/b) addressed this issue and found no tendency for insiders' buying (selling) to precede good (bad) news. Using two signals (the insider transactions and the company-related published news and classifying all significant related news according to the market response to the disclosed news as good, bad or neutral), Givoly and Palmon found that the abnormal returns from insider trades are not associated with disclosure of specific news about the company. The same result was found when taking into account the transaction size. The abnormal returns endure well beyond the typical period of market reaction to the disclosure of specific news event. Consistent with the signal theory [section (3.3.2)], the above literature provide evidence indicating that the insiders' abnormal return is likely to be due to the information revealed through insider trading itself. That is insider trades do reveal special information other than that specific news disclosed subsequently about their company. In the same direction, Anand *et al.* (2002) examined the information content of insider trading and its relation to the Australian firm's future financial performance and find that only large size director sales are strongly related to future performance of small sized firms.

Another argument is that the firm-specific information contents detected by the literature are in fact a result of event study methodology not from insider trading itself. Eckbo and Smith (1998) advocate this argument by investigating the conditional performance of Norwegian insider trading. Taking into consideration constant conditional and time-varying betas, they show that insider-trading portfolios, measured by either value or volume of transactions, could not earn significant abnormal returns because there was no information content in such transactions. In fact, the informational content of insider trading is a relative term, either in terms of disclosure, *i.e.* fully or partially revealing [section (3.3.1)]. or in terms of measure, *i.e.* the returns [section (5.2.1.5)]. So the abnormal returns of insider trading literature are, in fact, relative measures not only in terms of which model is used to estimate the expected returns, but also in terms of the different samples used in the comparison, *i.e.* control variables and sample.

Most of the literature that employed event study methodology used a sort of control sample for the purpose of comparison. For example, Aboody and Lev (2000), who employed the 3-Factor-Model of Fama and French (1993) in an event study, used two samples of insider trades, one in firms with Research and Development (R&D) expenditures and the other without R&D. They showed that insider trading in R&D firms gained more than those in non-R&D firms. They also showed that the information content of insider trading in R&D firms was relatively more than in non-R&D firms. Another example is presented by Gregory *et al.* (1994) who compared the performance of insider trading of small and medium firms with large firms. Controlling for size effect, thin trading and overlaps, they found that insider trading of small and medium size firms' portfolios outperform those of large firms. Similar frameworks are used by multivariate analysis literature. Rozeff and Zaman (1998), for example, compared insider-trading intensity in growth and value firms, defined by the ratio of cash flow to the market stock price. They found that insider trading intensified in value firms compared to growth firms. Furthermore, Kara and Denning (1998) show that 60% of insider trading transactions is profitable and that this profitability is subject to transaction costs and risk aversion degree.

Thus, the above examples seem to suggest that as long as both insider trading and control samples are identically treated by the same methodology, *i.e.* event study or multivariate analysis, the information content of insider trading becomes a matter of signal definition not a methodological measure. Section (3.4.2.1) above lists indicators of the signal used in the literature and section (5.2.1.1) of chapter 5 describes these definitions.

(3.4.2.1.2) Economy-wide Information

Which type of information revealed by insider trading is a subject examined by Seyhun (1988a). By analysing the same sample used in Seyhun (1986), he assumes that a relationship between insider trades and subsequent market returns would exist if there were a relationship between insider trading and the economy-wide activity. Hence, the information content of insider trading is that of the wide economy. On the other hand, if there were a relationship between insider trading and the firm-specific information, then, there would be no relationship between insider trading and subsequent market return. In addition, Iqbal and Shetty (2002/b) investigates whether insider transactions and stock returns have causality relationships at the firm level and find a large negative impact of stock returns on subsequent insider transactions. This seems to suggest that [as in Hillier and Marshall (2002/b] insiders buy after stock price decreases (such as bad earnings news) and sell after stock price increases (such as good earnings news).

Using the regression analysis to test these assumptions, Seyhun finds that aggregate insider trading activity occurs 2 months before the changes in excess returns on the market portfolio. Hence, he concluded, insiders observe the effects of economy-wide information in their firms' activities before the stock exchange does and thus trade on these observations. In other words, Seyhun finds that insiders increase their purchasing before the stock exchange returns increase, and vice versa. Moreover, this relationship is found to be stronger in insiders' firm characterised by higher market risk and larger size.

Another example about this issue can be seen in Baesel and Stein (1979). Although the objective of this study did not include detecting the economy-wide information content of insider trading, the types of insiders in the sample are well representative to the Canadian economic directions. Those are bank directors who have superior information about the state of the economy than ordinary insiders. That is so because of the enormous power is concentrated in the hands of bank directors. Such that, 22 directors of the Royal Bank are on board of 240 companies, 22 directors of Bank of Commerce are on board of 225 companies and 20 directors of Bank of Nova Scotia are on board of 220 companies. Thus, bank directors' trades can be seen as a signal for the state of the economy. Baesel and Stein found positive cumulative abnormal returns (CAR) of both ordinary insiders and bank directors' trades over 12 months. However, CAR of bank directors buying is more than that of ordinary insiders. This result supports the notion of superior information possessed by bank directors, on one hand, and the economy-wide information content of bank directors trading on the other hand.

(3.4.2.2) Insider Trading Effects on Stock Prices and Market Efficiency

It becomes apparent that insiders' abnormal returns earned from trading in their own companies' shares have become widely acknowledgeable. However, the case of outsiders' abnormal returns that might be earned by using publicly available information and by imitating insiders trading constitutes a serious challenge to the EMH.

Friederich *et al.* (2002) and (1999), Gregory *et al.* (1997), Hillier and Marshall (2002 a) and Pope *et al.* (1990) in the UK and Kara and Denning (1998), Rozeff and Zaman (1988) and Seyhun (1986) in USA investigate this issue and refute previous research findings [such as those of Lorie and Neiderhoffer (1968) and Jaffe (1974a) in USA and King and Roell (1988) in UK]. They all support the notion of the semi-strong form of market efficiency, *i.e.* outsiders cannot use publicly available information to earn abnormal returns. However, they reach different conclusions concerning the profitability of the insiders.

On one side of the Atlantic, *i.e.* UK, Pope *et al.* (1990) found opposite results to those of King and Roell (1988). They show positive insignificant abnormal returns for buy portfolio and negative significant abnormal returns for the sell one and, concluded that, LSE is efficient in the strong level sense. In fact, Pope *et al.* used both MAR and MM in an event study and found identical results. Gregory *et al.* (1997) reconcile both studies by showing that the buy portfolio results are consistent with King and Roell, and the sell one with Pope *et al.* They concluded that LSE is semi-strongly efficient. Gregory *et al.* results can be justified by the fact, that proven by Chakravarty and McConnell (1999), that the market does not distinguish the price effect of insiders' purchases (sales) from those of the outsiders'. In the most recent study in the UK, Friederich *et al.* (2002) examine the stock returns around insider trading and find that after transaction cost, no positive abnormal returns can be earned by outsiders imitating insider trades.

On the other side of the Atlantic, *i.e.* USA, Seyhun (1986), using daily returns, supports previous research of significant abnormal returns, while Rozeff and Zaman (1988), using monthly data, find insignificant abnormal return and supports the existence of the strong form of the EMH. In Fact, Seyhun uses 59148 insider transactions for 769 companies quoted on NYSE and AMEX during the period 1975-1981, and grouped the sample by firm size and identity of insiders (officer, director, officer/director, chairman of the board of directors, and large shareholders[29]). While Rozeff and Zaman use 698 insider transactions on the NYSE only, during the period 1973-1982, and grouped them by firm size[30] and P/E ratio. Both employed event study methodology and define the event by number of insider buyers (sellers) in a given calendar month, and both take into account the transaction costs[31].

Moreover, Baesel and Stein (1979) show evidence on inefficiency of Ontario Stock Exchange resulted from the lax of market response to the information content of bank directors and other insiders trading, as reported in table (3.1) and reviewed in previous section (3.4.2.1.2). While Anand (2002) find no significance market reaction to Australian director's purchases and strong reaction to sales, particularly in small sized firms.

It can be argued, however, that the above literature implies that some factors not employed by previous research, such as firm size and intensity of inside buyers (sellers), can significantly affect the outsiders' abnormal returns earned by replicating insiders' transactions. To this end, Toutkoushian (1996) argues that the outsiders' abnormal returns, which are due to replicating insiders' trading, depends not only on the insiders' private information, but also the extent to which potential abnormal returns have already been captured by other outsiders receiving information in a more timely manner. This leads Toutkoushian to examine the determinants of the outsiders' profitability. In other words, he examines whether outsider abnormal returns are in fact influenced by the intensity of insider trading, measured by the number of insiders, value of the transactions and the proportion of the firm value traded by insider transactions, as well as the type of transaction (buy/sell), and the delay with which the Official Summary published. Kara and Denning (1998), for example, show that insiders' profitability is subject to transaction costs and risk aversion degree. While Toutkoushian's results still

[29] USA legislation, SEA 1934, defines the insiders as the firm's directors, officers, as well as those shareholders who own 10% or more of the firm's equity.
[30] Rozeff and Zaman define the firm size by the market value of its equity, while Seyhun uses the average company's equity during the period 1975-1981.

support the semi-strong form of the EMH, he finds that outsiders' profitability varies according to specific factors. It is found that the intensity of insiders trading, the volume, and the delay, with which information is received, have significant effects on outsiders' profitability. However, these factors have a varied level of influence on outsider profitability according to the type of the insider trading.

Another issue investigated by literature is the effect of insider trading on bid-ask spreads. In theory, market makers set security prices so that they earn zero-profit. However, with presence of insider trading, they experience an adverse selection problem. Since informed (un-informed) investors trading is (not) related to abnormal future price changes, they lose (earn zero-profit) systematically to the informed trading. That, they would unpremeditated buy stocks from the informed prior to abnormal stock price decreases and sell to the informed prior to abnormal stock price rises. They offset this loss by lowering the bid (purchase) price to reflect possible unfavourable information and rising the ask (sale) price to reflect possible favourable information. Thus, their loss from trading with the informed is offset by their gain from the un-informed investors, which resulted in transferring their loss to the un-informed investors. This leads to suggest that (1) there is a positive relation between the insider trading intensity and bid-ask spreads and (2) a positive relation between the abnormal returns of the informed investors and the bid-ask spreads [Seyhun (1986)].

Inconsistent with the theory, the majority of empirical literature shows no impact of insider trading on bid-ask spreads. Seyhun (1986), for example, indicates that as the value of insider trading increases the bid-ask spread widened. However, he admits that the value of insider trading is not related to insider information and, thus, has no information content. This result ruled-out the theory. Chung and Charoenwong (1998) show another example of contradicting results. That bid-ask spread is greater with insider trading in cross-sectional data, while the time-series data shows no evidence on the impact of insider trading on the spreads. Based upon Seyhun (1986) general conclusion, that insider trading widens the bid-ask spread, Hanousek and Podpiera (2002) consider the bid-ask spread as an indicator for non-reported informed trading in the Czech non-regulated emerging market in transition.

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[31] While Seyhun consider costs between 2.7% and 5.2%, depending on the firm size, Rozeff and Zaman fix costs at 2%, regardless of the firm size.

In fact, Ckakravarty and McConnell (1997) are mostly dedicated to examine this matter. By studying a law case, *viz.* Boesky purchases Carnation's stocks prior to an acquisition offer, they find that although Boesky's large purchases increases stock price there were no adverse effect on bid-ask spreads. Cornell and Sirri (1992) attained the same conclusions.

(3.5) SUMMARY AND CONCLUSION

This chapter discussed the conceptual foundation that explains insider trading in the context of efficient market hypothesis, the rational expectations equilibrium and the informational signalling theories; and reviewed the empirical literature that detects the information contents of insider trading and its impact on the stock exchange.

Empirical literature finds that insider trading contains firm-related and/or economy-wide information and insiders do outperform the market, thus the market is not strongly efficient; however, outsiders mimicking insiders could not earn abnormal returns, thus the market is semi-strongly efficient. Twentieth century literature argues that insiders' abnormal returns are explained by subsequent news. Insiders buy prior to favourable news and sell prior to unfavourable news. While Twenty-First century research finds that insiders buy after unusual bad stock performance and sell after abnormal good stock performance.

The UK literature on insider trading is lagged behind the USA one, not only in terms of the extent of this literature (depth), but also in terms of the aspects that have not investigated yet (breadth). The current level of literature provides an ample field for more UK studies on the various aspects of all type of insiders, not only directors, trade.

Chapter Four
Insider Trading and the Managerial Incentive Agency Theory and the Empirical Evidence

(4.1) INTRODUCTION

The second issue examined in this study is about whether insider trading can be considered as a managerial incentive. That is whether the director's expected returns from insider trading could be seen as an implicit part of his compensation package. While chapter 3 reviews the first issue, *i.e.* the information content of insider trading, this chapter continues the theme of previous chapter but from a different perspective. That is by considering the ways of controlling the behaviour of the relatively informed, *i.e.* firm's directors (insiders), by the less informed, *i.e.* shareholders (outsiders). Chapter one established the foundation of this research, in which section (1.4.2) briefly introduced the relevant body of literature. This chapter expands that section by reviewing the relevant body of literature, with the aim of providing a theoretical foundations of executives pay. In addition, its objective is to identifying the link between both issues that are addressed by this research.

The structure of the chapter will be as follows: section (4.2) introduces the parent discipline in relation to the second issue. That is the Agency Theory; firstly in terms of the Principal-Agent Model, and secondly in terms of the managerial incentives theory. Section (4.3) links the first issue with the second issue of the study. That is the immediate relationship between insider trading and Agency Theory, and section (4.4) presents the theoretical background and the empirical literature in relation to the role of insider trading as a managerial incentive. Finally, section (4.5) concludes the chapter.

(4.2) AGENCY THEORY

The ultimate theoretical objective of the firm's directors is to maximize the shareholders' wealth. Corporate law prescribes the fiduciary duty rule so that directors should take decisions/actions that increase the firm's output. However, the fiduciary duty rule, naively applied, does not account for the information and incentive problems that can emerge in a corporate firm, where shareholders are unlimited in numbers and outsiders to the firm's decision-making process [see, for instance, Clark (1995) in this respect]. In particular, shareholders may have to rely on information about firm's future output provided by better-informed directors. Moreover, the firm's future output may depend on unobservable managerial inputs (efforts). If shareholders must provide incentives for the directors to provide truthfully and give appropriate effort, the management may find it optimal to act and produce a quality output than prescribed by the fiduciary duty rule.

To illustrate the relationship between shareholders (owners - principals) and directors (agents), a risk-neutral shareholders hires risk-averse directors, who are assumed to enjoy private benefit from running the firm, reflect a preference for greater perquisite consumption and reputation. The directors provide input (efforts) that enhances the firm's output but is costly to them and unverifiable by the owners. Absent an explicit incentive scheme, the directors will always wish to report the favourable information to demand for higher compensation, while putting forth the minimum amount of effort to minimize private costs. Consequently, owners must use a disciplinary device to give the directors the incentive to report truthfully and give appropriate effort.

This issue of controlling the behaviour of the well informed by the less informed has come to be known in the literature as Agency Theory [Lambert (2001) reviews agency theory and its application to accounting issues]. By definition, agency theory is concerned with studying the contractual relationships resulted in a delegation of certain degree of decision-making autonomy by owners of an entity to one or more parties. This particular contractual relationship, known as an agency relationship, indicates that one party (known as principal) hires another party (known as agent) to act, represent and/or conduct certain activities on behalf of the principal [see, for example, Jensen and Meckling (1976) and Ross (1973)]. Agency theory is concerned with the asymmetric information in the principal-agent relationship, on one hand; and with the contract design (compensation) that motivates the agent to act in the principal's interests, on the other hand. Section (4.2.1) explains the principal-agent model and reviews relevant literature, while section (4.2.2) discusses the incentive theory in the managerial compensation contracts. In fact, relevant literature, reviewed below, focuses almost entirely on the normative aspects of the agency theory, *i.e.* principal-agent model. That is on how to design the optimal compensation contracts between the principal and the agent to overcome the problems of uncertainty, *i.e.* asymmetric information, and imperfect monitoring, *i.e.* conflict of interests, that exist in the agency relationship[1].

(4.2.1) Principal-Agent Model

The relationship between shareholders (principal) and firm's management (agent) is but one example of agency relationship. Other examples include insurer-insured, lender-borrower, landlord-tenants, client-lawyer, patient-doctor and university-lecturer. This agency relationship is known as a Principal-Agent Model, or Finance Model, as named by Keasey, Thompson and Wright (1997). In the classic agency relation, the owner attempts to design a reward contract that will induce the manager to utilise his special skills (education, experience and professionalism) and privileged information in the owner's best interest [Toms and Wright (2001) present a theoretical synthesis of the evolution of Principal-Agent Model in the British business].

The principal-agent model was evolved simultaneously to, however independent of, the agency theory, mainly by influential works of Ross (1973), Mirrlees (1976), Holmstrom (1979), and Grossman and Hart (1983). This body of literature aimed at deriving optimal incentive contract for risk-averse agent. In a typical principal-agent model, a risk-averse agent makes an unobservable action/effort (e) to produce stochastic output [Q(e)], and receives compensation [w(Q)] and utility [u(w,e)]. The optimal contract [w*(Q)] is the one that maximizes the risk-neutral principal's utility [Q-w(Q)] subject to

(1) The agent chooses actions/efforts to maximize his utility [u(w,e)]. This is referred to as incentive compatibility constraint, and
(2) The expected utility of the optimal contract must exceed the agent's reservation utility. This is called participation constraint [Hallock and Murphy (1999a), p. xi].

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[1] However, there is another distinct line of agency theory literature, which is concerned almost exclusively with the positive aspects of the agency theory [see, for example, Fama (1980), Jensen and Meckling (1976) and Strong and Walker (1987)]. That is with explaining why certain types of organisational forms tend to dominate certain sectors of the economic activities [Higgins and Toms (1997) study the relationship between firm structure and performance]; such as the relationship between changes in corporate governance and the exploitation of scale and scope economies [Toms and Wright (2002)] and shareholding companies in the manufacturing sector and proprietorships and partnerships in service sector [Strong and Walker (1987)]. In addition, it is concerned with the determination of the equilibrium contractual form characterising most contributors to the organisation, *viz.* shareholders and creditors [Douglas (2002) and Jensen and Meckling (1976)]. In other words, the positive agency theory is about the firm's ownership structure, capital structure and contractual structures [Fama (1980)]. However,

The principal-agent relationship has two characteristics, uncertainty and conflict explained as follows: First, uncertainty. The agent has a certain degree of independence over undertaking certain decision variables that influence the economic value of the principal's entity, *i.e.* principal's wealth. Asymmetric information exists in this relationship because the principal does not know what the agent's action is and/or whether that action is appropriate. The agency theory literature identifies two sources of information asymmetries. Firstly, the hidden action or moral hazard, which occurs when the agent's choice from different decision variables is not observable by the principal. This is restricted to post-contractual unobservable actions. It is a problem of inducing agents to supply proper amounts of productive inputs when their actions cannot be observed directly [see, for example, Guesnerie (1990), Holmstrom (1979 and 1982) and Kotowitz (1990)]. Secondly, hidden information or adverse selection, which occurs when the principal does not know the distribution set, used as supplying information to the agent's productive inputs. This is restricted to pre-contractual unobservable managerial type. Examples of supplying informational set include knowledge of the returns, payoff probabilities, management abilities, functional relationship and business parameters [see, for instance, Bohlin (1997) and Kotowitz (1990)].

The principal-agent model indicates that the agent chooses from among different variables an action, which is associated with unobservable random variable that resulted in a measurable output, *i.e.* monetary, payable to the principal. The problem of asymmetric information exists when the agent has access to information - related to transforming the agent's decision variables into outputs - that is not available to the principal. The output (Q) is a function of the agent's effort (e), that is:

$$Q = f(e) \qquad (4.1)$$

This equation implies that the output is positively associated with the effort level. Higher effort levels generate more output and lower effort level decreases the output produced. In the context of the agency relationship, the agent's efforts, similar to his actions, are unobservable; however, the output can be measured with almost perfect accuracy. Relevant literature [see for example Ross (1973), Mirrlees (1976) and

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this line of the agency theory has no direct link with this research hypothesis. For literature review of 25 years of corporate governance research, see Denis (2001).

Holmstrom (1979)] concentrates on a situation per which the agent's efforts can neither be observed nor be perfectly inferred on the basis of observable variables. Thus, it is assumed that output is a function of effort and unobservable random variable (θ), which represents the state of the world [Ross (1973)], that

$$Q = f(e,\theta) \qquad (4.2)$$

The second characteristic of the Principal-Agent relation is the conflicts. Here both parties differ in their choices over alternative decision variables that would result in a conflict between their objectives. Rationally, the principal prefers more economic value to less regardless of the level of the effort exercised by the agent. Also, the agent prefers more economic value to less but gains from the effort exercised and affected by the state of the world. Hence, the principal-agent problem arises whenever one party's action has an affect on another party. Relevant literature identifies two main reasons for the existence of this problem. These are (1) moral hazard and adverse selection problems, discussed above, and (2) risk-sharing problem, for example in the landlord-tenant relationship [see for example Shavell (1979) and Stiglitz (1974) and (1975)].

By assumption, both parties are utility maximising. The principal's utility (U_p) depends only on wealth, *i.e.* monetary output (Q),

$$U_p = f(Q) \qquad (4.3)$$

and substituting (4.2) in (4.3) gives

$$U_p = f(e,\theta) \qquad (4.4)$$

On the other hand, the agent's utility (U_a) depends on effort (e) in addition to output,

$$U_a = f(Q, e) \qquad (4.5)$$

and, once again substituting (4.2) in (4.5) gives[2]

$$U_a = f(e^2, \theta) \qquad (4.6)$$

[2] Strong and Walker (1987), p.169

This equation clearly shows that the agent's utility is associated with his effort more than with the output. Thus, this effort might be directed to a different way than that of the principal's objectives. Thus, it is reasonable to expect that the agent will not always act to the best interests of the principal. In the context of the firm's management, agency problem occurs when there is asymmetric information, either relating to what the agent's did or what he should do (moral hazard problem). On one hand, the agent's actions affect the principal and, on the other hand, these actions are almost unobservable by the principal, however, they can be inferred by their output. In fact, even though the agent's actions can be observable, the principal still does not know if these actions are appropriate, because of the imperfect information he/she has about the state-of-his-entity-world (adverse selection problem). Thus, compensation should be based upon the observed output rather than the unobserved actions.

Furthermore, the principal-agent model assumes that the principal is risk-neutral as he/she prefers more money for less [equation (4.4)], and the agent is risk-averse as the effort has a greater impact on his output [equation (4.6)]. The output, in fact, has to be shared between both parties. The agent derives utility from output and dis-utility from effort. Thus, it is reasonable to assume the following utility function for the agent [Strong and Walker (1987), p.169]

$$U_a = Q^{1/2} - e^2 \qquad (4.7)$$

The agent's derives utility equals to the square root of the monetary payoff and dis-utility equals to square level of effort. Thus, higher effort exerted by the agent decreases his utility while increases the principal's utility. This equation shows clearly the conflict of interest between the principal and the agent. If, for example, the agent has a guaranteed monetary payoff regardless of the realised output, then it is not reasonable to expect him/her to select higher level of effort. Since he is risk-averse, the agent maximises his utility by exerting the lowest, *i.e.* risk-less, level of effort while minimises the principal utility by producing the lowest level of output. Agency theory literature prescribes a natural remedy to the problem of conflict of interests by designing a contract that monitors the agent's actions. That is by relating the agent's compensation to the entity output. This issue is a subject of the following section (4.2.2).

Although the agent's action might be observable, with much certainty or inferred with much accuracy, the principal-agent problem still occurs because of the difference in rewards each party receives as a result of that action. In addition, an action of one party would affect the other party[3]. That is, for instance, when the agent takes less than the required care in response to the principal's action. In the context of business ethics, this is called the moral-hazard problem[4]. Kotowitz (1990) assumes that the moral-hazard problem occurs as a result of an incomplete contract between the two parties. Stiglitz (1990) states clearly that the principal-agent problem is essentially about the economic incentives. Relevant literature identifies six factors that might explain the presence of this incompleteness. These are:

(1) information asymmetry [see, for example, Arrow (1995), Holmstrom (1979) and Kotowitz (1990)],
(2) barriers to contracting [see, for instance, Jensen and Mckling (1976), Kotowitz (1990), Posner (1998) and Stiglitz and Weiss (1981)],
(3) the enforcement problem [see, for example, Kotowitz (1990)],
(4) an optimal contract [see, for instance, Holmstrom (1983), Kotowitz (1990), Mirrlees (1976), Ross (1973), and Stiglitz (1974) and (1975)],
(5) market responses [see, for example, Fama (1980) and Kotowitz (1990)] and
(6) welfare effects [see, for instance, Kotowitz (1990)].

In fact, the first three factors are the ones most responsible for the presence of the problem, while the last three factors are the ones used to build theories for tackling this problem.

Of the above factors, the market and institutional responses and information asymmetry, is the central concern of this section. The market response to the moral-hazard problem takes the form of pressure to increase the contract's features that can help in alleviating the problem; such as increasing the risk-sharing aspects of the contract. This may lead the risk averse agent to undertake more risky actions. But taking into consideration the labour market forces, such assumption might be untypical and unrealistic. Labour market forces can take the form of "reputation building" [Fama (1980)], or professional licensing and certification [Arrow (1995)], [see section (4.3.1)].

[3] Agency Theory literature provides three explanations for the existence of the principal-agent problem: (1) insurance, (2) credit and (3) rent. See for example Stiglitz (1990).

[4] This term is firstly used in the insurance literature, and refers to the adverse effects that the insurance contract may have on the insured party's behaviour.

However, the way in which the principal monitors the agent's action and restrains divergence of interests incurs costs. These costs incurred for monitoring the agency problem are termed as agency costs. Jensen and Meckling (1976) classify these costs into three types. These are, first principal's monitoring expenditures that include observing, controlling and measuring the agent's actions through, *enter alias,* means of budget restrictions, compensation policies and operating rules. An example of this sort of cost is appointing non-executives in the board of directors, a phenomena, which is popular in the today's corporations[5]. Second, agents bonding expenditures to guarantee that the agent will not take certain actions that harm the principal's interests and ensure that the principal will be compensated if he/she takes such actions. Examples of this type of cost include the professional indemnity cover and the labour market forces [See also section (4.3.1)]. Almost in all agency relationships, the principal's monitoring and agent's bonding costs are positively incurred, *i.e.* insurance policy purchased by shareholders. However, there still possible deviation between both parties' interests, which would lead to a reduction in the principal's welfare. This deviation might be due to imperfect contract, or due to compensate for bonding cost, or dis-equilibrium in the labour market. Thus, the third cost is the monetary value of this reduction in the principal's residual cost, *i.e.* residual loss.

(4.2.2) Managerial Incentive Theory

Corporate control mechanisms are ways to motivate managers to act in the shareholders' interest. These include (1) internal mechanisms, such as managerial incentives, directors' monitoring by non-executive directors, and the internal labour market, and (2) external mechanisms, such as outside shareholders or creditholders monitoring, the market for corporate control, competition in the product market, external managerial labour market and company and securities laws [Bushman and Smith (2001) review the literature on corporate governance]. This study concerns only with the managerial incentive of the internal mechanisms.

[5] Fama and Jensen (1983) argue that the appointment of independent non-executive directors (NED) is in the heart of the effective resolution of the Agency problems. In the UK, Cadbury (1992) recommends the appointment of, at least, three NEDs in the British boards, to bring about independent judgment on issues of strategy, performance, resources, key appointments and standard of conduct, as well as setting up executives remunerations [see section (2.7) in chapter two]. Furthermore, Ezzamel and Watson (1997) and Hamill *et al.* (2002 b) and Young (2000) reviews the literature and present evidence on some of the costs and benefits associated with recent increase in the use of NEDs in the UK listed companies.

The incentive problem is the second issue dealt with in the agency theory. Relevant literature focuses on the different possible methods and contract structures involved in motivating the agent to perform for the best interest of the principal, given that the agent has and may use the information asymmetry to his own interests [see, for example, Bohlin (1997), Gjesdal (1982), Holmstrom (1983), Mirrlees (1976), Ross (1973), Shavell (1979) and Stiglitz (1974) and (1975)]. The previous section shows clearly the monetary implications [equation (4.7)] of the conflict of interest between the principal and the agent. Thus, it is inevitable for the principal to design a contract that provides the agent with an incentive to choose a higher level of effort. To be acceptable by the agent, however, such a contract should provide him/her with expected utility equals at least to his utility under the original no-incentive contract. Since the incentive contract effectively forces the agent to choose the effort level specified by the principal, it is referred to in literature as enforceable contract [see for example Hart (1990), Kotowitz (1990) and Stiglitz (1975)]. In order to adopt the enforceable contract, the agent's effort has to be observable by the principal. So that the contract will be designed in such a way that the agent will certainly follows the principal's objectives, *i.e.* desired effort. Agency theory literature referred to this contract as a first-best contract, which entails optimal risk sharing [see, for instance, Bohlin (1997) and Guesnerie (1990)]. Under such a contract where efforts are observable, literature shows that the risk sharing between both parties leads to an optimal reward to the agent and optimal output to the principal [see, for example, Strong and Walker (1987)].

In the real world, however, it may be not possible for the principal to observe the agent's effort level. Otherwise, the enforceable contract would be an easy and fair solution to the agency problem. In such a situation where the effort is not observable, and where information asymmetry exists between both parties, the incentive scheme of the agent must be related to observable factors, such as the monetary output [see, for example, Bohlin (1997) and Gjesdal (1982)]. Under such circumstances of uncertainty, the principal can solve the agency problem by offering the agent a contract whereby the principal receives a certain level of the output with the agent receiving the residual output. This incentive contract is referred to as the second-best contract [see, for instance, Bernardo *et al.* (2001)]. On one hand, the agent's expected residual output must be chosen so as to provide the agent with minimum compensation equals to what he/she would receive from the enforceable contract, *i.e.* first-best contract. On the other hand, the principal would receive an expected output greater than what he would receive from the original contract, but less than that from the first-best contract.

Information asymmetry in the agency relationship has a cost [Bohlin (1997)]. By adopting the incentive contract, the principal in effect transfers some of the risk associated with the effort to the agent. Hence, the principal increases his expected output whilst maintaining the expected compensation of the agent[6]. However, as the agent's effort is not observable and as the agent bears greater burden of risk than what he/she would have under the optimal level in the first-best contract, the optimality of risk sharing and output are broken down in this contract. This issue is referred to as the moral hazard problem [see, for example, Bohlin (1997), Mirrlees (1976) and Stiglitz (1975)].

Almost all shareholding companies have long-term incentive contracts with their management. That is a multi-period contract. The principal-agent model presented so far is concerned with a single-period contract. The literature extended the agency model to incorporate multi-period contract, based on three main assumptions. These are firstly the contract is repeated and accepted by both parties over multi-period. Secondly, the effort level in a certain period affects the output in that period. Thirdly, the random variable, *i.e.* state of the world, which influences the output in a given period, is distributed independently over time [see, for instance, Holmstrom (1983) and Webb (1992)]. Given these assumptions, Lambert (1983) shows that the optimal reward for any period depends on the output realised in the earlier period, and the reward in a certain period within the multi-period contract, differs from reward in a single-period contract. Lambert also argues that the expected utility of the principal per period increases with the number of repetitions of the contract.

Once again, all shareholding companies have several directors in their management. The principal-agent model presented so far is concerned with a single-agent. Literature extended the agency model so the agency relationship consists of one principal (shareholders) and several agents (firm's directors). Literature extends the principal-agent model to incorporate several agents. All of which, however, agree on the

[6] Strong and Walker [(1987), p. 170] provide an interesting numerical illustration on the impact of this sort of contract on both parties.

assumption that the reward of each agent depends firstly on his own absolute performance and secondly his relative performance in comparison to agents experiencing similar production circumstances. A leading example of this literature can be seen in Holmstrom (1982). He shows that an agent's reward is independent of the performances of other agents if and only if the random variable, which influences the agent's output and uncontrollable and unobservable, is independent of the random variables that influence other agents' output.

(4.3) INSIDER TRADING AND THE AGENCY PROBLEM

This section aims at providing theoretical background on whether directors (agents) trade on private price-sensitive information is beneficial to shareholders (principals), and on what costs, if any [see chapter 2 for the debate on this issue]. An insider trading / agency theory aspect that received considerably little analytical attention and few empirical investigation.

This approach was originally advocated by Manne (1966) and supported later by Carlton and Fischel (1983). Manne advocated that the ability of an agent to trade on his informational advantage could be considered as a part of an explicit or implicit contract between the principals and the agent. In a principal-agent context, Carlton and Fischel (1983) and Dye (1984) pointed out that agent trades might be socially beneficial as it helps the agent to renegotiate contracts when certain conditions change. Furthermore, Jensen and Meckling (1976) argued that when directors do not receive the marginal benefit of their efforts they would be less motivated in the pursuit of new ventures, as they are risk-averse [see section 4.2.1 above]. Therefore, insider trading can be seen as part of the managerial incentives but not an agency problem. According to Manne, it rectified a problem of agency costs. Easterbrook (1995) argues that both shareholders and managers can gain from devices that ameliorate the aligning divergence of interest.

Manne school views insider trading as a form of contingent residual claim by directors per which they could achieve significant returns whenever their efforts produced more than expected gains that the stock price would raise. This argument supports the direction of this research from different aspects. Firstly, directors would become less risk-averse in selecting good projects and develop them efficiently as their efforts increased. Bebchuk and Fershtman (1994) studied the effect of insider trading on *ex ante* managerial behaviour and found that insider trading leads directors to choose riskier projects because it enables them to make profitable trading as they learn the results of such projects before the stock market. Secondly, directors would compensate shareholders by accepting lower base salaries and their trading returns can be seen as low-cost incentives for their extra efforts. On the other hand, permitting insider trading improves the bargaining power of shareholders to provide less-*expensive extra effort* incentives [see for example Fenn *et. al* (1991), p. 14]. Thirdly, insider trading increases the equilibrium level of output, which in turn improves the shareholders' wealth [Hu and Noe (2001)]. Finally, communicating information through insider trading may be of value to the firm than through direct disclosure. Carlton and Fischel (1983) provide several examples on this argument[7].

Linking the principal-agent model, the managerial incentives theory, and the above four arguments provides the essence of an economic theory for considering insider trading as a managerial incentive. The following sub-sections elaborate this argument but from three different aspects. These are the agency cost of insider trading [section (4.3.1)], the moral hazard [section (4.3.2)], and the adverse selection [section (4.3.3)].

(4.3.1) Insider Trading and Agency Costs

In monitoring the agent's action and containing the divergence of interests, the principal has to borne certain (agency) costs, detailed in section (4.2.1). In the context of this section, the residual loss of those agency costs is of interest. That is the value of the reduction in the principal's welfare due to the divergence of interests. In fact, this type of agency costs is due to the imperfect monitoring of the agency problem. It represents the residual of all contractual incentive-based agreement. Thus, one way to overcome the residual cost is by permitting insider (agent) trading, which is referred hereto as residual trading. Insider trading, in this context, called residual trading because it represents (1) trading on residual (not yet disclosed, *i.e.* what is left) information, (2) the agent's residual effort (since the insider's main effort is to run the firm not to trade in its shares), (3) the agent's residual return (because the main stream of the agent's returns should come from the explicit form of the rewarding contract), (4) the agent's residual

[7] Carlton and Fischel (1983), page 868.

incentives (that is not explicitly contractual), and (5) the principal's residual *cost* (not that of the agency cost) if accepting the argument that outsiders loose for insider trading profitability. Reichelstein (2000) establishes that the agency cost is lower under residual income based on the relative benefit depreciation schedule than under a performance measure based only on realised cash flows.

The Manne School sees insider buying as a form of contingent residual claim by directors, from which they can obtain substantial returns whenever their extra-efforts generated more output than what the market expected. Thus, directors would be aligned with shareholders' interests. Opponents to insider trading would argue that the same conclusion would be reached by using contractual incentives-based compensation, such as bonuses and stock options. Manne argued that such contingent schemes are not as beneficial in addressing the agency problem. Stock options, for example, always issued at the beginning of the contract and not contingent on previous performance. Thus, they do not substantially motivate performance during the period. Bonuses, on the other hand, are largely depend on a director's office (CEO, CFO, or a director; large firm or small firm) and are not so tied with performance. Opponents, once again argue that insider trading is also not perfectly tied with performance, as business success sometimes results from chances rather than dedicated skills, and the stock prices rise or fall accordingly. Admittedly, no compensation scheme is perfect but one can evaluate the benefits of one only in relation to the others. Carlton and Fischel (1983) reviewed such arguments and supported the one that insider trading is an efficient compensation scheme. Insider trading provides returns to those who knew the price-sensitive information first [see Easterbrook (1995), p.84].

Insider selling can be seen as a compensation for non-diversified agents, compared with diversified principal. On one hand, insiders can avoid losses by selling before bad news, and thus reduce the cost of being non-diversified. On the other hand, as Easterbrook (1995) argue, even with real bad news, the firm must pay its managers the wages they could earn at other firms, or otherwise they will leave. In fact, insiders would never produce bad news solely in order to trade on such news. In addition, insiders short-swing trading is prohibited. However, when insiders can trade on both sides (buy & sell and buy & sell), Noe (1995) argues that, the agent's *ex ante* utility may be increased through permitting insider trading. Thus, principals can use insider-trading profit to meet the agent's reservation compensation constraint, and this provides an incentive to principals to allow agents to trade.

The agency costs are real as any other cost. However, firm's directors face a number of pressures of varying intensity that help align their interests with those of shareholders. These include the threat of legal action of violation of fiduciary duties [Starks (1987)], the threat of hostile takeover [Manne (1965)], the competition from other potential directors is supplied by the managerial labour market [Jensen and Meckling (1976)], the threat of removal by dissatisfied shareholders (proxy fight), and the discipline of the non-executive directors.

The market for the director himself in the managerial labour markets, along with other sources of pressures, limits agency costs because the competitive market supplies other potential directors, thus reducing the cost of obtaining managerial services. However, the extent of which the labour market reduces the agency cost depends on various factors. Such as, first, the level of managerial skills and knowledge required to running the firm. That is how professional, educated and/or skilled should the director, be, to run the firm. Spence (1973) considered this as a job signalling to the labour market. Second, how easily to evaluate the director's performance [Jensen and Meckling (1976)]. Third, the director market value outside his firm. Spence (1973), once again, considered this as a director signalling to the labour market. Finally, the replacement search cost, which is dependent on how sophisticated, is the labour market [Noe (1995)].

Obviously, when the director's responsibilities require little knowledge and low skills to manage the firm, when it is easy to evaluate his performance, and when his market value outside the firm and the replacement costs are modest, then agency cost will be relatively small, and vice versa.

In addition, agency costs are likely to decline whenever the opportunity cost of hiring the director is high enough to ensure that his compensation aligns managerial and shareholders' interests. Thus, reducing the cost of allowing firm's discretion in setting insider-trading policy [Noe (1995)]. Fama (1980) argues that there are three conditions imposed by the managerial labour market for full control of managerial behaviours through compensation changes, which resolves the managerial incentive problem. These are, firstly, director's talents and his taste for consumption on the job are not known with certainty. These however, are likely to change through time and must be imputed by the labour market at least in part from information about his current and past performance. Secondly, informational efficient managerial labour market appropriately uses current and past information to revise future compensation. Thirdly, the weight of the compensation revision process is sufficient to resolve any potential problem with managerial incentives.

Finally, the capital markets, *i.e.* the market for the firm itself, constrain the agency cost. On one hand, when incompetent management depreciates the market value of the firm, shareholders have the option of selling their firm. Also, rival firms may induce shareholders to sell their firm in a process of takeover. In either case, agency costs will be eliminated completely [Jensen and Meckling (1976)]. On the other hand, the capital market provides directors with an opportunity to invest their inside information in insider trading. Noe (1995) shows that this will have a positive effect on director's effort, which is in line with the shareholders' interest and thus reducing the agency costs at no cost.

(4.3.2) Insider Trading and Moral Hazard

Hu and Noe (2001) show that the beneficial effect of insider trading cannot be recognised without linking the moral hazard problem in the same model. Therefore, this section aims at defining and explains the problem of moral hazard in the principal-agent context, as well as identifying the potential devices to reduce the costs associated with this problem.

Moral hazard can be defined, as in Kotowitz (1990), as unobservable actions of agents in maximizing their benefit to the detriment of principals, in situations where they do not bear (enjoy) the full consequences (benefits) of their actions due to uncertainty and incomplete contracts[8]. Thus, moral hazard might refer to the problem of inducing agents to make proper efforts and supply proper amount of productive inputs when their actions cannot be observed and contracted for directly by the principals [see, for

[8] Interestingly, Chude and Silvers (2002) analyse a principal-agent model with moral hazard, in which the principal, not the agent has private information and find that a principal with more information ends up

example, Holmstrom (1982)]. So, the source of moral hazard problem is an asymmetry of information in the principal-agent relationship, which cannot be contracted for.

Therefore, moral hazard can be seen as a special case of incompleteness of contracts[9], which creates the divergence of interest between the agents and the principals. In this context, the moral hazard can be addressed as whether a compensation contract can reduce that divergence without incurring additional costs exceeding the available benefits. The occurrence of additional cost creates a moral hazard problem. On one hand, whenever the agent can claim residual of the profits of a successful output but the principals bear the entire cost of failure, the agent has an incentive to make risky decision even if it has a lower return than other less-risky options. Empirically, however, literature shows that when too much risk is placed on the agent, firm performance suffers [see, for instance, Mishra *et al.* (2000)]. On the other hand, when the agent's rewards are not related to principal welfare, Vafeas and Theodorou (1998) identify three types of agent's moral hazard that might occur: First, risk-aversion problem, where the agent invested his human capital, livehoods and future, in the company. Second, horizon problem, where the managerial contract period is very short in comparison with the firm's life, leading to managerial short termism. Third, over-retention problem, where managers may like to retain funds, rather than paid them as dividends, to ensure their monetary compensations are maintained.

To reduce these moral hazard costs, Fama (1980) suggests that the optimal compensation contract will have to entail fixed, rather than residual, claims, supplemented by re-evaluation after performance completed. Holmstrom (1982) supported this argument by showing that relative performance evaluation can be helpful in reducing moral hazard costs, because it incorporates risk-sharing relation between agents and principals. However, as Easterbrook (1995) shows, such a contract depends on the timely possession of information by principals, which is not the case, thus ending up with an unavoidable moral hazard problem. In fact, as the Agency Theory assumes, the agents are risk-averse. Thus, it is very possible that agents make too little risky

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earning less profit than a principal with less information; while the agent can end up better off when the principal has private information.

[9] Kotowitz (1990) analysed the reasons behind the incompleteness of contracts such as the coexistence of unequal information and risk aversion, costs and legal barriers to contracting and costs of contract enforcement.

decisions and accept lower return. And, whenever they shift to riskier position, it is not necessary that these have lower returns [see, for example, Holmstrom (1983) and Shavell (1979)].

A natural remedy to this problem is to monitor the agent's actions by employing a forcing contract to achieve a first-best solution, entailing optimal risk sharing. However, full complete monitoring of the actions and full observation of information are either impossible or costly [see, for example, Holmstrom (1979)]. Recognising moral hazard problem of this sort, an indirect remedy might be employed to reflect the asymmetric information, on one hand, and to enforce risk taking, on the other hand. That is by allowing insider trading. One strain of insider trading literature [see, for example, Dye (1984), Hu and Noe (2001) and Noe (1995)] argue that by permitting insider trading, moral hazard problem can be reduced, if not eliminated. In an empirical quarrel, Dye (1984) argues that incentives via insider trading are superior to incentives via performance-contingent methods. In addition, Noe (1995) analysed the relationship between moral hazard in the principal-agent agency relation and managerial insider trading. The analysis yields that permitting insider trading improves managerial effort incentives, thus, reduces the moral hazard problem and increases the output and consequently, shareholders' welfare. Hu and Noe (2001) provide two explanations for such a conclusion. Firstly, insider trading impounds information about the costs and benefits of effort and perks consumption into share prices, which allows risk-neutral shareholders to select more efficient portfolio allocations. Secondly, insider trading can induce directors to increase their stake in the firm beyond that level provided by explicit form of the contract, *e.g.* stock options.

(4.3.3) Insider Trading and Adverse Selection

As Arrow (1995) shows, the information cost and monitoring difficulties that create moral hazard may also create adverse selection, as well as insider trading. Furthermore, insider trading creates an adverse selection problem for the competitive market makers. However, as Levine and Smith (2003) show, as long as the number of liquidity traders is high relative to number of insiders, the market makers can find break-even (zero) trading profit. In the context of agency theory, adverse selection problem arises from an agent action that can be observed by the principals, but cannot be verified whether the action was the correct one, except by the agent himself [see, for example, Holmstrom (1982)]. Adverse selection is restricted to pre-contractual asymmetric information [Bohlin (1997)]. Specifically, whenever the firm write contract that cannot be enforced, it faces a serious problem of adverse selection. An example illustrates this problem as follows. A dishonest agent will find the contract attractive, as he will get the salary and engage in inside trades, so that he will be overcompensated. To avoid overcompensation, the firm must reduce salaries across the agents. The honest agents, who do not trade on inside information, become underpaid and will leave the firm. To increase its management quality, the firm might voluntary prohibit insider trading, assuming that such prohibition is socially beneficial. However, it will not be able to distinguish who does and who does not comply with the prohibition. Thus, the firm will not capture the gains from prohibition [see, for instance, Easterbrook (1995)]. Therefore, the best solution would be a contract-permitting insider trading for all agents while reducing the salaries. If the dishonest agent wants to mislead the market by false information, the honest agents in his firm, who are now allowed to trade, would revised the dishonest signal by communicating true information to the market. Thus, the stock price now reflects the true information and becomes efficient, on one hand, and the good agents drive out the bad ones, thus, increasing the management quality, on the other hand.

The stock price reflects the currently available information and future expectations about the outputs of the firm. So that unusually good (bad) output, and/or privately held information, produce profitable (loss avoidance) insider trading. As risk neutral, principals are indifferent between paying the agents their compensation in salary alone and equivalently paying them a portion in salary and the rest as a possibility of insider trading returns. However, they will choose whichever compensation gives the agent the better incentive to take the correct decision and profitable action. On the other hand, the risk-averse agent, as un-diversified, would choose the salary alone. However, such a compensation package has no incentive and the firm would pay more and the agent would receive less under this scheme than under the insider trading one. The problem with this contract is that the insider trading part of the compensation is set-up in an explicit form. Since expected returns from insider trading are uncertain payoff to the risk averse agent, he would choose the salary-alone contract. Thus, to induce the agent to choose the other contract, the expected return from insider trading has to be an implicit part of the compensation package but not an alternative to straight salary offer.

However, there is an adverse selection problem even when insider trading is the optimal incentive for agents. Easterbrook (1995) argues that if agents are not free to leave the firm, insider-trading possibilities might be optimal incentive tools; but this is not the case, agents are free to leave. A counter argument, however, would refer to the pressure exerted from the managerial labour market. So that, even agents are free to leave the firm, their market value would decline significantly as incompetent directors. In addition, Easterbrook's adverse selection argument can be encountered by a signalling argument. As in "lemon market" of Akerlof (1970) and "signalling market" of Spence (1973), higher quality agents "signal" their quality by choosing a compensation package with non-payment component, *i.e.* insider trading. Since adverse selection is a pre-contractual problem, it is costly and/or difficult for the principals to reduce it, *i.e.* identifying the quality of the agent before knowing his input into the firm's output. Thus, they design a contract that let agents to identify their quality themselves. Carlton and Fischel (1983) argue that such contracts will have contingent payoffs, which only the high quality agents will receive. As high quality agents know their private talents, they are more certain to receive the contingent payoff than those of less quality.

(4.4) INSIDER TRADING AS A MANAGERIAL INCENTIVE

The issue of considering insider trading as a managerial incentive cannot be separated from the issue of the agency problems, discussed in the previous section (4.3). This section, however, is not about the debate on insider trading as a managerial incentive [sections (2.2) and (2.3) in chapter 2 discussed this debate]. Instead, it is about how and when insider trading can be considered as a managerial incentive. Thus, the purpose of this section is to show the role of insider trading in mitigating the problems of uncertainty and imperfect monitoring in the agency relationship between the principal and the agent. That is by reviewing the theory [section (4.4.1)] and analysing the empirical findings [section (4.4.2)].

(4.4.1) Theoretical Review

There are strong theoretical reasons to believe that it is good to encourage practices that increase managerial wealth when share price increases[10]. According to EMH, share price is the best proxy for share value and hence for shareholders' welfare. Thus, compensation schemes whose return to the manager is favourably influenced by increase in share price are more likely to lead to managerial efforts that maximize shareholders' wealth. Two mechanisms can be used, mutually or exclusively, to tie managerial wealth with shareholders' welfare. These are equity-related compensation, e.g. executive share options (ESO)[11], and/or insider trading. Pay performance literature well documented the former mechanism[12], which is out of this research boundary. While the second mechanism is the subject of insider trading in the agency theory context, which is the concern of this section.

There is a substantial body of literature analysing the economic implications of insider trading on the stock exchange [see chapter 3 for literature review]. But little has investigated insider-trading role in the optimal contracting approach. This approach, originated by Manne (1966) and later by Carlton and Fischel (1983) and Dye (1984), advocates that the agent's ability to utilise his informational advantage can be part of an implicit, or explicit, contract between the principal and the agent. Here, the agent exchanges his productive inputs for compensation that may include, implicitly, expected return might be earned from insider trading. Thus, by allowing the agent (manager) to profit from appreciation in firm value, *i.e.* increasing principal (shareholders) welfare, engendered by his efforts, *i.e.* his contracted for productive inputs, improves the alignment of interest between principal and agent.

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[10] These reasons come from a fundamental principle in economics, that people are rational maximizers of their own wealth [See, for example, Posner (1998), p.3].

[11] Jin's (2002) findings that the optimal incentive level decreases with firm's specific risk, might implicitly indicate that increasing manager's ownership in the firm decreases his optimal incentive level.

[12] Main *et al.* (1996), for example, examine the relationship between total board remuneration with ESO and firm performance in the UK; McKnight and Tomkins (1999) analyse how each type of pay (salary, annual bonus and ESO) is related to executive performance in the UK; Skovoroda *et al.* (2003) examine the executive's reward-risk-trade-off in addition to the certainty-equivalent pay-performance sensitivity, by using a UK data set to provide some estimates of the size of these effects; Reitman (1993) demonstrates the strategic use of stock options as a managerial incentive as well as to curb overly aggressive managerial behaviour; and Bruce and Trevor (1997) examine the relationship between executive rewards, including ESO but not insider trading, and the corporate governance and surveys the empirical findings.

Two relative questions have been addressed in the literature. The first is about when it is beneficial to the manager (agent) and the shareholders (principal) to give the manager discretion in the selection of his compensation. While the second is regarding how insider trading aligns both parties' interests. In a traditional signalling model. Dye (1984) addresses these issues by modelling the principal-agent relationship in a stock exchange. He demonstrates that the desirability of insider trading depends on the distributional relationship among the inside information held by management (such as number of insiders, changes in earnings and changes in price-earnings ratio), the manager's efforts and the firm's output. Under certain distributional assumptions. Dye shows that both the manager and the shareholders may achieve strictly higher utility by allowing the manager some distribution over the selection of his compensation scheme that they would obtain if the manager was not given such discretion. This discretion allows the manager to disseminate his private information to the shareholders. In addition, he shows that insider trading is one mean by which such discretion can be granted to managers. That is, by considering insider trading as one component of compensation, insider trading is one mechanism that might be used by shareholders to improve on earnings-contingent contracts. Dye concluded that if the manager is initially compensated with earnings-contingent contracts, then his wealth as well as the shareholders welfare could be improved by allowing insider trading.

Hu and Noe (2001) while supporting Dye (1984) conclusion, argue that the beneficial effects of insider trading would not be entirely apparent when the informational and moral hazard issues for insider trading are modelled separately. By developing a model that links moral hazard and information asymmetry aspects of insider trading. They show the beneficial effects of insider trading. Hu and Noe argue that shareholders' welfare improved through permitting insider trading that leads managers to take positions in the firm's stock. Manager's position would be long when his compensation is a small fraction of firm value and short when compensation is a large fraction of the firm value (because he is a risk-averse). Such positions are independent of his private information; however share prices vary with his insider-trading signal. Thus, insider trading increases the efficiency of the stock prices and subsequently. the shareholders' welfare. When managers extract only small fraction of firm value in explicit compensation. insider trading also. increases the fraction of the firm's value captured by managers. Hu and Noe (2001) conclude that permitting insider trading increases both the equilibrium level of output and shareholders' welfare for two reasons. First, insider trading impounds information regarding managerial taste for perk consumption into asset prices, and this increases shareholders' ability to choose more efficient investments. Second, allowing insider trading can induce managers to increase their stake in the firm beyond that obtained through their compensation contract, e.g. ESO. This effect leads to reduce managerial perk consumption and/or increased managerial efforts. Thus, insider trading provides both low-cost incentives for managerial efforts and increases price informativeness, *i.e.* efficiency.

The same conclusion is reached by Noe (1995), who also shows that insider trading; along with any fixed level of incentive compensation improves managerial incentives. Noe argues that insider trading improves the bargaining position of shareholders relative to managers, thus reduces the willingness of shareholders to provide expensive effort-assuring managerial compensation packages.

Another literature examines this issue but through the role of insider trading in facilitating shareholders' control. Zhang (2001) shows that with proper regulation, insider trading mitigates the problem of information asymmetry and subsequently allows shareholders to better control their firm. He demonstrated this argument in the context of corporate investment, where the manager has inside information about the potential investment. When the manager proposes a new project, shareholders do not know whether it is a profitable investment or whether it serves the manager's self interest, such as to realize personal ambition or to enhance human capital. If the manager is allowed to buy the firm's stock before taking the investment decision, then his trade conveys information about the expected profitability of the project. So, shareholders screen the investment proposal upon the revealed information and act upon accordingly, whether to approve the investment decision or otherwise. Zhang recognizes that two assumptions have to be held in order for insider trading to act as a mechanism to alleviate information asymmetry between the manager and shareholders. These are (1) insider trading transactions have to be disclosed publicly, and (2) insiders should not be allowed to sell the purchased shares shortly after purchase. The current levels of regulations are, in fact, assures that these two assumptions are in hold. Zhang (2001) argues that his findings are applicable not only on corporate investment context, but also on other situations where the managerial decision is significant (such as acquisition, restructuring and divestiture).

Other researchers have examined the issue from different angle. That is by focusing on how insider trading affects the agent's *ex ante* behaviour in choosing among various levels of quality and risk projects. Bebchuk and Fershtman (1994), for example, examine how insider-trading affect's the manager's choice among different project's risk levels. They show that insider trading leads risk-averse managers to choose desirably riskier projects that would be rejected without insider trading. That is so because increased volatility of expected results, *i.e.* uncertainty of returns, enables them to make higher insider trading profit as long as they learn "how uncertainty is resolved" in advance of the market. In addition, Bebchuk and Fershtman exhibit that under certain conditions, the managerial contract that allow insider-trading leads to a relative increase in the degree to which manager's salary depends on the firm performance.

Moreover, recent work on the relation between insider trading restrictions and executive compensation by Roulstone (2003) shows that insiders will demand compensation for their restrictions and that firms will need to increase incentives to restricted insiders. In addition, Roulstone finds that firms that restrict insider trading pay a premium in total compensation relative to firms not restricting insider trading. Also, these firms use more incentive-based compensation and their insiders hold more equity incentives relative to firms that do not restrict insider trading.

To sum up, literature established that there are two ways per which insider trading might reduce agency costs by improving the managerial incentives. First, there may be a shareholders' welfare effect: if the managerial compensation is stock-price related, then their obligation to increase their own wealth encourage them to make harder efforts, and thus increases the shareholders' welfare. That is to the extent that insider trading increases manager's proportional ownership of the firm (by buying under-priced shares); insider trading may encourage them to work harder to increase the value (stock price) of their holdings. Core and Larcker (2002) find that firms with low managerial ownership have low stock price performance and their accounting and stock returns have increased as the managerial ownership increases. However, Jin (2002) demonstrates that the optimal incentive level decreases with firm-specific risk Second, there may be a shareholders' control effect: to the extent that the insider trading bridges the information gap between managers and shareholders, where firm's decisions are controlled by the board and/or shareholders. Maug (2002) shows that when large shareholders can monitor under-performing firms, managers have an incentive to give them early warnings about adverse performance to induce them to sell their holdings and refrain from intervention.

(4.4.2) Empirical Evidence

Based on the foundations established by the theoretical literature [reviewed in section (4.2.1) above], empirical research relates the explicit form of managerial compensation with insider trading in the following propositions: On one hand, it assumes that the total compensation consists of an explicit form (salary and annual bonus) and an implicit one (expected returns from insider trading). On the other hand, it predicts that as number of insiders increases the expected insider trading returns decreases, and hence that in the competitive managerial labour market, the explicit compensation form has to be increased to offset the decrease in the implicit compensation form. Thus, it is expected that there is a positive relation between number of insiders and the explicit form of compensation. Empirical literature[13] will be reviewed alongside the empirical test in chapter 6.

(4.5) SUMMARY AND CONCLUSION

This chapter discussed the non-signalling theory behind this research hypothesis. That is the Agency Theory and the possibility of considering insider trading as a managerial incentive. The chapter has analysed the principal-agent model, the incentive theory, the agency problems and costs, and the position of insider trading within these agency concepts. In addition, it has reviewed the relevant theoretical literature that backed the possible consideration of insider trading as a managerial incentive.

Literature shows that in the context of principal-agent problem, insider trading can be used as a mechanism to alleviate the conflict of interest between the managers and the shareholders while (1) increasing shareholders' welfare [see, for example, Hu and Noe

[13] That is so because there is only one empirical study located by the researcher. Although every possible, available and accessible source of research has been exhausted during the period 2000-2003.

(2001)], (2) improving shareholders' control over their firm [see, for instance, Zhang (2001)], (3) concluding an optimal contracting [see, for example, Dye (1984)], *i.e.* increasing managers' efforts level [see, for instance, Bebchuk and Fershtman (1993)], and (4) enhancing the investment decision in the firm [see, for example, Bebchuk and Fershtman (1994)].

PART III: EMPIRICAL TESTS

Chapter 5
The Information content of Insider Trading: Signal Methodology and Empirical Results

(5.1) INTRODUCTION

The research objectives and hypotheses are drawn in section (1.4). These, in short, are first, insider trading has information content, second, it has an impact on stock prices and market efficiency; and finally, it can be considered as a managerial incentive. The theory as well as relevant literature of the first two hypotheses is introduced in chapter 3. This chapter empirically examines the information content of insider trading hypotheses by testing director trading incidence in all FTSE 100 companies experiencing directors' trading in their own firm's ordinary shares (OS) and/or Executive Security Options (ESO), during the test period 1/5/1999-1/7/2000. The purpose of this chapter is to detect the information content of insider trading by measuring the abnormal returns, if any, of such trading. In addition, it will reflect on the impact of such trading on London Stock Exchange (LSE) efficiency. It shall do so by employing event study methodology and using different signals definition.

The importance of this investigation is two fold. Firstly, it provides evidence on the inside information content of insider trading. Secondly, it gives indications on the level of London Stock Exchange (LSE) efficiency. Moreover, the significance of this study, over previous UK literature, reviewed in section (3.4.2.1), stems from seven newly used measures. However, these represent marginal contribution to the knowledge in terms of the methodology employed in relevant literature. These measures are firstly, it uses daily data. Except Friederich *et al.* (2002), most relevant UK studies used monthly data. Brown and Warner (1985) and Friederich *et al.* (2002) argue that daily data is advantaguous in estimating the market model terms because the joint hypothesis problem is less serious in studies with shorter event windows. Also, statistical tests have much power with daily data. Secondly, it uses the security' return, instead of share prices. Thirdly, it uses a new set of data. That is a post-1993 Justice Act of insider trading. While the latest data used in literature is 1997 by the latest study of Hillier and Marshall (2002). The results of this study provide indications about the latest insider trading regulation in UK, taking into account that fact that the purpose of the Act is to regulate rather than prohibiting insider trading. Fourthly, it employs three different definitions of the event itself. These are single, multiple, and quantitative signal definitions. The use of different signal definitions will add to the knowledge, based on ex ante expectations of their differential information impact, in the since that additional signals complement single signals so that we expect a cumulative (but perhaps asymptotic) effect in terms of timing and magnitude of market response and that alternatively different signal types substitute for one another. Fifthly, this study uses the CAPM to estimate the expected returns, instead of the market model, because it takes into consideration the market risk premium when producing the abnormal returns. Sixthly, it reports the results within a shorter event window than used in the literature. Surely a shorter event window will *prima facie* yield less information about director trading than a longer one. Finally, it provides, for the first time, empirical evidence on the ESO transactions, in addition to ordinary shares. This might shed light into the comparison level of the information content of these types of transactions. More elaboration about these measures can be found in the following sections.

Based on the fact that a firm's directors, as prime insiders, are more informative about their firm's current status and future perspective, it is expected that such trading, if based upon private and price-sensitive information, would be more profitable than that of outsiders. In such a case, directors' trading can be seen as a "signal". Buying indicates good news, and selling indicates bad news. In the context of EMH, the security price will adjust to incorporate the new information, as sooner as the higher level of market efficiency.

The time span of security price adjustment to the new information differs according to the type of the signal. In case of a predictable signal, the security price would start to adjust well before the signal date itself, but continue after that "event" date. That is if and only if the event date is known regardless the nature of the event, *i.e.* good or bad. On the other hand, the price adjustment to un-anticipated event may not begin before the event date and would take, relatively, longer period than predictable signal, to fully reflect the event's information.

A firm produces many signals to the security exchange. Such as dividend and earnings announcements, which disclosed at once; and security split and merger and acquisition announcements, which disclosed gradually. The main difference between directors dealing signal and other security-specific signals is that the timing of the directors' trading is unanticipated, while the timing of the latter is usually predictable.

Since the research by Fama *et al.* (1969), event studies have become a common part of empirical research in financial economics. Event study analysis is a well-established technique, which uses financial market data, to assess the impact of particular types of security-specific events on the value of the security, such as firm-specific, industry-related and economic-wide events. Given the efficiency of the market, the impact of an event will be reflected in the security price. Thus, the impact of an event can be measured by using security prices observed over a relatively short period around or after the event date. This technique measures the difference between the observed return on the event and the expected one around or after the event date. Any significant difference is interpreted as abnormal return or loss.

This chapter presents an empirical investigation into the incidence of insider trading, by employing event study methodology. It is structured as follows. Section (5.2) sets up the event study methodology, while section (5.3) reviews relevant empirical methodology used in literature, with particular emphasis on the UK. The choice behind deterring the empirical methodology used in literature after the methodology section is due to the fact that the review will be based mainly on the methodology used in the literature. Thus, it becomes easier and more direct to point out to the different models, definitions and measures used in the literature; and to highlight the contribution and significance of this study over related literature. Nevertheless, section (5.4) describes the market data used, while section (5.5) follows the test procedures. Section (5.6) shows and interprets the empirical results, while section (5.7) re-run the analysis taking into account various side-effects that might alter the results, such as thin trading, confounding events, firm size, year-by-year analysis and signals definition effect. Finally section (5.8) concludes and summarises the findings.

(5.2) METHODOLOGY

The following figure (5.1) represents the timeline of the time intervals, terms, and symbols used throughout this chapter.

Figure (5.1) The Timeline

[Estimation Period	] [Separation Period	] [	Test Period		]
x ----------------------------	x -------------------	x ----	x-----------	x----------	x
t-L2	t-L1	t-S	t	t+D	t+T
Days Before Event Date	Days Before Event Date	Any Date Before Event Date	Day 0, Transaction Date, (Event Date)	Any Date After Event Date	No. of Days After Event Date (Length of Event Window)
-250	-50	-30	0	6	12.. to.. 60

It can be seen from the figure that t is the centre of this timeline and represents the event date. While t+D is assumed to be the disclosure date, per which the event becomes known in the market. t+T represents the end date of the test period, as well as the end of the event window. In some cases, however, T represents the length of any time interval. The estimation period is a past time series of data from t-L2 to t-L1, while no data will be used during the separation period, *i.e.* between t-L1 and t-S. Finally, the test period (t-S to t+T) is the period per which event will be investigated. A complete explanation and interpretation will be presented in the following sections.

(5.2.1) Event Study

Ever since the original paper by Fama *et al.* (1969)[1], event study has become an integral part of empirical research in financial economics, as well as other disciplines. It is used to assess the financial impact of an event on the firm's value measured by stock price. Given the efficiency of the market, the effects of an event will be reflected sooner in the stock prices. Thus, an event's impact can be measured using stock prices observed over a relatively short time period around that event. Any significant difference between the realised returns and the expected ones is interpreted as abnormal return (loss).

In addition to measure an event impact; such technique is often used to test the efficient market hypothesis, corporate policies, and regulations. This indicates that event study

[1] However, MacKinlay (1997) and Campbell *et al.* (1997) argued that the first published event study is traced back to Dolley (1933).

can be used concurrently to test the impact of an event and to test the market efficiency, at the same time. However, as Toms (2001) argues that "the joint hypothesis problem" presents a serious difficulty in event study research. Nevertheless, the significance of event study over direct productivity related measures is that the latter requires a longer period, months or even years, to observe the impact of the event, while the first can be detected over days. Hence, event study has been used in economics and finance, for review, see, for instance, MacKinlay (1997); in accounting, see, for example, Toms (2001); and in management, see McWilliams and Siegel's (1997) review.

Event study involves the following procedures:

(1) Define the event itself,

(2) Specify the event date,

(3) Estimate the expected returns around the event date, *i.e.* event window,

(4) Observe the realised returns around the event date,

(5) Measure the abnormal returns *i.e.* AR. That is the difference between the expected and realised returns, and

(6) Cumulate the abnormal returns over the event window, *i.e.* CAR.

These procedures are employed in this study, and detailed in the following sub-sections.

(5.2.1.1) Event Definition

A key element of the event study is the event definition. Gregory *et al.* (1997) argue that "the method of signal definition chosen has an important impact on some of the conclusion drawn"[2]. This study defines the event as an incidence per which a firm's director buys or sells his firm's ordinary shares (OS) or hold or sell the exercised executive share options (ESO). The data set consists of raw transactions. Such that same date double transactions by a director as well as different directors' transactions for the same firm. Thus, the data has to refine so as to attain a single signal (SS), per which the event is defined by the transaction (buy or sell) for each firm on a daily basis. Or to cumulate a multiple signal (MS), per which the event is defined by number of a firm's director's trade within a calendar month. Or, finally, to quantify the signal to achieve a quantitative signal (QS), per which the event is defined by number of shares, traded by a firm's directors on a daily basis. Obviously, this refining process ends up with three

[2] Gregory et al. (1997), page 340.

different definitions of the event, i.e. single, multiple, and quantitative signals. These are detailed in the following sections.

In fact, this study adopts the single signal definition for the purpose of measuring the abnormal returns, while employs the multiple and quantitative signals to verify the empirical results.

(5.2.1.1.1) Single Signal (SS)

The initial sample has been filtered as to attain a defined event of single-signal for equally weighted portfolios[3], according to the following procedures:

1. The sample, already, splits directors trading in OS's and those in ESO's.
2. Multiple, but similar type of, transactions (*e.g.* buy OS's) of a given director at the same day are considered one (buy) transaction in the (Buy OS's) portfolio. However, the volumes of each of these transactions are added up.
3. Multiple, but similar type of, transactions (*e.g.* sell OS's) by different company's directors at the same day are considered one (sell) transaction in the (Sell OS's) portfolio. However, the volumes of each of these transactions are added up, and the number of directors is reported.
4. Multiple, but different types of, transactions (*e.g.* buy and sell) of a given director at the same day are considered one transaction. However, the volumes of these transactions are subtracted. If the volume of the buy (sell) transactions is more than that of sell (buy), then such transaction is considered as a buy (sell) transaction in the Buy (Sell) portfolio, and the number of buying directors (selling) is reported.

(5.2.1.1.2) Multiple Signal (MS)

A multiple signal is defined in terms of number of a firm's directors traded in their own firm's securities within a calendar month (Grossman and Stiglitz, 1980). The defined single signal sample, mentioned above, is used to construct a multiple signal sample, according to the following steps:

(1) For each calendar month, firms with only one director transaction are excluded from the sample.

[3] A defined event is an event with one signal, e.g. buy, at a given date.

(2) All firm's directors transaction within a calendar month are summed together to form a multiple signal for each firm-month.

(3) The number of directors and volume of shares traded for each firm-month multiple signal is added up.

(4) Then, the abnormal returns calculated for each transaction within the firm-month multiple signal is summed and the average is then computed.

(5.2.1.1.3) Quantitative Signal (QS)

The quantitative signal can be defined in terms of the number of shares traded or the value of the shares traded. A quantitative signal is defined in terms of volume of shares traded in each transaction (Kyle, 1985). This signal, in fact, can be defined by the value of shares traded. Gregory *et al.* (1994) employed the net number of shares while Gregory *et al.* (1997) and Friederich *et al.* (2002) used used net value of shares. However, this second definition requires, in addition to number of shares traded, the actual price for each share traded, which is not available to this study. However, both measures put different weights on the quantitative signal; and both are affected by firm-size, which will be dealt with in section (5.7.4).

Once again, the defined single signal sample, mentioned above, is used to construct a quantitative signal sample, according to the following procedures:

(1) Each portfolio is sorted out by the net volume of each transaction.

(2) The four quartiles for each portfolio are identified according to the volume of shares traded per deal.

(3) Within each portfolio, four sub-portfolios are then constructed. The first-quartile portfolio (QS1), the second-quartile portfolio (QS2), the third-quartile portfolio (QS3), and the fourth-quartile portfolio (QS4).

(4) Each sub-portfolio is treated as a stand-alone portfolio.[4]

[4]Moreover, the quantitative signal is defined in terms of the median of the volume of shares traded in each deal. That is the 50% percentile of each portfolio. Since the size of directors trading volume within each portfolio is highly varied, viz. insignificant arithmetic mean, an alternative definition is employed to overcome the size variance problem. That is the ratio of each transaction-security volume to the total volume traded in that security per day. In other words, the ratio of net volume traded by directors per security-transaction total volume traded of that security per day (NV/TV). Then the median of the ratio's transaction(s) is (are) identified and considered as a stand alone portfolio for each buy or sell OS, and exercise and hold or sell ESO.

It is worth mentioning here that the difference between a single signal portfolio and a quantitative one is in terms of the volume of transactions. The first one consists of all deals regardless of their volume, while the latter consists of those deals within certain volume ranges, *viz.* according to the specified quartile.

(5.2.1.2) Event Date

Given the purpose of this study, the event date is defined, initially, as the date per which a director buys/sells his own firm's OS or ESO. That is the transaction date (t0). However, the transaction takes up to seven working days after the transaction date to be disclosed to the market that is (t6). So, it is not unreasonable to expect that the market re-action to insiders' transaction would not start at the date of transaction, but within the following seven days. The reason behind this is that directors' transaction shall be reported to the LSE within seven days of the date of the transaction. And that the major source of the financial news, *i.e.* The Financial Times, does not publish such news but every Saturday. Thus, the investigation has to be extended beyond the t6, to take into account the unknown disclosure date.

In defining the event date, this study takes into account the true daily market signal. Of the UK studies, King and Roell (1988) considered the event date as the end of the calendar month of the publication date of the transaction in The Financial Times. Other UK literature [*e.g.* Gregory *et al.* (1994) and (1997), Hillier and Marshall (2002/a) and (Pope *et al.* (1990)] used the end of the calendar month of the transaction date. King and Roell's definition assumes that the disclosure date is the date of The Financial Times' publication of the transaction, which is, in fact, not. Thus, ignores the true market signal. In addition, most of UK studies ignored the daily market signal by employing end of calendar month event date.

Finally, the event date for single signal and quantitative signal is the same. That is the date of the transaction. However, for multiple signal, it is different. It is the date of the last transaction in the calendar month.

(5.2.1.3) Event Window

The event window is defined as the period from the date of the transaction itself (t0) through the presumable date of disclosure (t6), to the 13^{th} day (t12). Since the director trading is not a predictable event, there is no need for the event window to include pre-transaction period[5]. This is in fact consistent with all of UK literature, which started at time t0 [see column (10) of table (5.1)]. In addition, the disclosure requirement enforces the need for investigating the period not only after the transaction date, but also beyond disclosure dates.

Once again, as the exact disclosure date is unknown, it is not unreasonable to extend the event window but to the shortest possible length of time. The database states specifically the exact date of each transaction, however, the disclosure date, as with all UK-relevant literature[6], is unknown. By regulations, such trading should be disclosed within seven days to the market. So that share price is not expected to start to reflect such signal before disclosure. But since the market makers execute such transactions, they start to widen the bid/ask spread to reduce their potential risk/loss due to uncertain information (private or liquidity reason) implied by directors dealing[7]. This process would end up with slight adjustments in share prices during the period between the transaction date itself and the presumable disclosure date of that transaction.

By extending the event window beyond the regulator's disclosure date, this study aims at, *inter alias*, identifying, on average, the disclosures date. Moreover, this study will follow the shorter possible event windows. That is to avoid the problem encounter the longer event windows used in literature. Such those reported in section (5.3.2). However, different possible event windows will be used, and the results will be reported, but marginally.

[5]Although the Event Window is defined as a period of 13 days (from t0 to t12), the results of longer event windows are reported in the appendices, as well. These are 7 days (t6 to t12) 19 days (t-6 to t12), 55 days (t6 to t60), 61 days (t0 to t60) and 91 days (t-30 and t60).

[6] See, for example, Gregory *et al.* (1997), p.317.

(5.2.1.4) Expected Returns

There are three different models, used in event study literature, to estimate *ex ante* expected return[8]. These are Mean Adjusted Returns[9], Market Adjusted Returns[10], and Market and Risk Adjusted Returns. However, they all agree on one definition of the abnormal return. That the abnormal return for any firm's security (i) in any time period (t) is the difference between its actual *ex post* return and *ex ante* expected one.

On one hand, the Mean Adjusted model is, however, consistent with the Capital Asset Pricing Model (CAPM)[11], it assumes that the return on security i at any point of time is a function of the average past time series of returns. This contradicts with the first level of efficiency of the EMH, which assumes that current returns are independent of past returns. On the Other hand, the Market Adjusted Returns model assumes that all securities in the sample are equal in terms of the size and the risk, which are not. A strong body of literature (e.g. MacKinlay (1997), Gregory *et al.* (1997) and (1994), Pope *et al.* (1990), and Seyhun (1986)) shows that these two factors affect the estimated returns significantly.

However, Brown and Warner (1985) argue that mean adjusted and market adjusted models are as inferior and powerful as Market Model (MM) and CAPM. Also, Beaver (1981)[12] and Brown and Weinstein (1985) examine the utility of the statistical Factor Model[13] of the process of generating stock returns in event tests. They find limited value added relative to the use of MM. Nevertheless, due to the subjectivity problem of the Mean Adjusted Return, and risk-ignorance of the Market Adjusted Return, in estimating

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[7] For more information about the association between insider trading and the bid/ask spread, see for example Chung and Charoenwong (1998), Chakravarty and McConnell (1997) and Seyhun (1986).

[8] For more details about these models, see for example MacKinlay (1997) and Brown and Warner (1980) and (1985).

[9] It assumes that the *ex-ante* expected return [E(Rt)] is constant for each security over time, but differs across securities, i.e [E(Rit) = ΣRi, where i = 1,2,3.., I]. See, for example Campell et al. (1997), p. 151.

[10] It assumes that the ex ante expected returns are constant across securities, but not necessarily constant over time for a given security. That is, the ex ante expected returns for any security, at a point of time, E(Rt) equals the expected market return at that particular point of time, i.e [E(Rit) = ΣRt, where t = 1,2,3.., T]. See, for example Campell et al. (1997), p. 151 and Pope et al. (1990), p. 366. This model assumes a stable linear relationship between the market return and the security return.

[11] CAPM assumes that a stock has a constant systematic risk, and that the efficient frontier is stationary, thus the expected return is constant.

[12] In Xiang (1993), p. 366.

[13] That is: $R_{it} = \beta_{i1} * f_{1t} + \beta_{i2} * f_{2t} + ... + \beta_{iK} * f_{Kt} + \varepsilon_{it}$

Where f's are generated from factor analysis during a previous period.

the expected returns, this study follows the majority of the literature and employs the third model, *i.e.* Market and Risk Adjusted Return.

Market and Risk Adjusted Returns: This model represents the standard and the most developed test. It is based upon the market model estimates for each security in the sample, and the abnormal return calculations, as follows:

Sharpe's (1964) simple Market Model (MM)[14] expresses the actual rate of return (R) on the security (i) at time (t) as a function of market return (Rm), in the context of past time series (t-L2 to t-L1), such that

$$R_{it} = \alpha_i + (\sum_{t=t-n}^{t=n} \beta_{it} * R_{mt}) + \Omega_{it} \dots\dots\dots (1)$$

Where α is the intercept term, β the systematic risk of security i, and Ωit is the error term, with ΣΩit = 0.

This equation indicates that the actual return can be measured by regressing the (t-n) lagged, (t+n) leading days or months, and contemporaneous (t) market rate of returns (R_m) on observed security returns.

The validity of the MM depends on satisfying three conditions:

1. The sum of the residuals should equal to zero, $\Sigma\Omega_{it} = 0$,
2. There is no significant correlation between the residuals (Ω_{it}) and the market return (R_{mt}), and
3. The sum of the differences between the average residuals ($A\Omega_i$) and residuals (Ω_{it}) should equal to zero, i.e. $\Sigma\Phi_{it} = 0$. That is

$$A\Omega_i = \Omega_{it} + \Phi_{it}$$

$$\Phi_{it} = A\Omega_i - \Omega_{it} \dots\dots\dots (2)$$

If these conditions satisfied, the MM parameters can be used in the two-factor *ex-ante* CAPM to calculate the expected rate of return [$E(R_{it})$] as

$$E(R_{it}) = R_{ft} + \beta_{iK} * (R_{mt} - R_{ft}) \dots\dots\dots (3)$$

Where β_{ik} is Dimson's (1979) to deal with thin trading or zero daily returns on share prices. That is the sum of Beta's of the lagged, leading, and contemporaneous regressions of MM, *i.e.* $\beta_{ik} = (\sum_{t=t-n}^{t+n} \beta_{it})$. Then, *ex-post* CAPM re-stated to calculate the expected rate of return $[E(R_{it})]$ as[15]

$$E(R_{it}) = \alpha_i + R_{ft} + \beta_{iK} * (R_{mt} - R_{ft}) \qquad (4)$$

In this equation, β shall be obtained by summing the slope coefficients from MM (equation 1), and α and β are to be estimated for a given security for the conventional prior window. That is 200 trading days from preceding 250 trading days of the test period. Since the test period, per which abnormal returns are being measured, should be completely separated from the estimation period, the MM parameters used in line with events occurring in one period are estimated from data on previous period [Givoly and Palmon (1985)]. Specifically, the 50 days exclusion period is used to take into account the assumption that insiders may trade following a period of abnormal performance by the company [Gregory *et al.* (1994)].

There is one issue, however, arises from employing Market and Risk Adjusted Returns. That is the issue of specifying which market model for estimating the expected returns is to be used. That is the choice between MM and the ex-post CAPM. Although most of the literature used the MM in estimating the expected returns, this study uses the CAPM. On one hand, the intercept α of the MM can impound abnormal returns, particularly, in the period of the event window [Pope *et al.* (1990), p. 366]. In such a case, the alternative model, i.e. ex-post two-factor CAPM, has to be used. However, it is very difficult to generate a zero-beta portfolio (Rf) which is uncorrelated with the market portfolio returns (Rm). Also, Roll (1977)[16] argues that the market portfolio cannot be observed directly. But, the development and the use of a more sophisticated information technology enable market participants to observe the changes in the market portfolio spontaneously. On the other hand, the rationale behind the use of CAPM might be explained in the context of market risk premium when comparing the computed-abnormal returns with the market returns. While the MM produced raw abnormal returns that do not take into consideration the market risk premium. However, as Fama (1996) argues, in applications that require estimates of expected return, CAPM is the

[14] Originally suggested by Markowitz (1952).
[15] See Pope *et al.* (1990).

popular choice. Empirically, Pope *et al.* (1990) examined the impact of using either MM and CAPM in estimating the expected returns in the event study and found identical results.

(5.2.1.5) Abnormal Returns

The abnormal rate of return (AR_{it}) is the difference between the actual and expected rates of return on the security at time (t). It will be calculated during the period event window (t0 to t+T). That is so if and only if the event date is unpredictable and there is no leakage in information. If it is otherwise, then it is expected that due to the analyst forecasts and/or leak of information, the security price would start to change and reflect the new information at time (t-S) before the event date (t0)[17]. That is[18]

$$AR_{it} = \varepsilon_{it} = R_{it} - E(R_{it}) \qquad (5)$$

The simple arithmetic mean of all signals abnormal returns ($\acute{A}R_t$) at any point of time during the event window is

$$\overline{AR}_t = \frac{1}{N} * \sum_{i=1}^{N} AR_{it} \qquad (6)$$

Where (N) is the number of sample securities who's abnormal return are available at the time (t).

(5.2.1.6) Cumulative Abnormal Returns

The cumulative abnormal rate of returns (CAR_T), of all securities during the event window t+T, is measured as

$$CAR_T = \sum_{t=0}^{t+T} \overline{AR}_t \qquad (7)$$

Where (t+T) is the length of the event window.

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16 In Brown and Warner (1980), p.210.

17 In fact, some event study literature used the market model, per which:

$$AR_{it} = R_{it} - (\alpha_i + \beta_{iK} * R_{mt})$$

18 Proof of equation 5: E(R) - R_f = α + β (R_m-R_f) + €, solve this for α and multiply both sides by (-1) will produce α = E(R) - R_f - β (R_m-R_f) - €, as much as the portfolio be larger, α will become so close to zero, and β to one (Rportfolio≡R_m). Thus, 0 = E(R) - R_f - 1 (R_m-R_f) - €, that is € = E(R) - R_f - (R_m-R_f), and, as such, € = E(R) - R_f - R_m + R_f, so € = E(R) - R_m.

The significance of event period cumulative abnormal returns has to be assessed. The null hypothesis is that the CAR_T is equal or less (more) than zero for buy (sell) portfolios. Otherwise, it is more than zero, positive, for buy portfolios; or less than zero, negative, for sell portfolios. Given the null hypothesis that, H_0: $CAR \leq 0$ ($CAR \geq 0$) for buy (sell) portfolios, then the alternative hypotheses, if H0 is rejected, are: H1:
$CAR_T > 0$ for the "Buy" portfolios, and $CAR_T < 0$ for the "Sell" Portfolios.

(5.2.2) Test of Type I Error

It is expected that the empirical results would end up with one of two possibilities: (1) Reject H_0, and (2) Fail to reject H_0. However, an accepted hypothesis might be true or false. Likewise, a rejected hypothesis might be either true or false. Thus, there are four possible outcomes, as summarised in the following diagram.

Empirical Results of H_0	True H_0	False H_0
Accept H_0	Desirable	*Type II Error*
Reject H_0	*Type I Error*	Desirable

These are (1) Reject a false null hypothesis, (2) Reject a true null hypothesis, usually called Type I Error, (3) Fail to reject a false null hypothesis, called Type *II* Error, and (4) Fail to reject a true null hypothesis. The first and the last possibilities are desirable, while the middle ones are not. The probability of committing type *I* error, that is the risk level, is called alpha (α)[19], and that of type *II* error is beta (β). The *t*-test is used to estimate type *I* error. While a multivariate model and robustness check can be used to estimate type *II* error.

Initially, the *t*-test is the ratio of the mean to its variability, *i.e.* standardization of the average abnormal returns (SAR_{it})[20]. That is

$$SAR_{it} = \frac{\overline{AR}_{it}}{SD_{AR_i}} \qquad (8)$$

[19] In social research, *the rule of thumb* is to set α, for one-tailed test, at 5%.
[20] The purpose of standardising the mean is to allow for the portfolio's cross-sectional distribution to be compared to a unit normal. More detailed information about *t*-test can be found in any business statistics textbook. See, for example, Diamantopoulos and Schlegelmilch (1999), chapter 10; and Daniel and Terrell (1992).

Event study literature differently standardized the abnormal returns to capture these variations. Three major event study literatures have employed different formulas for computing the standardized abnormal returns and the *t*-value, as such. These are Dodd and Warner (1983), Brown and Warner (1980) and (1985)[21].

This study follows Dodd and Warner's (1983) *t*-test[22] (hereinafter called DW1983), and reports that of Brown and Warner's (1985) (hereinafter called BW1985) as well. This is due to the fact that the event, *i.e.* directors trading, is not predictable. Fama *et al.* (1969) state that the variability in returns predictable and/or timing-known events (forecasted and/or leaked information signal) increases substantially in the times closest to the event. Thus, it can be suggested that event studies with predictable events should follow BW1985's *t*-test; while those with unpredictable events should follow DW1983's. DW1983 standardised the abnormal returns in a similar way to equation (8) above. However, they calculate SD_i relative to the market portfolio returns, not the sample mean. That is[23]

$$SD_{AR_i} = \sqrt{S_i^2 * \{1 + (\frac{1}{[(t-L2)-(t-L1)]}) + (\frac{(R_{m_t} - \overline{R_m})^2}{\sum_{t=t-L2}^{t-L1}(R_{m_t} - \overline{R_m})^2})\}} \quad \text{.........................(9)}$$

Where S_i^2 is the estimated residual variance from MM for security i, Rm_t is the return to the market at time t, and $\overline{Rm}$ is the average market return over 250 days (from t-L2 to t-L1) used in the MM.

Then, for each security (i), SARs are summed over the event window to form a standardized cumulative abnormal return[24], by

$$SCAR_i = \frac{1}{\sqrt{T}} * \sum_{t=1}^{T} SAR_{it} \quad \text{...(10)}$$

Where T here is the length of the event window.

[21] Coutts et al (1995) present an alternative test statistics, and Corrado (1989) develops a non-parametric test, i.e. rank test; and Corrado and Zivney (1992) evaluate the sign of the rank test. However, Hamill et al. (2002/a) compares the results generated from a range of parametric models and two classes of non-parametric models used in event studies and concludes that in computing abnormal returns, rank test should be adopted in conjunction with parametric ones.

[22] It can be argued that Dodd and Warner (1983) is the first to establish a developed methodology for event studies, standardized the abnormal returns relative to the market portfolio variation, the estimated residuals variation from MM for each security, and the length of the estimation period.

[23] Dodd and Warner (1983), pp. 436-437.

[24] If and only if ARs are normally distributed and independent across t, then SCARi is distributed Student-*t* with [(t+T)-2] degrees of freedom. As long as t+Ti, SCARi is distributed unit normal.

Thus, *t*-test can be used to assess the significance of SCAR's, by

$$t - value = \overline{SCAR_T} * \sqrt{N} \ldots\ldots(11)$$

Where T is the length of the event window, and N is the number of the securities in the portfolio.

And ŚCARt is the cross-sectional average standardized cumulative abnormal return, calculated by

$$\overline{SCAR_T} = \frac{1}{N} * \sum_{i=1}^{N} SCAR_{iT} \ldots\ldots(12)$$

BW1985, on the other hand, calculate SD relative to the sample mean. That is[25]

$$SD_{(AR_i)} = \sqrt{\frac{\sum_{t=t-L2}^{t-L1} (\overline{AR_t} - \overline{AR_i})^2}{[(t-L1)-(t-L2)]-1}} \ldots\ldots(13)$$

ÁRt is the mean of the sample's ARt at point of time t, and ÁRi is the mean of the security i's abnormal returns over the time period t-L2 to t-L1. That is

$$\overline{AR_t} = \frac{1}{N} * (\sum_{i=1}^{N} AR_{it}) \ldots and \ldots \overline{AR_i} = \frac{1}{[(t-L1)-(t-L2)]} * (\sum_{t=t-L2}^{t-L1} AR_{it}) \ldots\ldots(14)$$

Assuming cross sectional independence, the *t*-value for any point of time, during the event window, is given by[26]

$$t - value = \frac{1}{\sqrt{N}} * \sum_{i=1}^{N} SAR_{i,t+T} \ldots\ldots(15)$$

Where N represents the number of securities in the sample, and t+T is the length of the event window.

In summary, the above *t*-test formulas produce different values. The main source of the difference among them comes from two streams. These are computation of the mean and the standardization process either by cross-sectional or time-series. DW1983 standardized ARs relevant to the market portfolio as well as the residuals of the MM.

[25] Brown and Warner (1985), pp. 7-8.
[26] Brown and Warner (1985), p. 28.

While BW1985 compute the standard deviation over time for each security and calculate the average cross sectional[27].

It can be argued that as many securities included in the sample, as much the difference between these formulas becomes close to the zero. That is due to the fact that as much the sample represents the market, as much it would have the market's statistical measures.

Although this study reports the computations of the above *t*-test formulas, *i.e.* equations 11 and 15 (DW1983 and BW1985, respectively) accepting or rejecting the null hypothesis will be based upon the risk level resulted from formula 11, *i.e.* DW1983. Moreover, the reason behind reporting BW1985 formula, in line with DW1983, is mainly due to the similar methodology used in this research, as well as the frequency of the data, *i.e.* daily data. Also, DW1985 represents the most recent one of the three approaches.

(5.3) REVIEW OF METHODOLOGY

Chapter 3 introduced, *inter alias*, the relevant literature to the first parent discipline of this study. This includes market informational efficiency theory, signalling theory, and critical review of insider trading literature. In this section, the empirical literature, with emphasis on the UK, will be reviewed in line with the methodology presented in previous section. That is in terms of defining the event, measuring the abnormal returns and the reported findings.

The EMH proposed that asymmetrically informed economic agents would be able to earn abnormal returns, and reduce the level of market efficiency. However, it is not the abnormal return that reduces the efficiency, instead, it is the incomplete informational market. In other words, information asymmetry between economic agents presents a serious challenge to the strong level of market efficiency. Insiders are the most informed agents.

[27] Brown and Weinstein (1985) compared the analytical computation of analysis of power using distributional assumptions with the empirical power, and found the results are very close to BW1985 model.

In the context of signalling theory, it is not unreasonable to believe that insiders do have inside, *i.e.* private-price-sensitive, information. Therefore, trading by firm's insiders is expected to convey a signal to the market. This signal might incorporate inside information. Such information might be about the current value of the firm (under/over-pricing), the intrinsic future value of the firm (perspectives), and/or the industry as a whole. The market perceives the signal's sign, not the contents. Buying represents a positive (good news) signal, and selling is a negative (bad news).

However, insider trading might be undertaken for liquidity reasons. Given that the market knows but cannot differentiate between insider trading purposes, multiple and quantitative signals needed to be examined. That is, trading by more insiders and/or the volume of such trading. This chapter empirically investigates these signals as well, and relevant literature will be reviewed in this section.

The primary focus of the early empirical literature was on measuring abnormal returns. This body of literature has established some well-found facts about the return behaviour following insider trades.

Table (5.1) provides an overview of prior event studies, on event definition, measurement of abnormal returns and results. Another purpose of the table is to illustrate the differences between this study and the current UK literature. The literature is listed according to the country of investigation and date of publication, where the most recent is listed first.

Column (1) refers to the country in which the studies were conducted. It can be seen that insider-trading issue is less investigated in the UK compared with the other side of the Atlantic (USA). Column (2) names the author(s) and the year of the study. Except for King and Roell (1988), all of UK studies reported in the table used very old data relative to the publication year. For example, Hillier and Marshall (2002/a), which is the most recent study, used five years old data (1991-1997). While the data collected for this study are concurrent with the writing process (2001). Hence, this study contributes to the current literature in terms of updated data, by covering un-examined period of directors trading in the UK. Column (3) indicates the name of the specific market per which the sample securities were traded. The test period, reported in column (4), indicates the period of insider trading transactions, over which the abnormal returns are measured. Column (5) states the type of securities investigated; *i.e.* ordinary shares (OS) and/or executive share options (ESO). Only Gregory *et al.* (1994) uses ESO in addition to the OS. Given that market perceives the signal's sign, not its issuer, it is not unreasonable to assume that the market does not differentiate between different types of firm's insiders, *i.e.* directors, officers, advisors, bankers, lawyers and auditors. Column (6) defines the insiders. That is which individuals of the firm's insiders are investigated. Most of the UK insider trading literature used director dealings, as there is no data on other type of insider trades [see, for instance, Friederich *et al.* (2002), Hillier and Marshall (2002/a&b), Gregory *et al.* (1997) and (1994), Pope *et al.* (1990), and King and Roell (1988)].

Most importantly is column (7), of which the definition of the event is stated. Such a definition is an important factor in conducting the event test. It can be seen, however, that there is no consensus among the literature regarding one single definition of the insider-trading event. Column (8) reports the number of buy and sell transactions in the sample. Given the data availability and the breadth of the market, *i.e.* number of securities listed in the market, it is obvious that the USA literature often uses larger number of transactions than their counterparts in the UK. Column (9) indicates the frequency of the data used while column (10) states the length of the event window(s). Clearly, these two columns are associated with each other. When the frequency of the data used is monthly, the length of the event window examined is in monthly terms. One exemption of this rule is Givoly and Palmon (1985) who used daily data and accumulated it monthly. Column (11) and (12) refer to the methodology/model used in computing the expected return and the tests of significance employed to detect type *I* error, respectively. It can be seen that the majority of the literature used the market model (MM) to measure the expected return, and Dodd and Warner's (1983) *t*-test. Finally, column (13) reports the empirical results of buy and sell insider-trading transactions during the specified event window(s).

In an ideal world of perfect information, it is expected that the value of a firm's security would not be affected by anyone's trading, and that the market is strongly efficient. Directors and other firm-involved professionals would not be able to detect the over/under value of their own firm's securities. Thus, they would not be able to attain abnormal returns, because they do not have information, about their firm's current status and future perspectives, more than any other market participants do. Numerous body of empirical evidence, however, shows that insider trading transactions yield significant and persistent abnormal returns, as summarised in column 13, table (4.1), across different countries (column 1), capital markets (column 3), time intervals (column 4), securities under investigation (column 5) and insiders (column 6). The signal (column 7) is typically defined in terms of the dates of insider trading transactions. However, such signal might be defined in terms of number of transactions, volume, value, or number of insiders traded within the event date.

The empirical literature typically identified two anomalies in the behaviour of insider trading abnormal returns. These are (1) persistency over time [1977 – 1997 in the UK, and 1950 – 1997 in USA], and (2) domination of buy portfolios over sell ones in terms of both rate of return and significance of such returns [Aboody and Lev (2000), Chang and Sul (1998), Friederich *et al.* (2002), Givoly and Palmon (1985), Gregory *et al.* (1994), Hillier and Marshall (2002/a), King and Roell (1988), Pettit and Venkatesh (1995), Roth and Saporoschenko (1999) and Seyhun (1986)]. Given the various non-profit reasons for insider trading, which are almost sell-related reason, *e.g.* liquidity purpose, it is not unreasonable to predict the second anomaly.

All of UK studies reported that insider trading buy transactions tend to significantly outperform the outsiders. Using daily data, Friederich *et al.* (2002) and (1999) and Hillier and Marshall (2002/a) report significant abnormal returns (AR) over 8 days after the event, while Gregory *et al.* (1997), using monthly data, document significant cumulative abnormal returns (CAR) of 3.18%, 3.54%, 4.80%, and 4.80% of buy transactions over 3, 6, 12, and 24 months, respectively. Similarly, Chang and Suk (1998), Seyhun (1986) and Givoly and Palmon (1985), of the USA studies, reported significant CAR of buy portfolios over 1, 2, 3 and 12 months.

Insider trading sell transactions, on the other hand, indicate contradicting results. Of the UK literature, Friederich *et al.* (2002) and (1999), Gregory *et al.* (1997), Hillier and Marshall (2002/a) and Pope *et al.* (1990) found significant abnormal losses over 3, 6, 12, and 24 months. While Gregory *et al.* (1994) provided indistinguishable from zero CAR during the transactions' month and insignificant losses thereafter. King and Roell

(1988) found positive but insignificant abnormal returns over a period of up to one year. Except for Finnerty (1976b), the USA studies reported similar insignificant losses to those of the UK's.

Table (5.1) Summary Review of Empirical Literature on Defining the Event, Measuring Abnormal Returns, and Reporting the Results
[The literature are listed according to the country/market of investigation and date of publication, where the most recent is listed first]

1	2	3	4	5	6	7	8		9	10	11	12	13	
Country	Study Year of Publication	Market	Test Period	Type Of Security	Type Of Insiders	Signal Definition / Signal Date	No. of Signals Buy	 Sell	Data Frequency	Event Windows	E (R) Model	T-Test Model	Results Buy	 Sell
UK	**Friederich *et al.* (2002) and (1999)**	LSE	10/1986 - 12/1990	OS	Directors	Net Quantity of Shares Traded (QS)	1702	1268	Daily	-20 to +20 days	MM	BW1985, Boehmer *et al.* (1991) and Corrado (1989)	-AR (-20 to -1)* +AR (0 to 8)* +CAR (0 to 20)	+AR (-20 to -1) -AR (0 to 8) +CAR (0 to 20)
	Hillier and Marshall (2002/a)	LSE	17/9/1991 - 31/3/1997	OS	Directors	Net Trading (buy - sale) (QS)	1841	2145	Monthly	-120 to +120 days	MM	Boehmer et al (1991)	-CAR (-40 to -1)* +AR (0) +AR **(1 to 3*)**	+CAR (-40 to -1)* +AR (0) - AR (1 to 3*)
	Hillier and Marshall (2002/b)	LSE	1/1/1992 - 31/12/1996	OS	Directors	No. of Trades Around Interim & Final Earnings Announcent / No. of All Trades in the Year. (SS) Interim and Final Announcement Periods Compared With Other Periods.	1215	930	Daily	-120 to +120 days around announce-ment date	MM	Boehmer et al (1991)	Buy > Sell in the Event Period and B=S in other periods. B/S in Event > B/S in Other Period.	B interim > B final, S interim < S final, B interim > S interim, Directors Buy (Sell) After (Before) Poor (Good) Stock Performance.
	Gregory *et al.* (1997)	LSE	1/1986 - 12/1990	OS	Directors	(1) Net Value of Shares Bought/Sold in a Month (QS)	3722	3034	Monthly	3, 6, 12, 24 month	MM	DW1983	+CAR (3,6,12,24)*	-CAR (3,6,12,24)*
						(2) Net Number of Deals (Buy/Sell) in a Month > 2 (QS)	1380	973					+CAR **(3,6,12,24)***	-CAR (3,6,12,24)*
						(3) Net Value of Shares Bought/Sold in a Month > £10k, > £100k, & £1m (QS)	1826, 368, 55	2376, 1051, 179					+CAR (3,6,12,24)* **+CAR3,6,12**	-CAR (3,6,12,24)* -CAR (3,6)*
	Gregory *et al.* (1994)	LSE	1/1984 12/1986	OS & ESO	Directors	Net Value of Shares Bought/Sold in a Month (QS)	613	1040	Monthly	0, 1, 3, 6, 12, 24 month	MM	DW1983	s1: +CAR 3* 12* s2: +CAR (1,3,6,12)*	S1&s2&s3 +CAR 0, -CAR 1, 3, 6, 12, 24
	Pope *et al.* (1990)	LSE	4/1977 12/1984	OS	Directors	Net Number of Buyers (Sellers) In a Month > 2 (MS)	275	289	Monthly	6 month	MM	BW1980	+CAR0* +CAR(1to6)	+CAR0 -CAR(1to6)*
	King and Roell (1988)	LSE	1/1986 8/1987	OS	Directors	Transaction Type / Publication Date in FT (SS)	31	84	Monthly	1,3,12 month	MAR & RAR	Std. Error	+AR (1,3,12)*	+AR 1,3,12

Cont. Table (5.1) Summary Review of Empirical Literature on Defining the Event, Measuring Abnormal Returns, and Reporting the Results

1	2	3	4	5	6	7	8		9	10	11	12	13	
Country	Study Year of Publication	Market	Test Period	Type Of Security	Type Of Insiders	Signal Definition / Signal Date	No. of Signals Buy	 Sell	Data Frequency	Event Windows	E (R) Model	T-Test Model	Results Buy	 Sell
USA	Aboody & Lev (2000)	NYSE	1/1985-12/1997	OS & SSO	Officers	Transaction Type / (SS) Transaction Date R&D and (No R&D)	7027 (17124)	18255 (21585)	Monthly	Trnsct To SEC filing	MAR	N/R	+AR3% (0.9%)	-AR0.5% (-0.1%)
	Roth & Saporoschenko (1999)	NYSE	1993-1995	OS	Officers/ Directors	Transaction Type / (SS) Publication Date of Purchases	142	0	Daily	-14 to +14,252 d	MAR	BW1985	+CAR0*	N/R
	Chang & Suk (1998)	NYSE	8/1988 – 12/1990	OS	Officers/ Directors	Transaction Type / (SS) Transaction, Filing, & Publication Dates	330	377	Daily	-19to22 day	MM	DW1983	+CAR +1to+3*	-CAR +1to+3
	Yermack (1997)	AMEX	1992/1993 & 1993/1994	ESO	CEO	ESO Award Date (SS)	620		Daily	-20 to +20 day	MM	DW1983	At -20d, 47.6% +CARs, 0d 48.1%, 15d 53.1%*, 20d 54.5%*,	30d 55.4%*, 40d 55.7%*, and at 50d 57.4%* CAR are + and = 2%
	Pettit & Venkatesh (1995)	NYSE& AMEX	1/1980 – 8/1987	OS	Officers/ Directors	Value(Number) of Net Purchases (QS)	30000	70000	Monthly	3years (12m*3)	MM	Parametric &Non-Test	+CAR0* (CAR0)	N/R
	Rozeff & Zaman (1988)	NYSE	1/1973 – 12/1982	OS	Officers/ Directors	3 Insiders Buy (Sell) With No One Sells Monthly (MS)	365	333	Monthly	12 months	MM	Jaffe1974	-AR1* +AR3,6,12	N/R
	Seyhun (1986)	NYSE	1975 – 1981	OS	Officers/ Directors	Number of Buyers-Sellers Monthly (Last Deal Date) (MS)	6244	8839	Daily	-200 to 300 d	MM	DW1983	+CAR 1 to 300*	-CAR 1 to 300
	Givoly & Palmon (1985)	AMEX	1973 1975	OS	Officers/ Directors	Transaction Type / Transaction Date (SS)	1118	413	1month = 20 day	0- 239 days	MM	N/R	+CAR 1*2*3*	-CAR1, +CAR2to12
	Finnerty (1976)a	NYSE	1971	OS	Officers/ Directors	# Insider *{(Volume sold –Volume bought) / Volume holding} > 0=Sell,<0=Buy (MS)	282	572			MDA	N/R	YES	YES
	Finnerty (1976)b	NYSE	1/1969 12/1972	OS	Officers/ Directors	Transaction Type / Transaction Date (SS)	9602	21487	Monthly	11 months	CAPM	N/R	+AR (1,3,4,5,6,10)*	-AR (0to4)* 6* (8to11)*
	Jaffe (1974)a	NYSE	1962 1968	OS	Officers/ Directors	#Buyer > # Seller = Buy Month / Publication Date (MS)	466	486	Monthly	8 months	CAPM	N/R	+CAR1*2*8*	N/R
	Lorie & Niederhoffer (1968)	NYSE	1/1950-12/1960	OS	Officers/ Directors	#Buy - #Sell, Volume buy-Volume sell / Last Deal in Month, (QS)	3973	3277	Monthly	6 months	% Price / Market	N/R	YES	YES
Australia	Arnand et al (2002)	ASX	N/R	OS	Directors	ASX Announcement Day of Insider Trading (Called Signal G) [Directors have to disclose within 14 days] (SS)	380	186	Daily	-10 to +20 days	MM and MAR	N/R	-10d -AR*, 0d -AR, 1d -AR, 2d -AR, 6d -AR*, 10d -AR	-10d +AR*, 0d -AR, 1d -AR*, 2d -AR, 6d -AR, 10d -AR*
Norweg	Eckbo & Smith (1998)	OSE	1/1985 12/1992	OS	Officers/ Directors	Number of Buyers-Sellers Monthly (Last Deal Date) (MS)	N/R	N/R	Monthly	7 months	MM	N/R	NO	NO
Spain	Brio *et al.* (2002)	MSE	1/1992 – 12/1996	OS	Directors & Large Shareholders	Buy or Sell (SS)	589	406	Daily	-80 to +10 days	MM & CARCH MM	DW1980 & CARCH Test	CAR(0,1) +, (1,15) +, (15,32) +, (1,60) +	CAR(0,1) +*, (1,15) -*, (15,32) +, (1,60) +

Notes: abbreviations used in the table

*	= Significant rate of return,
%Price/Mrkt	= Changes in security prices relative to the market,
AMEX	= American Stock Exchange,
AR	= Abnormal returns,
ASX	= Australian Stock Exchange ,
BEO	= Exercised ESO, held not sold,
BW1980	= Brown and Warner's (1980) t-test formula,
BW1985	= Brown and Warner's (1985) t-test formula,
CAPM	= Capital Asset Pricing Model,
CAR	= Cumulative Abnormal Returns,
CARCH	= Constrained ARCH,
CEO	= Chief Executive Officer,
d	= Day,
DW1983	= Dodd and Warner's (1983) t-test formula,
E (R)	= The model used to estimate the Expected Return,
ESO	= Executive Share Options,
LSE	= London Stock Exchange,
m	= Month,
MAR	= Market Adjusted Return,
MDA	= Multiple Discriminant Analysis,
MM	= Market Model,
MS	= Multiple Signal,
QS	= Quantitative Signal,
MSE	= Madrid Stock Exchange,
N/R	= Not Reported,
NYSE	= New York Stock Exchange,
OS	= Ordinary Shares,
OSE	= Oslo Stock Exchange,
R & D	= Research and Development,
RAR	= Risk Adjusted Return,
SEC	= Securities Exchange Commission, USA,
SS	= Single Signal,

Many arguments can be put forward with relation to the most of the existing literature. These include (1) the signal definition and date, (2) the length of the event window used, and (3) the significance of the results, as explained in the following sub-sections.

(5.3.1) Signal Definition and Event Date

In terms of defining the signal, the literature used one or more of the following three definitions. Firstly: net transactions' type (buy or sell) in one trading day. We refer to this definition as a single-signal. Here, insider trading transactions within a day are filtered, *i.e.* deducting selling transactions from buying ones, and report the result as a one transaction with a positive (negative) signal if number of buying transactions is more (less) than the number of selling ones. Brio *et al.* (2002), Chang and Suk (1998), Friederich *et al.* (2002), Givoly and Palmon (1985), Hillier and Marshall (2002/b) and Roth and Saporoschenko (1999), used this definition with daily data.

In fact, with this sort of signal definition, daily data are superior on monthly data. That is so because the market does perceive the net transactions within a day, but not within a month. The market has no memory. Also, using monthly data in this context indicates the loss of many days within the event month, *i.e.* the difference between each transaction's date within the event month and the event date, which is fixed on a certain date for all of the month's transactions. Aboody and Lev (2000), Finnerty (1976b), Friederich *et al.* (2002), Gregory *et al.* (1997), Hillier and Marshall (2002/b), King and Roell (1988), Lorie and Niederhoffer (1968) and Pettit and Venkatesh (1995) used this definition, as well, but with monthly event windows. In fact, Gregory *et al.* (1997) did not report the exact event date, *e.g.* end of the month or last transaction's date within a month, and Pettit and Venkatesh (1995) used January of each calendar year to cumulate the abnormal returns for each security.

In this study, this definition will be applied on a set of daily data. Hence, the significance of this study can be seen, *inter alias*, in terms of the accuracy of the signal definition and the event date over the majority of UK studies which used monthly data.

Secondly: net transactions' value (or volume) during a calendar month. We refer to this definition as a quantitative-signal. Here, the value (or volume) of insider trading transactions within a calendar month are filtered. That is by deducting the value (or volume) of selling transactions within a calendar month from the buying ones, and report the result as a one quantified-signal with a positive (negative) sign if the value (or volume) of buying transactions are more (less) than the value (or volume) of selling ones. Friederich *et al.* (2002), Gregory *et al.* (1997) and (1994), Hillier and Marshall (2002/b), Lorie and Niederhoffer (1968), and Pettit and Venkatesh (1995) used this sort of signal. The above argument, regarding the use of monthly data, presents a limitation on this definition. That it does not take into account the daily reaction of the market towards such signal. When applying this definition, this study overcomes such a problem daily, instead of monthly-quantified signals.

Thirdly: net number of insiders during a calendar month. We refer to this definition as multiple-signals. Here, the number of insider trades within a calendar month is filtered, *i.e.* deducting the number of seller insiders within a calendar month from the buyer insiders, and report the result as a one multiple-signals with a net number of buyer (seller) insiders if the number of buyer (seller) insiders is more (less) than the number of seller (buyer) insiders. Eckbo and Smith (1998), Finnerty (1976a), Pope *et al.* (1990), Rozeff and Zaman (1988) and Seyhun (1986) used the enforce signal. The same argument regarding the use of monthly data and event windows presents a limitation on this definition, as well. However, such limitation can be encountered by computing the average daily abnormal returns for each transaction-day during the calendar month. In fact, this represents part of the multiple signal definition used in this study. Moreover, it can be argued that the second and the third definitions are useful signals to detect *type II error*, instead of testing the initial null hypothesis, as such.

(5.3.2) Event Window

With respect to the length of the event windows used in the literature, it can be seen from table 1 that these ranges from one month to 36 months, for monthly data, and from one day to 300 days, for daily data. However, most literature reported sub-windows within a wider window. All of UK literature and most of USA ones used monthly data. Surely a shorter event window will *prima facie* yield less information about insider trading than a long event window. But, as McWilliams and Siegel (1997) indicate, longer window is more likely to incorporate other events, and thus resulted with confounding effects from other events. Other events include in addition to similar or reversal insider trading transactions, the announcement of earnings and dividends, merger and acquisition (M&A), research and development (R&D) results, and new large contracts. None of the literature has claimed control for such confounding effects.

Another issue relating to the event window is that literature assumed that the event date, which is the centre of the event study, is identified with certainty. That is the publication date for some literature. However, it is difficult to identify the exact date per which the market is informed. An example of this is when collecting event dates from the Saturdays section of the Financial Times [*e.g.* King and Roell (1988)], LSE's Official Weekly Intelligence [*e.g.* Pope *et al.* (1990)], from the Insider Trading Spotlight weekly section of the Wall Street Journal [*e.g.* Roth and Saporoschenko (1999)] and Chang and Suk (1998)], or from the *SEC's Official Summary* [*e.g.* Jaffe (1974a)]. In such cases, one cannot be certain if the market informed prior to the disclosure.

Similarly, when considering the transaction date, last transaction date in a calendar month or last day of a calendar month, by other literature, such as in Aboody and Lev (2000), Finnerty (1976b), Friederich *et al.* (2002), Givoly and Palmon (1985), Gregory *et al.* (1997) and (1994), Hillier and Marshall (2002/a), Pettit and Venkatesh (1995), Rozeff and Zaman (1988) and Seyhun (1986). In fact, it's an event date for the insider, but not the market, unless the market is informed promptly with such transaction, which is not the case. The issue here is, once again, when the market is informed.

The common approach to handle the matter of uncertain event date is to expand the event window, with controlling for other event effects, which has not been investigated by currently available UK literature.

(5.3.3) Test of Significance

Finally, with respect to the significance test of the empirical results, it can be seen from column 12 of table (5.1) that there is no general agreement on the *t*-test formula. However, Dodd and Warner's (1983) *t*-test formula is the most used one [*e.g.* Brio et al (2002), Chang and Suk (1998), Gregory *et al.* (1997) and (1994), Seyhun (1986) and Yermack (1997)]. While Brown and Warner's (1985) is used by two study [Friederich et al (2002) and Roth and Saporoschenko (1999)] and Brown and Warner's (1980) is used by one UK study [Pope *et al.* (1990)]. As shown in the previous section, the difference between these formulas is due to the standardisation process employed. Brown and Warner's (1980), in particular, has many limitations, such that it uses the average of the sample securities standard deviations, while the sample consists of firms with different sizes, various industries, and varied time series of returns, *i.e.* non-synchronisation. This study follows Dodd and Warner's (1983) *t*-test, and report Brown and Warner's (1985), as well.

(5.4) THE DATA

This study employs all of the FTSE 100 company's transactions experiencing directors' trading in their own firms' ordinary shares (OS) and/or Executive Share Options (ESO).

As with all of UK literature, insider-trading transactions are collected personally. That is to say there is no institutional agency to record, update and maintain such transactions in the UK, such as the USA's *Centre for Research on Security Prices* (CRSP). FTSE100 companies' directors' trading covering the period 1/5/1999-1/7/2000 (hereafter called as the sample period) has been collected from Hemscott.NET's website[28]. Similar type of data source is used by Gregory *et al.* (1997), who collected the data from Directus Ltd. Other UK studies extracted data from the publications. King and Roell (1988) used the weekly "Share Stakes" section of the Financial Times; Pope *et al.* (1990) used LSE Weekly Official Intelligence; and Gregory et al. (1994) used LSE Companies' Information Fiche Service.

Nevertheless, the initial sample consists of 1200 director trades (96,245,713 shares). Of which, 285 transactions (31,029,571 shares) for directors exercised their executive share options (BEO), and 152 transactions (23,619,348 shares) for directors sold their executive share options (SSO). In addition, there are 508 transactions (13,683,912 shares) of which directors bought their own firm's ordinary share (Buy), and 157 transactions (19,842,685 shares) for selling ordinary share (Sell). Moreover, 98 transactions (8,070,197 shares) are excluded because these are non-markets and non-executive share options transactions, such as those resulted from inheritance, marriage,

[28] A public shareholdings investment company listed in LSE, with a URL: *www.hemscott.com*.

divorce, and gifts. In fact, ESO are included in the sample following literature findings that directors might use their private information to timing the exercises of their ESO [see, for instance, Carpenter and Remmers (2001), Hillier and Marshall (2002'c) and Yermack (1997)].

All securities of the FTSE100, with continuous market daily trading, have been chosen to implement the event test methodology mentioned above. Of 101 securities with directors' dealing, only 96 securities satisfy this condition. Market-based data, for each firm during the period 1/1/1997-1/1/2001, collected from Datastream. These are:

(1) Daily share's return (RI), [see section (5.4.2) for the justification behind using this RI not the share price].
(2) Daily FT all shares return (FTALLSH),
(3) Daily UK Treasury Bond Benchmark (UKTB).
(4) Daily volume traded in each FTSE100 securities.

FT all shares return (FTALLSH) is used as the market portfolio's return, despite the fact that all the sample's securities are of the FTSE 100 and despite the availability of this index return. The main reason behind this decision is that securities in FTSE100 are not constant. It is found that many securities have been removed from the FTSE100 and others are entered the group during the period 1997-2000. So, FTSE100 does not represent the whole securities in the sample at many points of time. FTALLSH, however, does. Moreover, the UK Treasury Bond (UKTB) return index is considered as a risk-free security.

(5.4.1) Descriptive Statistics of the Market Data

As this study uses daily data and the relevant UK literature uses monthly data, it's not possible to compare the statistics of this study with the UK studies. Table (5.2) shows that, on average, the daily return indices (RI's) of 96 securities of FTSE100 during the MM estimation period (16/6/1998-23/3/1999) is 0.11%, with standard deviation of 0.0286. While that of the FTALLSH return index, *i.e.* market portfolio return, is lower (0.03%) with lower (0.0130) standard deviation, as well. This is consistent with the Theory of Finance that more risk is associated with more return. Appendix (A5.1), however, provides descriptive statistics for each security's daily return during the MM estimation period.

Also, table (5.2) indicates that, on average, the range of security return indices is a dramatic one with a minimum RI's of -9.75% and a maximum of 11.41%, compared with -3.18% and 3.87% of the market return (R_m), respectively. The distribution of the average RI's has a skewness of 0.3 and kurtosis of 3.4. The percentile figures are not affected by the observed skewness of return index distribution. These provide further evidence on the RI's. The median, for example, shows average RI's of -0.02%, compared with 0.00% of R_m.

On the other hand, the overall statistical properties for each of securities return indices (RI's) and market return (R_m) during the test period (1/4/1999-31/8/2000) provide similar picture as that during the estimation period, *i.e.* reported in appendix (A5.1). A detailed descriptive statistics for each security's return during the abnormal returns test period is shown in appendix (A5.2).

On average, the daily RI's of 96 securities of FTSE100 during the estimation period is very close to that of the estimation period (0.10%), with similar standard deviation (0.0290), as well. However, that of the R_m is higher slightly than that of the estimation period (0.04%) with lower (0.0100) standard deviation. Once again, the returns of this period are consistent with the Theory of Finance.

In addition, the range, on average of RI's, is a dramatic one with a minimum RI's of -10.95% and a maximum of 14.09%, compared with -3.18% and 2.30% of the market return R_m, respectively. The distribution of the average RI's has a skewness of 0.4 and kurtosis of 4.0. The percentile figures are not affected by the observed skewness of return distribution. These provide further evidence on the RI's. The median, for example, shows average RI's similar to that of previous period (-0.02%), compared with a higher R_m median (0.06%).

(5.4.2) Normality of the Market Data

Brown and Warner (1985) argue that using daily share prices in the event studies have many problems. For example, it departs from normality and thus it ends up with incorrect test statistics inference. In addition, McWilliams and Siegel (1997) states that t-test is sensitive to outliers. Moreover, non-normality produces a biased and inconsistent market-model-parameters estimated from Ordinary Least Squares (OLS).

Sharpe (1970) suggested that stock returns should be used instead of stock prices in whatever model used. In fact, there are two reasons for this study to use securities returns instead of share prices. Firstly, security returns are complete and scale-free summary of the investment opportunity. Secondly, security returns have more attractive statistical properties than prices, such as stationarity [Campbell *et al.* (1997) p.9]. Moreover, it can be argued that the Datastream's security return indices, used in this study, are computationally more efficient than share prices. The distribution of the indices' time-series is a Student-*t*, uniform, but not necessarily is a normal distribution.

Testing of the underlying assumption of normality, or uniform, of the indices' time-series distribution is conducted by SPSS's one-sample Kolmogorov-Smirnov (Lilliefors significance correction) (K-S) test[29]. Appendix (A5.3) reports the shape of distribution and test of normality of all securities returns and the market return for the purpose of estimating the MM parameters, *i.e.* during the estimation period, as well as testing the abnormal returns, *i.e.* during the test period. Obviously, all RI's have a positive, but less than one, skewness statistics, with average kurtosis statistics of 3.4 during the estimation period and 4.0 during the test period. The average (K-S) statistics during the estimation period is 1.190 and that during the test period is 1.496. Both of which are insignificant at 5% (p-value < 0.05) or less, thus the non-normality hypothesis is rejected, and RIs are normally distributed. Figure (5.2a) shows the distribution of the average RI's during the estimation period. On the other hand, the market return shows negative skewness, although less than one, during both periods, *i.e.* -0.0037 and -0.2445. Also, the kurtosis statistics are less than one, during both periods, as well, i.e. 0.4078 and 0.2525. However, the K-S statistics during the two periods are 1.614

[29] It compares the observed cumulative distribution function for a variable with a specified theoretical distribution. If the index distributions found to be departed statistically significant from normality, then suitable data transformation has to be employed to correct the shape of the distribution.

[significant at less than 5% (p-value < 0.050)] and 0.735 [not significant at less than 5% (p-value < 0.050)], respectively. Figure (5.2b) shows the uniform distribution of the average RI's during the estimation and test periods.

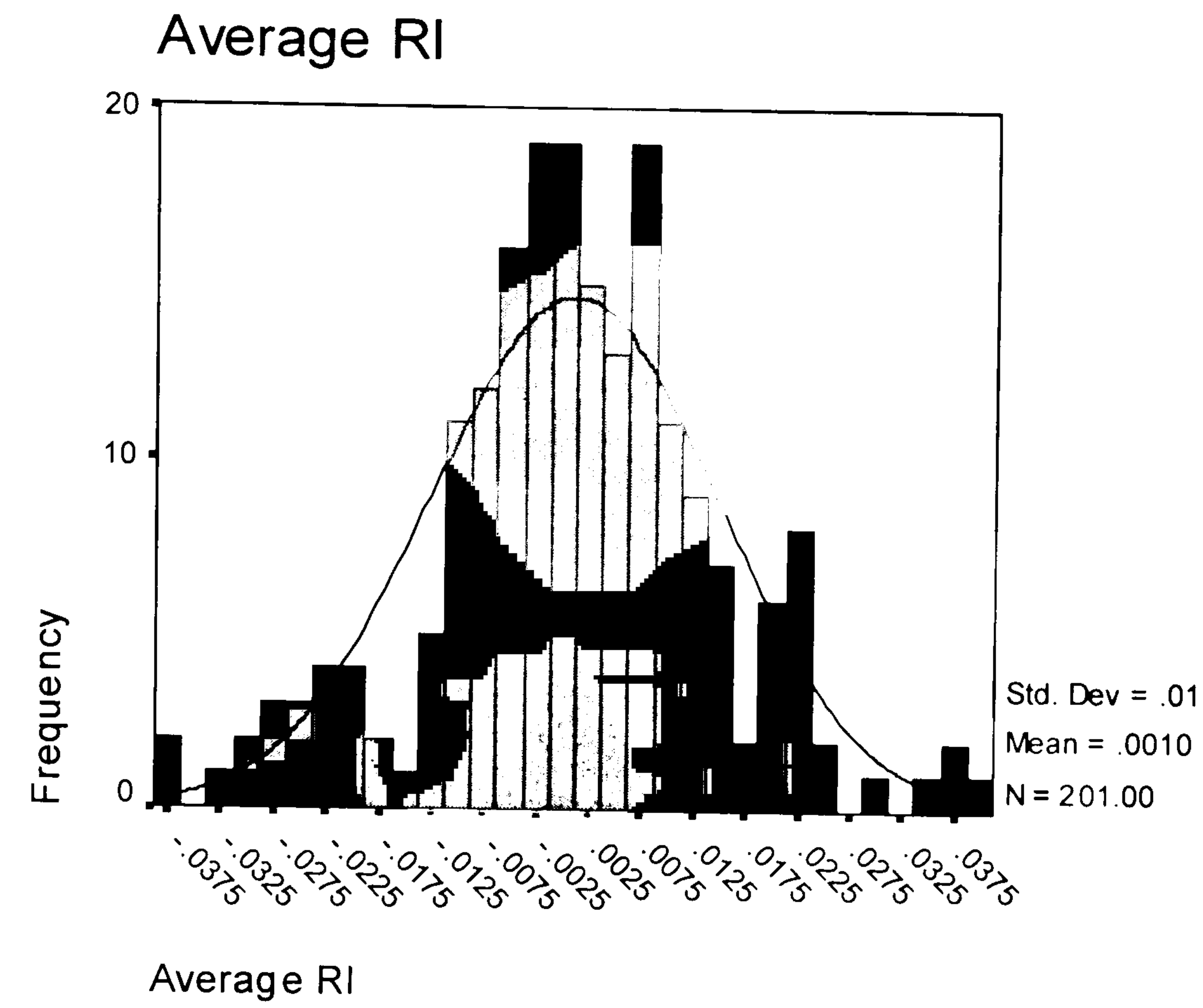
(5.4.3) Independence of the Market Data

The bivariate Pearson's correlation is calculated to measure the association between each security's return (RI) and the market return (R_m) during the estimation period and the test period. Appendix (A5.4) shows statistically significant strong association between FTSE100 security returns indices and market return during both periods. On average, the correlation during the estimation period (46.22%) is slightly more than that during the test period (31.92%).

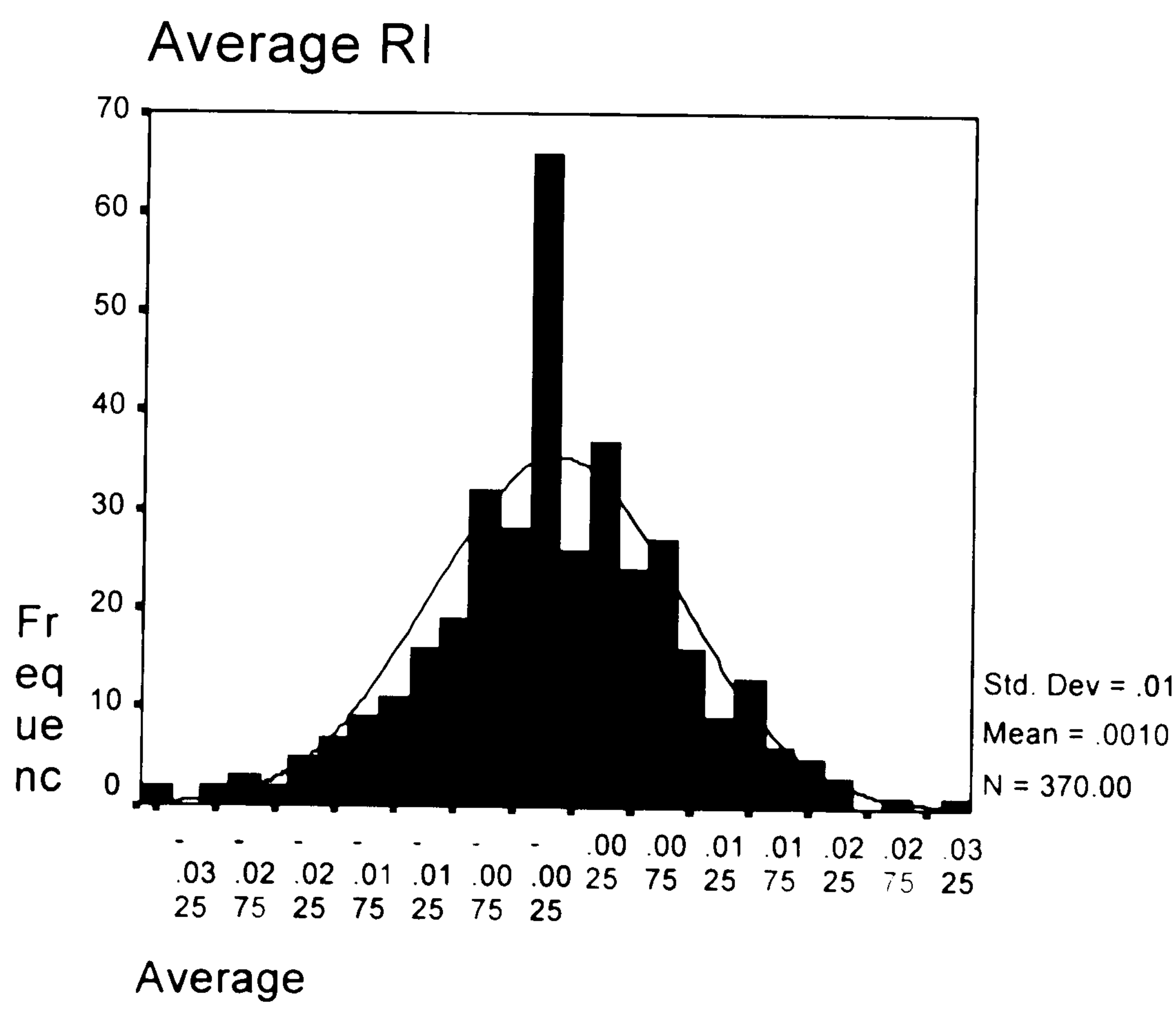
These results, somehow, justify the use of MM for estimating each security's alpha and beta. In other words, the underlying assumption of the MM that there is a linear relationship between the security's and the market returns is satisfied. However, since the market return does not fully and comprehensively explain the security's return, it is expected that the MM would have small level of R-Square Adjusted (R^2). Based on this phenomenon, this study uses the CAPM to estimate the security's expected return. The later model captures other factors that explain the security's return. Such these are the risk-free portfolio (R_f) and market risk premium (R_m - R_f).

Figure (5.2) The Distribution of the Average Returns of FTSE100

(a) During the Estimation Period (16/6/1998 - 23/3/1999)



(b) During the Test Period (1/4/1999 - 31/8/2000)



(5.5) TEST PROCEDURES

The methodology of event study stated in section (5.2) is employed using the data sets described in section (5.4), and the test procedures are performed, and the results are detailed in the following sections.

(5.5.1) Construction of Portfolio Signals

Section (5.2.1.1) introduced the event definitions. The procedures of producing single signal definition (section 5.2.1.1.1) resulted in with a filtered sample with 562 signals (54,622,027 shares) in four portfolios; Hold ESO's called (BEO), Sell ESO's called (SSO), Buy OS's (Buy) and Sell OS's (Sell). Of which the BEO portfolio consists of 110 signals (8,306,886 share options exercised), SSO portfolio with 62 (14,369,233 share options sold), Buy portfolio consists of 295 signals (13,430,629 ordinary shares), and Sell portfolio with 95 signals (18,515,279 ordinary shares).

All of the securities in the portfolios are of the Financial Times largest 100 companies. This indicates, in somehow, that the firms' size is consistent within and across the portfolios.

Also, the multiple signal definition (section 5.2.1.1.2) resulted in a sample with 185 transactions in four portfolios. Of which the BEO portfolio consists of 32 signals, SSO portfolio with 16 signals, Buy portfolio consists of 103 signals, and Sell portfolio with 34 signals.

Finally, the quartile quantified signal procedures[30] (section 5.2.1.1.3) resulted in sixteenth sub-portfolios with 562 signals, allocated as follows:

(1) The first quartile BEO portfolio (BEO-QS1) consists of 28 signals, of which the volume of signals ranges between 5 to 3710 shares per deal.

[30] In addition, the median of the volume signal definition (Footnote 4 above) resulted in four semi-portfolios with 13 signals, allocated as follows: Eight signals in the buy portfolio, One signal in the sell portfolio, two signals in the exercised and hold ESO portfolio, and two signals in the sell of ESO portfolio. Finally, the median of the ratio NV/TV signal definition (footnote 4 above) resulted in four semi-portfolios with 14 signals, allocated as follows: Nine signals in the buy portfolio, one signal in the sell portfolio, two signals in the exercised and hold ESO portfolio, and two signals in the sell of ESO portfolio.

(2) The second quartile BEO portfolio (BEO-QS2) with 28 signals and volume ranges between 4073 to 11184 shares.

(3) The third quartile BEO portfolio (BEO-QS3) with 27 signals ranges between 12366 to 69520 shares.

(4) The fourth quartile BEO portfolio (BEO-QS4) with 27 signals ranges between 70000 to 1000504 shares.

(5) The first quartile SSO portfolio (SSO-QS1) consists of 16 signals, of which the volume of signals ranges between 4000 to 21332 shares per deal.

(6) The second quartile SSO portfolio (SSO-QS2) with 15 signals and volume ranges between 23563 to 60000 shares.

(7) The third quartile SSO portfolio (SSO-QS3) with 15 signals ranges between 75000 to 165504 shares.

(8) The fourth quartile SSO portfolio (SSO-QS4) with 16 signals ranges between 179340 to 2500000 shares.

(9) The first quartile Buy portfolio (Buy-QS1) consists of 74 signals, of which the volume of signals ranges between 60 to 1524 shares per deal.

(10) The second quartile Buy portfolio (Buy-QS2) with 73 signals and volume ranges between 1593 to 3884 shares.

(11) The third quartile Buy portfolio (Buy-QS3) with 74 signals ranges between 4000 to 11000 shares.

(12) The fourth quartile Buy portfolio (Buy-QS4) with 74 signals ranges between 11850 to 8546456 shares.

(13) The first quartile Sell portfolio (Sell-QS1) consists of 24 signals, of which the volume of signals ranges between 5 and 7000 shares per deal.

(14) The second quartile Sell portfolio (Sell-QS2) with 24 signals and volume ranges between 7076 and 20179 shares.

(15) The third quartile Sell portfolio (Sell-QS3) with 24 signals ranges between 20689 to 100000 shares.

(16) The fourth quartile Sell portfolio (Sell-QS4) with 24 signals ranges between 106000 to 3300000 shares.

(5.5.2) The Returns

For the purpose of this study, daily percentage changes of security's return are calculated for sample's securities, FTALLSH return index, and UKTB benchmark, during the period -250 day to -50 days of the sample period. That is from 16/6/1998 to 23/3/1999 (hereafter called the estimation period). Of the FTSE100, 96 securities have had a continuous return index time series. Statistically, the sample average daily rate of return of the sample is 0.11% with 0.00286 standard deviation, i.e. the risk. The mean studentized range of the returns is 0.2123 for the 99% fractile, which indicates that the sample is normally distributed. Other indicators, such as the average time-series skewness (0.2983) and kurtosis (3.3904), support this conclusion. The above results are consistent with the empirical findings of Xing and Howe (2003), who examined the relationship between risk and returns in the LSE and find significant positive association between them.

(5.5.2.1) The Market Model

The simple Market Model (MM), equation (1), is used to estimate the intercept term α and systematic risk β of a security, by regressing the market return at time t, to the security's return during the estimation period[31]. Since the test period, per which abnormal returns are being measured, should be completely separated from the estimation period, the MM parameters used in line with events occurring in one year are estimated from data on previous year [Givoly and Palmon (1985)]. Specifically, the 50 days exclusion period is used to take into account the assumption that insiders may trade following a period of abnormal performance by the company [Gregory *et al.* (1994)]. Appendix (A5.5) details the results. It shows that, of 96 securities' β, 94 ones are significant at 5% degree of significance or less. While there are only 4 securities' α are significant at 5%, and one security at 10%. However, with the weakness of, but very much accepted R^2 Adjusted, *i.e.* 23.5% on average, the general conclusion is consistent with the market model assumption. That, security's return is subject to other factors, not

[31] For a sub-sample, each of the market return at time –15, -7, 0, +7, +15 days is regressed solely to the security's return at time t. Then the coefficients of variation from each regression equation are summed up. The result then is compared with the initial regression coefficient. The findings are almost the same, and the difference is very slightly. However, the Adjusted R-Square of the initial regression MM has improved significantly. The sample securities are correlated weakly, but significantly, with FTALLSH at time 0. However, this becomes rather weakly but negatively insignificant at time -7, +7, and +15.

only market return, such as the return on a risk-free security and the security's risk premium, *i.e.* [β_i*($R_m - R_f$)].

The return on a security and the return on the market portfolio are each measured over the same trading interval. Thus, OLS estimates of MM parameters are, initially, unbiased and consistent. Otherwise, alternative techniques for parameter estimation have to be considered[32].

Most importantly is the error terms, *i.e.* residuals, resulted from the MM. Empirical investigation of the residuals shows that:

(1) The sum of the residuals of each security in the sample equals to zero (0.0000),

(2) The mean residuals of the whole sample equals to zero (0.0000), with a significant standard error (0.0018) at 5%,

(3) The sum of the differences between the average residuals ($A\Omega_i$) and the residuals (Ω_{it}), equation 4, of each security in the sample equals to zero (0.00000).

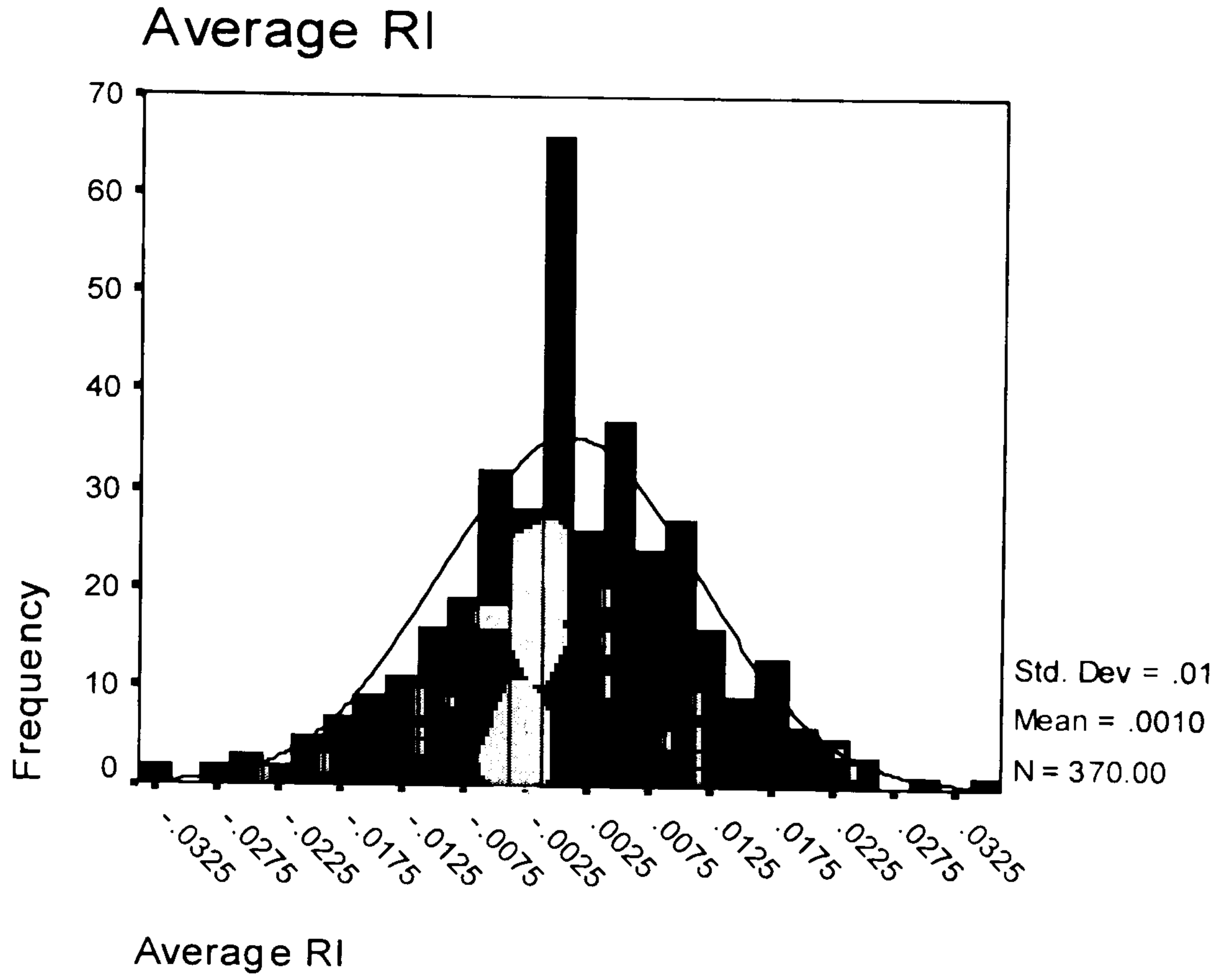
(4) There is no significant correlation between the market return (Rm_t) and each security's residuals (Ω_{it}).

(5) Thus, the data are hetroscedasticity-free and the error term is unit normally distributed.

The main statistical indicators of the MM residuals, summarised in appendix (A5.5), support the validity of the MM parameters. Figure (5.3) shows the shape of the distribution of the average 96 securities residuals.

[32] For non-synchronous trading and MM parameter estimation, see, for example, Campbell *et al.* (1997), p. 84, and p. 128-129.

Figure (5.3) The Distribution of the Average Residuals of 96 Securities of FTSE100 During the Estimation Period (6/1998 - 3/1999)



(5.5.2.2) The Capital Asset Pricing Model

The *ex-post* CAPM, equation (4), is used to calculate the expected return on a security (i) at time (t) during the test period 1/4/1999 to 31/8/2000. On average, the expected return on FTSE100 is 0.12% compared with 0.05% on risk-free security and 0.04% on market portfolio. These figures are consistent with the Theory of Finance. Table (5.2) summarises the main statistical properties of these computations.

(5.5.2.3) Standardised Abnormal Returns

The abnormal return (AR_{it}), equation (5), is calculated for the test period 1/4/1999 to 31/8/2000. Table (5.2) reports the statistics, as well. One general conclusion can be drawn from the table. That, there is at best only weak evidence that securities have positive abnormal returns. The average AR_T for FTSE100 (96 securities) is -0.02% with 0.0301 standard deviation, 0.4497 skewness and 3.4939 kurtosis, compared with +0.05% average return on R_f and +0.04% on R_m during the same period. These results are consistent with relevant literature, such as Fama *et al.* (1969).

Table (5.2) Main Statistical Properties of FTSE100 Securities' Parameters Used in the Event Test

Item (Period)	No. Of Firms	Range	Min	Max	**Mean**	Mean Std Error	**Std. Deviation**	Variance	Skewness **Stat.**	Skewness Std Error	Kurtosis **Stat.**	Kurtosis Std Error
Return (16/6/98-23/3/99)	96	0.2123	-0.0978	0.1145	**0.0011**	0.0021	**0.0287**	0.0009	**0.298**	0.178	**3.390**	0.353
Beta (16/6/98-23/3/99)	96	0.7290	0.0710	0.8000	**0.4623**	0.0164	**0.1607**	0.0258	**-0.15**	0.246	**-0.53**	0.488
Alpha (16/6/98-23/3/99)	96	0.0177	-0.0036	0.0141	**0.0008**	0.0002	**0.0022**	0.0000	**2.93**	0.246	**14.42**	0.488
F-Value (16/6/98-23/3/99)	96	352.56	1.0000	353.56	**72.854**	6.4964	**63.651**	4051.52	**1.54**	0.246	**3.09**	0.488
DW (16/6/98-23/3/99)	96	1.4190	1.2910	2.7100	**1.8954**	0.0221	**0.2163**	0.0468	**0.55**	0.246	**2.49**	0.488
R-Square Adjusted (16/6/98-23/3/99)	96	0.6380	0.0000	0.6380	**0.2351**	0.0152	**0.1485**	0.0220	**0.55**	0.246	**-0.48**	0.488
MM Residuals (16/6/98-23/3/99)	96	0.1833	-0.0831	0.1002	**0.0000**	0.0018	**0.0242**	0.0006	**0.334**	0.172	**3.541**	0.342
E(R) = CAPM (1/4/1999-31/8/2000)	96	0.0428	-0.0198	0.0230	**0.0012**	0.0004	**0.0075**	0.0001	**0.022**	0.127	**0.033**	0.253
Return (1/4/1999-31/8/2000)	96	0.2483	-0.1087	0.1396	**0.0010**	0.0015	**0.0288**	0.0009	**0.416**	0.127	**3.971**	0.253
Abnormal Return (1/4/1999-31/8/2000)	96	0.2548	-0.1119	0.1429	**-0.0002**	0.0016	**0.0301**	0.0010	**0.450**	0.127	**3.494**	0.253

In addition, a cross-sectional dependence of each portfolio's securities abnormal returns is investigated. That is by measuring the correlation coefficient between subsequent abnormal returns during the event window, *viz.* t0 to t+12, as well as other windows, as reported below. Appendix (A5.6) reports the correlation during different event windows. The average correlation of cross-sectional AR's of BEO's portfolio during the period from t0 to t+12 is -1.98%. And -0.13% of SSO's portfolio, +0.12% of Buy portfolio, and +7.61% of Sell portfolio. All of which are, obviously, have weak correlation. Of the UK studies, King and Roell (1988) report "some signs of autocorrelation among weekly excess returns, but with first order autocorrelation coefficients all well within the band of 10%"[33].

It can be seen clearly that all of the reported correlation is weak. Thus, there are no overlaps exist in the successive abnormal returns within the event windows. This, in fact, is a result of the weak level of market efficiency, per which the security returns over-time and across-securities are independent. That the security returns represents a Random Walk.

The abnormal returns for each single (SS), multiple (MS), and quantitative (QS) signal is computed according to equation (5)[34]. Then the average for each signal-portfolio is calculated following equation (6). Table (5.3) shows the results.

Moreover, to examine the statistical significance of the mean standardized AR during the event period, the test statistics are computed according to DW1983 equation (11), and BW1985, equation (15)[35]. Following the literature, the significance level is set to be at 5%. Since the alternative hypotheses have one-way directions, *viz.* positive for buy portfolios and negative for sell portfolios, then the test used is a one-sided test. Table (5.3) reports the test statistics during the event window, as well. The abnormal return, standard deviation, and test-statistics for longer event windows are reported in the appendix (A5.8).

Except for Friederich *et al.* (2002) and King and Roell (1988), none of UK studies report the rates of abnormal return during the event window. In addition, King and Roell, used monthly data, have not reported the rates of return at the event (publication) date itself. However, they found significantly positive AR after 1, 3, and 12 months of event date, for buy portfolio, and insignificantly positive AR for sell portfolio during the same periods. The same results are found when relating the AR to the market return and to the risk-adjusted benchmark.

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[33] King and Roell (1988), see the note underneath table 2, p. 179.

[34] As well as the signal defined by the median of the transaction's volume and that of the ratio of NV/TV, as explained in footnote 4, and the results are reported in appendix (A5.7).

[35] Also, Brown and Warner's (1980) *t*-test (BW1980) has been employed. The results, reported in the appendix (A5.7), show clearly that BW1980's produces different *t*-values than that of BW1985. Obviously, this is due to the different methodologies used for computation the variations, standardization (non-standardization) of the abnormal return in BW1985, (in BW1980), and the *t*-tests, as well.

In this section, the results in table (5.3) will be reviewed in terms of the outcomes of employing different signal definition. While section (5.6) interprets the empirical findings in terms of the research hypothesis, section (5.7) examines the robustness of the results.

It can be seen from table (5.3) and appendix (A5.9) that different signal definition produced different aspects of abnormal returns. It seems that none of the signal definition (MS, QS1, QS2, QS3, or QS4)[36] produced more significant results than those of the primary single signal (SS) definition used in this study. However, several points can be drawn, with the single signal (SS) definition is being as the benchmark, from employing different signal definition. These include firstly in terms of the sign of the ARs, secondly in terms of the magnitude, and thirdly in terms of the significance of these results, as follows:

(1) The Sign of the Abnormal Returns: It seems that employing more sophisticated signal definition improves the abnormal returns' (AR) sign. For example, there are 9(10) positive ARs resulted from the QS1 (QS3) of the buy portfolio, compared with 8 in the benchmark. In the sell portfolio, on the other hand, MS produced 9 negative ARs as the benchmark, while QS4 produced 11. This picture becomes clearer when moving to the ESO portfolios. MS, QS1, and QS4 of the BEO portfolio resulted in more positive ARs (8, 9, and 7 respectively) than the benchmark, which has 6 positive ARs. The figures of SSO portfolio confirm this conclusion. MS, QS1, QS2, and QS3 produced 8, 10, 6, and 6 negative ARs respectively, while SS has only 5.

[36] In addition to the median of the volume of transactions, and the median of the ratio of NVTV, as explained in footnote 4 above.

Table (5.3) FTSE100 Average AR and Test Statistics During the Event Window

(a) Ordinary Shares Portfolios:

AR	N	t0	t+1	t+2	t+3	T+4	t+5	t+6	t+7	t+8	t+9	t+10	t+11	t+12
Buy(SS)	295	-0.0001	0.0016	0.0005	0.0007	-0.0011	**0.0033**	**0.0035**	0.0000	**0.0046**	-0.0014	0.0008	-0.0019	-0.0002
T-Value		0.1611	1.4623*	0.1768	0.3604	-0.5851	2.2515**	2.1577**	-0.1569	2.9689*	-1.2490*	0.6795	-1.1816	0.0348
Buy(MS)	103	0.0001	0.0007	-0.0031	0.0003	-0.0017	0.0026	**0.0054**	-0.0027	**0.0062**	-0.0019	0.0013	-0.0015	0.0034
T-Value		0.2356	0.2713	-1.527*	0.2138	-0.3656	1.3629*	2.0705**	-1.2577	2.3898***	-1.0715	0.4667	-0.6321	1.6151*
Buy(1QS)	74	-0.0040	-0.0013	0.0014	0.0018	0.0002	0.0008	0.0029	-0.0022	0.0012	0.0002	0.0021	-0.0035	0.0026
T-Value		-1.4446*	-0.5203	0.6229	1.0357	0.2800	0.3893	1.2168	-1.0805	0.0978	0.0306	0.3633	-1.2609	0.7674
Buy(2QS)	73	0.0041	**0.0057**	0.0016	-0.0014	0.0005	**0.0059**	0.0026	0.0011	0.0034	**-0.0045**	-0.0033	-0.0021	**-0.0056**
T-Value		1.5665*	2.7324***	0.1694	-1.0679	0.4005	1.9336**	0.9033	0.6506	1.2562	-1.9008**	-0.9912	-0.6880	-1.9904**
Buy(3QS)	74	0.0032	0.0004	0.0011	0.0032	-0.0008	0.0025	0.0039	0.0034	**0.0054**	-0.0051	0.0027	-0.0040	-0.0018
T-Value		1.0515	0.2784	0.5094	0.8524	-0.6156	0.6054	0.8621	1.0956	2.0527**	-1.4668*	1.1951	-1.0763	-0.5457
Buy(4QS)	74	-0.0038	0.0015	-0.0021	-0.0010	-0.0043	0.0040	0.0045	-0.0022	**0.0083**	0.0036	0.0017	0.0019	**0.0040**
T-Value		-0.8536	0.4409	-0.9129	-0.1121	-1.2227	1.5978*	1.2940*	-0.9473	2.5565***	0.8671	0.7847	0.6781	1.8137**
Sell(SS)	95	**0.0091**	-0.0006	**-0.0084**	-0.0015	0.0019	-0.0033	-0.0043	-0.0001	0.0007	0.0024	-0.0038	**-0.0066**	**-0.0072**
T-Value		2.4141***	-0.4179	-3.2754***	-0.6983	0.5687	-0.9590	-1.1586	0.2095	0.1602	0.5285	-1.4554*	-1.6828**	-1.7788**
Sell(MS)	34	0.0087	**-0.0160**	**-0.0107**	0.0038	-0.0006	-0.0054	-0.0053	-0.0026	-0.0024	0.0021	0.0065	-0.0046	-0.0080
T-Value		0.9311	-2.9920***	-2.0606**	0.7311	-0.2474	-1.2239	-0.3947	-0.5072	-0.4748	0.0196	1.0595	-0.5548	-1.1538
Sell(1QS)	24	0.0001	-0.0042	**-0.0151**	-0.0029	0.0054	**-0.0123**	-0.0031	0.0064	0.0054	0.0005	**-0.0114**	**-0.0096**	-0.0066
T-Value		0.0376	-0.8062	-3.0592***	-0.6093	0.6643	-2.1990**	-0.2333	1.2653	0.9679	0.0190	-2.2165**	-1.8549**	-0.9964
Sell(QS2)	23	0.0060	0.0009	-0.0076	0.0063	0.0043	-0.0015	-0.0065	-0.0065	**-0.0092**	-0.0041	0.0048	**0.0090**	0.0000
T-Value		0.4100	-0.3441	-1.1480	1.2171	0.5355	-0.2120	-0.6174	-1.4686*	-1.8761**	-1.1288	0.6868	2.0088**	0.0183
Sell(QS3)	24	**0.0150**	**0.0142**	-0.0078	-0.0056	0.0022	0.0038	0.0019	0.0022	-0.0014	0.0042	-0.0079	-0.0096	-0.0103
T-Value		2.8139***	2.1260**	-1.6094*	-1.1774	0.1466	0.7929	0.2039	0.3343	0.2041	1.1250	-1.5049*	-1.5898*	-1.2791
Sell(QS4)	24	0.0151	**-0.0132**	-0.0032	-0.0033	-0.0040	-0.0030	-0.0095	-0.0027	-0.0076	0.0088	-0.0007	**-0.0158**	-0.0115
T-Value		1.5501*	-1.8144**	-0.7240	-0.7941	-0.2037	-0.2944	-1.6713*	0.2549	0.9832	1.0075	0.1221	-1.8913**	1.2837

Notes: (Buy) indicates Buy Ordinary Shares (OS) portfolio, (Sell) represents Sell OS portfolio, (BEO) denotes Holding the Exercised Executive Share Options (ESO) portfolio, and (SSO) means Selling the Exercised ESO portfolio; (SS) indicates the Single Signal definition of the event, (MS) represents the Multiple Signal, (QS1) to (QS4) denotes the First to Fourth Quartile Quantitative Signal; (N) represents the number of signals (transactions) in each portfolio; and (***) denotes that the Abnormal Return (AR) is significant at 1%, (**) significant at 5%, and (*) at 10%.

Cont. Table (5.3) FTSE100 Average Abnormal Returns and Test Statistics During the Event Window
(b) Executive Share Options Portfolios:

AR	N	t0	t+1	t+2	t+3	T+4	t+5	t+6	t+7	t+8	t+9	t+10	t+11	t+12
BEO(SS)	110	-0.0019	**0.0039**	**-0.0051**	**-0.0034**	0.0022	-0.0028	**-0.0061**	-0.0027	**0.0061**	0.0014	0.0023	**0.0046**	-0.0013
T-Value		-0.2506	1.7159**	-2.3820***	-1.5713 **	1.1535	-0.1673	-2.2583**	-0.7851	1.7659**	0.4093	1.1220	2.3750***	-0.3219
BEO(MS)	32	0.0003	0.0092	0.0007	**-0.0103**	**0.0084**	-0.0063	-0.0082	-0.0035	**0.0124**	-0.0017	0.0021	**0.0090**	0.0027
T-Value		0.4848	1.6968*	-0.5268	-2.3994**	2.2251**	-1.0870	-1.5631*	-0.8393	2.4908***	-0.2176	0.3176	1.7152***	0.7433
BEO(QS1)	28	0.0047	0.0003	**-0.0072**	-0.0029	**0.0079**	**0.0075**	-0.0024	**-0.0089**	0.0021	0.0029	0.0010	**0.0115**	-0.0070
T-Value		1.2423	-0.0797	-1.7715**	-1.2813	2.1378**	1.9258**	-0.5928	1.9435**	0.2023	0.6210	0.2705	2.9260***	1.1983
BEO(QS2)	28	-0.0078	0.0052	**-0.0118**	-0.0001	0.0012	-0.0028	-0.0066	0.0004	0.0026	-0.0011	0.0010	0.0005	-0.0006
T-Value		-1.5533*	-1.3743*	-2.6961***	-0.0610	0.2956	-0.5697	-1.4608*	-0.1089	0.7180	-0.3324	0.2900	0.4141	-0.2501
BEO(QS3)	27	0.0026	**0.0121**	**-0.0098**	-0.0071	0.0014	-0.0102	-0.0004	-0.0111	0.0106	0.0023	-0.0020	0.0012	0.0000
T-Value		0.8000	2.2025**	-1.7144**	-1.0806	-0.1507	-1.3160*	0.2601	-1.6211*	1.5872*	0.0433	-0.1920	0.6577	-0.1611
BEO(QS4)	27	-0.0072	-0.0018	0.0086	-0.0039	-0.0018	-0.0062	**-0.0153**	**0.0090**	0.0093	0.0016	**0.0094**	0.0050	0.0024
T-Value		1.2200	0.1490	1.4335*	-0.6035	-0.1693	-0.8139	-2.6102***	1.9937**	1.3532*	0.4128	1.8392**	0.5186	0.6245
SSO(SS)	62	-0.0025	0.0003	-0.0020	0.0045	-0.0044	0.0017	0.0006	0.0008	0.0011	0.0024	-0.0027	0.0037	-0.0030
T-Value		-0.8330	0.2842	-0.5938	1.0601	-1.1070	0.4917	0.3225	0.4727	0.3782	0.8918	-1.0477	0.9161	-0.9537
SSO(MS)	16	0.0094	-0.0052	-0.0054	0.0096	-0.0087	0.0033	-0.0019	-0.0093	-0.0070	-0.0038	0.0075	0.0038	0.0039
T-Value		0.9536	-0.5589	-0.7531	1.4781*	-0.9921	0.3389	-0.1859	-1.4047*	-1.0236	-0.4238	1.0416	0.5730	0.5815
SSO(QS1)	16	-0.0100	**-0.0113**	-0.0066	0.0007	-0.0011	-0.0008	-0.0010	-0.0006	-0.0027	0.0107	-0.0023	0.0051	-0.0046
T-Value		-1.1920	-1.9132**	-0.8943	-0.0847	-0.0203	0.1026	-0.2533	-0.1701	-0.7607	1.5435*	0.1591	0.6586	-0.4331
SSO(QS2)	15	**-0.0165**	-0.0010	0.0018	0.0020	-0.0061	0.0122	0.0085	0.0051	-0.0024	0.0056	-0.0039	**0.0157**	-0.0080
T-Value		-1.8656**	0.2004	0.1881	0.4321	0.3638	1.2577	1.5604*	-0.0505	-0.7038	0.6666	-0.6959	1.8043**	-0.7812
SSO(QS3)	15	**0.0175**	**0.0099**	-0.0041	**0.0106**	**-0.0181**	-0.0056	-0.0015	0.0054	0.0051	0.0012	-0.0063	**-0.0141**	0.0023
T-Value		2.2995**	1.8427**	-0.4446	1.5952**	-2.5740**	-1.3058	-0.1148	1.2940	1.1061	0.2611	-1.4418*	-2.0491**	0.3946
SSO(QS4)	16	-0.0005	0.0041	0.0010	0.0049	0.0066	0.0011	-0.0032	-0.0062	0.0044	-0.0080	0.0013	0.0079	-0.0016
T-Value		-0.1710	0.8281	0.2749	0.6372	1.0337	-0.0681	-0.6737	-0.8602	1.0197	-1.1203	0.2691	0.9185	0.1285

Notes: (Buy) indicates Buy Ordinary Shares (OS) portfolio, (Sell) represents Sell OS portfolio, (BEO) denotes Holding the Exercised Executive Share Options (ESO) portfolio, and (SSO) means Selling the Exercised ESO portfolio; (SS) indicates the Single Signal definition of the event, (MS) represents the Multiple Signal, (QS1) to (QS4) denotes the First to Fourth Quartile Quantitative Signal; (N) represents the number of signals (transactions) in each portfolio; and (***) denotes that the Abnormal Return (AR) is significant at 1%, (**) significant at 5%, and (*) at 10%.

(2) The Magnitude of the Abnormal Returns: An investigation into the AR's sign of certain days within the event window shows varied results. At the event day (t0), for example, the AR signs (rates of return) of buy portfolio resulted from QS1, and QS4 are similar (higher) to that of SS, which has a negative sign. While all signals definition of sell portfolio produced similar positive signs, with varied results. On the other hand, only QS2 and QS4 of BEO portfolio produced similar negative sign as that of the benchmark, with varied rates. While all signals definition, except QS3, of SSO portfolio resulted in with the same negative AR's sign of SS, with varied rates of return.

The picture at the assumed day of disclosure (t6) is much better. All signals definition of the buy (BEO) portfolio has produced similar positive (negative) signs as of the SS. As for the rates of the abnormal return, MS, QS3 and QS4 (MS, QS2 and QS4) produced higher rates than SS of the buy (BEO) portfolio. Of the sell portfolio, all signals, except QS3 produced similar signs as of the SS, while the rates are higher. The AR's sign and rates of SSO portfolio improved with all signals, except QS2.

Finally, the last day of the event window (t12) shows various results. The rate of the buy portfolio's AR has increased and the sign improved. That of the sell portfolio has mixed results. While the sign not changed, except in QS2, the rate increased by MS, QS3, and QS4. Of the BEO portfolio, the sign (rate) improved (increased) from negative (0.0013) in the benchmark to positive (0.0027 and 0.0024) by employing MS and QS4 respectively. QS1, QS2, and QS4 produced similar sign as of the SS, with higher rates of ARs in QS1 and QS2.

(3) The Significance of the Results: No clear conclusion in this regard can be reached by employing different signals definition. For example, the SS of buy portfolio has 3 significantly positive ARs at t5, t6, and t7. While that of MS (QS4) has 2 at t6 and t8 (t8 and t12). Interestingly, QS2 produced 2 significantly positive ARs at t1 and t5, and 2 negative ARs at t9 and t12. Only 1 significant AR resulted from QS3, while none from QS1.

Consistent with this study expectation, the benchmark (SS) of the sell portfolio has 1 significantly positive AR at t0, and 3 negative at t2, t11, and t12. While each of MS, QS2 and QS4 produced 2 significantly negative ARs at (t1 and t2), (t8 and t11), and (t1 and t11) respectively; QS3 has 2, as well, but positive ARs (t0 and t1). QS1 has 4 significantly negative ARs at t1, t5, t10, and t11.

On the other hand, ESO portfolios have, relatively, better results. For example, MS and QS1 of BEO portfolio have more significantly positive ARs. While the SS and MS of the SSO portfolio have no significant ARs at all. However, QS1, QS2 and QS4 have 4, 3, and 1 significantly negative ARs, respectively. QS3 has 2 significant ARs but with positive signs. Appendix (A5.9) summarises the above results.

(5.5.3.4) Standardised Cumulative Abnormal Returns

Finally, the average abnormal returns for each single (SS), multiple (MS), and quantitative (QS) signal-portfolio, at time t, are accumulated, from (t_0) to (t_{12}), according to equation (11). Moreover, following Dodd and Warner (1983), the AR is standardized and compounded over the event window to yield standardized cumulative abnormal return (SCAR), *i.e.* equation (10). The average ($\acute{S}CAR_t$) is calculated according to equation (12). Then, the test of significance of the $\acute{S}CAR_t$, according to equation (11), is computed. Table (5.4) states the results for each signal-portfolio[37].

It can be seen from the table that it is until the 6th day the single signal CAR_{t6} (+0.83%) of buy OS portfolio becomes significant at 10% and on the 8th day (CAR_{t8} = +1.29%) and thereafter at 5% or less. While that of sell OS becomes significant on the 11th and 12th day at 5% or less (CAR= -1.44% and -2.16%, respectively).

On the other hand, holding exercised ESO portfolio shows negative single signal CAR throughout the event window, with only two significant CARs (CAR_{t6} at 10% level of significance, and CAR_{t7} at 5%). Similarly, the sell ESO shows negative CAR throughout the event window, but none of which is significant.

Since these results are of daily measurements, it is not possible to make an appropriate comparison with relevant literature, which used monthly data, with different length of event windows.

[37] Although the Event Window is defined as a period of 12 days (from t0 to t+12), appendix (A5.10) reports the result of longer event windows, as well. These are 7 days (t6 to t12), 18 days (t-6 to t12), 55 days (t6 to t60), 60 days (t0 to t60) and 90 days (t-30 and t60).

In terms of this study hypothesis, the explanation of the significance of these findings shall be discussed in the interpretation section below. As for the significance of different signal definitions used, it can be seen from table (5.4) above that the significance of CAR for each portfolio differs as with the signal definition. Appendix (A5.11) summarises these results, firstly in terms of the sign of CAR, and secondly in terms of the significance of CARs according to each signal definition. For example, CAR of SS buy portfolio was significant during the sub-period t8 to t12; while no significance CAR resulted from MS, QS1, and QS4 during that period. Four significant CARs were found in QS2 (t6 to t9), and three in QS3 (t8 to t9).

As for the magnitude of CAR resulted from each signal definition, appendix (A5.12) includes the figures that represent CAR for each portfolio according to different signals. At t6, for example, QS2 (QS4) of the buy portfolio produced the highest (lowest) CAR of all signals, while at t12, QS4 (QS1) produced the highest (lowest) CAR. The SS maintains its position, the third highest CAR, throughout the event window. The same results produced in the sell portfolio. Of which, however, QS1 produced the lowest CAR, while SS maintains its fourth lowest CAR.

On the other hand, the shape of ESO's CARs was consistent with those of OS's. For example, MS of BEO portfolio has a negative CAR at t6 and increased sharply to the highest position CAR at t12. Likewise, QS4 upwards from the lowest negative CAR at t6 to the second highest positive CAR at t12.

Table (5.4) FTSE100 CAR and Test Statistic, During the Event Window

(a) Ordinary Shares Portfolios:

CAR	N	t0	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9	t+10	t+11	t+12
Buy(SS)	295	-0.0001	0.0015	0.0020	0.0026	0.0015	0.0048	0.0083	0.0083	**0.0129**	**0.0115**	**0.0123**	**0.0104**	**0.0102**
T-Value		-0.0209	0.2871	0.3818	0.5105	0.2984	0.9334	1.6137*	1.6203*	2.5108***	2.2309**	2.3895*	2.0203**	1.9867**
Buy(MS)	103	0.0001	0.0008	-0.0023	-0.0020	-0.0037	-0.0011	0.0043	0.0016	0.0078	0.0058	0.0071	0.0057	0.0091
T-Value		0.0165	0.0948	-0.2655	-0.2360	-0.4343	-0.1313	0.5017	0.1833	0.9079	0.6847	0.8354	0.6639	1.0655
Buy(1QS)	74	-0.0040	-0.0053	-0.0039	-0.0021	-0.0019	-0.0011	0.0018	-0.0004	0.0009	0.0011	0.0032	-0.0002	0.0024
T-Value		-0.3849	-0.5147	-0.3745	-0.2006	-0.1850	-0.1067	0.1771	-0.0351	0.0854	0.1059	0.3140	-0.0234	0.2295
Buy(2QS)	73	0.0042	0.0100	0.0115	0.0101	0.0107	0.0165	**0.0191**	**0.0203**	**0.0237**	**0.0192**	0.0159	0.0138	0.0082
T-Value		0.4011	0.9562	1.1082	0.9770	1.0300	1.5959*	1.8502**	1.9585**	2.2873**	1.8555**	1.5344***	1.3312***	0.7926
Buy(3QS)	74	0.0032	0.0037	0.0048	0.0080	0.0072	0.0097	0.0136	0.0170	**0.0224**	**0.0172**	**0.0200**	0.0160	0.0142
T-Value		0.3153	0.3581	0.4643	0.7759	0.7029	0.9429	1.3241*	1.6558*	2.1773**	1.6790**	1.9457**	1.5588***	1.3803
Buy(4QS)	74	-0.0038	-0.0023	-0.0044	-0.0054	-0.0097	-0.0057	-0.0012	-0.0034	0.0049	0.0085	0.0101	0.0121	0.0161
T-Value		-0.3704	-0.2199	-0.4282	-0.5264	-0.9451	-0.5577	-0.1170	-0.3307	0.4786	0.8264	0.9872	1.1762	1.5696***
Sell(SS)	95	0.0091	0.0085	0.0000	-0.0014	0.0005	-0.0028	-0.0071	-0.0071	-0.0064	-0.0040	-0.0078	**-0.0144**	**-0.0216**
T-Value		0.9987	0.9357	0.0055	-0.1574	0.0547	-0.3048	-0.7801	-0.7882	-0.7094	-0.4400	-0.8607	-1.5927**	-2.3867*
Sell(MS)	34	0.0087	-0.0073	-0.0181	-0.0143	-0.0147	-0.0202	-0.0255	**-0.0281**	**-0.0305**	**-0.0285**	-0.0219	**-0.0265**	**-0.0345**
T-Value		0.5723	-0.4848	-1.1938b	-0.9441	-0.9824	-1.3363	-1.6852*	-1.8574**	-2.0152**	1.8789**	-1.4479***	-1.7492**	-2.2763**
Sell(1QS)	24	0.0001	-0.0041	-0.0192	-0.0221	-0.0167	-0.0290	**-0.0321**	-0.0257	-0.0204	-0.0199	-0.0312	**-0.0409**	**-0.0475**
T-Value		0.0044	-0.2272	-1.0632	-1.2238	-0.9259	-1.6070*	-1.7809**	-1.4253*	-1.1286	-1.0799	-1.6710***	-2.1712**	-2.5153*
Sell(QS2)	23	0.0060	0.0069	-0.0008	0.0055	0.0098	0.0083	0.0018	-0.0047	-0.0139	-0.0180	-0.0133	-0.0043	-0.0043
T-Value		0.3239	0.3739	-0.0408	0.3007	0.5318	0.4513	0.0958	-0.2566	-0.7544	-0.9772	-0.7192	-0.2309	-0.2325
Sell(QS3)	24	0.0150	0.0292	0.0214	0.0158	0.0179	0.0218	0.0236	0.0259	0.0245	0.0287	0.0208	0.0112	0.0094
T-Value		0.8296	1.6182*	1.1864	0.8735	0.9932	1.2060	1.3107	1.4345*	1.3580*	1.5593*	1.1304	0.6090	0.0511
Sell(QS4)	24	0.0151	0.0019	-0.0013	-0.0047	-0.0087	-0.0117	-0.0212	-0.0239	-0.0163	-0.0075	-0.0082	-0.0240	**-0.0355**
T-Value		0.8360	0.1045	-0.0723	-0.2572	-0.4790	-0.6473	-1.1757	-1.3262*	-0.9024	-0.4054	-0.4434	-1.3005	-1.9271**

Notes: (Buy) indicates Buy Ordinary Shares (OS) portfolio, (Sell) represents Sell OS portfolio, (BEO) denotes Holding the Exercised Executive Share Options (ESO) portfolio, and (SSO) means Selling the Exercised ESO portfolio; (SS) indicates the Single Signal definition of the event, (MS) represents the Multiple Signal, (QS1) to (QS4) denotes the First to Fourth Quartile Quantitative Signal; (N) represents the number of signals (transactions) in each portfolio; and (***) denotes that the Cumulative Abnormal Return (CAR) is significant at 1%, (**) significant at 5%, and (*) at 10%.

Cont. Table (5.4) FTSE100 CAR and Test Statistic, During the Event Window

(b) Executive Share Options Portfolios:

BEO(SS)	110	-0.0019	0.0020	-0.0032	-0.0066	-0.0044	-0.0072	-0.0134	**-0.0160**	-0.0100	-0.0085	-0.0062	-0.0017	-0.0030
T-Value		-0.2295	0.2347	-0.3756	-0.7849	-0.5221	-0.8565	-1.5851*	-1.9030**	-1.1815	-1.0142	-0.7393	-0.1980	-0.3573
BEO(MS)	32	0.0003	0.0095	0.0102	-0.0001	0.0083	0.0020	-0.0062	-0.0097	0.0027	0.0010	0.0031	0.0121	0.0147
T-Value		0.0168	0.6084	0.6542	-0.0036	0.5345	0.1287	-0.3950	-0.6182	0.1751	0.0652	0.1973	0.7733	0.9442
BEO(QS1)	28	0.0047	0.0050	-0.0022	-0.0051	0.0029	0.0103	0.0079	-0.0010	0.0011	0.0040	0.0050	0.0165	0.0095
T-Value		0.2830	0.3021	-0.1290	-0.3029	0.1722	0.6193	0.4745	-0.0569	0.0676	0.2415	0.3010	0.9892	0.5701
BEO(QS2)	28	-0.0078	-0.0027	-0.0144	-0.0145	-0.0133	-0.0161	-0.0227	-0.0223	-0.0197	-0.0208	-0.0198	-0.0193	-0.0200
T-Value		-0.4687	-0.1590	-0.8677	-0.8707	-0.7982	-0.9655	-1.3598*	-1.3343*	-1.1794	-1.2453	-1.1878	-1.1585	-1.1953
BEO(QS3)	27	0.0026	0.0146	0.0048	-0.0023	-0.0009	-0.0111	-0.0115	-0.0226	-0.0120	-0.0097	-0.0117	-0.0106	-0.0105
T-Value		0.7744	1.4884*	0.8510	0.4025	0.4985	-0.1216	-0.1099	-0.8489	-0.3538	-0.1534	-0.1517	-0.0668	-0.0632
BEO(QS4)	27	-0.0072	-0.0090	-0.0004	-0.0043	-0.0062	-0.0123	-0.0276	-0.0186	-0.0093	-0.0077	0.0017	0.0067	0.0091
T-Value		-0.1874	-0.1498	0.4164	-0.1202	0.2725	-0.5721	-0.9191	-0.1032	-0.1504	0.0490	0.5284	0.2616	0.6237
SSO(SS)	62	-0.0025	-0.0022	-0.0042	0.0003	-0.0042	-0.0025	-0.0019	-0.0011	0.0000	0.0023	-0.0004	0.0033	0.0004
T-Value		-0.2224	-0.1971	-0.3764	0.0230	-0.3715	-0.2234	-0.1689	-0.0973	-0.0016	0.2085	-0.0354	0.2980	0.0331
SSO(MS)	16	0.0094	0.0042	-0.0012	0.0084	-0.0003	0.0030	0.0010	-0.0083	-0.0153	-0.0190	-0.0115	-0.0077	-0.0038
T-Value		0.4237	0.1893	-0.0549	0.3781	-0.0150	0.1347	0.0473	-0.3756	-0.6908	-0.8615	-0.5224	-0.3506	-0.1726
SSO(QS1)	16	-0.0100	-0.0214	-0.0279	-0.0273	-0.0284	-0.0292	-0.0303	-0.0309	-0.0336	-0.0229	-0.0252	-0.0201	-0.0247
T-Value		-0.3762	-0.8213	-1.1601	-1.0800	-1.3060	-1.5047*	-1.6161*	-1.6605*	-1.6479*	-1.0850	-1.3197	-1.1686	-1.3904*
SSO(QS2)	15	-0.0165	-0.0175	-0.0158	-0.0137	-0.0198	-0.0076	0.0009	0.0061	0.0036	0.0093	0.0054	0.0211	0.0131
T-Value		-0.7006	-0.7421	-0.6675	-0.5814	-0.8387	-0.3208	0.0393	0.2567	0.1539	0.3925	0.2287	0.8957	0.5552
SSO(QS3)	15	0.0175	0.0274	0.0232	0.0338	0.0157	0.0101	0.0086	0.0140	0.0191	0.0203	0.0140	-0.0001	0.0022
T-Value		0.7412	1.1592	0.9841	1.4317*	0.6650	0.4278	0.3648	0.5944	0.8099	0.8607	0.5930	-0.0054	0.0921
SSO(QS4)	16	-0.0005	0.0036	0.0046	0.0095	0.0161	0.0172	0.0140	0.0078	0.0122	0.0042	0.0055	0.0134	0.0118
T-Value		0.0725	0.2254	0.3540	0.4820	0.7714	0.9462	0.7635	0.5016	0.6723	0.2029	0.1917	0.4519	0.3931

Notes: (Buy) indicates Buy Ordinary Shares (OS) portfolio, (Sell) represents Sell OS portfolio, (BEO) denotes Holding the Exercised Executive Share Options (ESO) portfolio, and (SSO) means Selling the Exercised ESO portfolio; (SS) indicates the Single Signal definition of the event, (MS) represents the Multiple Signal, (QS1) to (QS4) denotes the First to Fourth Quartile Quantitative Signal; (N) represents the number of signals (transactions) in each portfolio; and (***) denotes that the Cumulative Abnormal Return (CAR) is significant at 1%, (**) significant at 5%, and (*) at 10%.

The shape of SSO's CAR is expected to be negatively downgrading one by the end of the event window. Of all signals, only MS and QS1 produced this expected shape. However, QS3 has such a line, but with positive CAR throughout the event window. In addition, QS2 has an up warding CAR, from negative at t0 to almost zero at t6 to the highest positive CAR at t12. QS4, however, produced the same CAR as of QS2, but CAR was always positive.

It seems that moving from simple signal definition, *viz.* SS, to more sophisticated ones, *viz.* MS and QS, significant CARs become closer to the event date. CARs of different signals of sell portfolios, for example, present a clear picture to this conclusion. CAR of SS was significant at t11 and t12, but that of MS, it becomes significant at t7 and t8, and that of QS1 at t6. For the purpose of this study hypothesis, these findings shall be elaborated more in the following section. Appendix (A5.12) summarises the above results and section (5.7.5) examines the signals definition effect on CARs..

(5.6) Empirical Findings

As the samples indicate, the empirical results will be interpreted by each type of directors trading portfolios. These are buy and sell ordinary share (OS) portfolios and those of holding and selling the exercised executive share options (ESO) portfolios. The logic behind this separation is, as Seyhun (1988/b) states, that it is expected that insiders' open market transactions are more likely to represent action taken as a result of private price-sensitive and inside information. On the other hand, ESO transactions can be seen differently. As these shares are already granted by the firm to its directors, then trading in these shares are more likely to be seen as an action taken for different reasons than those of OS transactions. Such as for ownership purposes (exercising and keep holding ESO) or liquidity (selling ESO) matters. However, there still inside information can be detected from such transactions. Literature shows that the timing of these transactions can be seen as an indicator on the current market share price, *viz.* over-or-undervalued [see, for example, Carpenter and Remmers (2001) and Yermack (1997)].

Nevertheless, the null hypothesis is the same for all. That is, directors trading in their own company's securities are not profitable. That is the test of H_0: CAR ≤ 0 (CAR ≥ 0), or alternatively H_1: CAR > 0 for the "Buy" portfolios, and CAR < 0 for "Sell" portfolios, respectively, at a one-tailed significance level of 5%. Tables (5.3) and (5.4) above report ARs and CARs, respectively, over 12 days after the event date and their significance. Examination of portfolio performance will follow.

Taking into consideration the empirical findings presented in previous sections (5.5.3.3) and (5.5.3.4), it is not unreasonable to assume that none of other signals definition (MS or any of QSs) has shown a significantly consistent result with those reported in previous literature [section (5.3)], and in comparison with the primary signal definition used in this study, *i.e.* SS. Thus, none of which can be considered as an alternative signal definition to that of SS. Therefore, the empirical findings will be explained mainly by SS's results. However, other signals shall be reported, where applicable, in line with SS.

(5.6.1) Directors Trading in Ordinary Shares (OS)

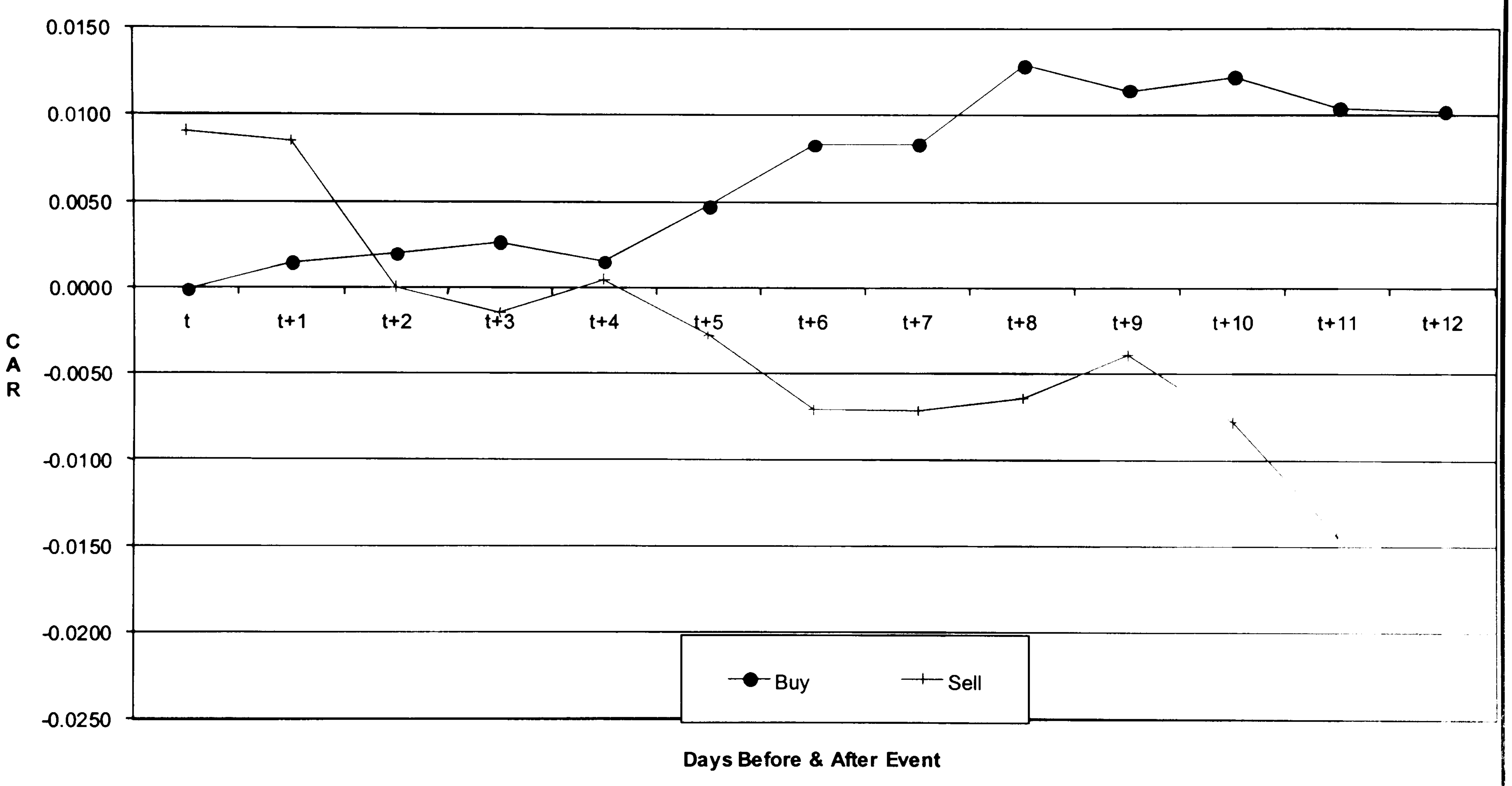
Based upon previous literature, it is not unreasonable to expect that CAR of buy (sell) portfolio is an up-warding (a down-warding) line during the event window. Figure (5.4) shows that CARs of buy and sell ordinary shares portfolios are in line with such expectations[38].

(5.6.1.1) Buying Ordinary Shares Portfolio (Buy)

The empirical result shown in table (5.4) shows that CAR of directors buying their own firm's ordinary shares is significantly positive at the end of the assumed day of disclosure (t6 = 0.83%) as well as at the end of the event window (t12 = 1.02%). A combination of t-values of CAR (DW1983) and AR (BW1985) shows that all of the returns during the period (t5 to t12) are significant. This leads to conclude that the null hypothesis of zero or negative CAR is rejected, and accept the alternative one.

[38] CARs produced by other signals, reported in appendix (A5.12a), show similar trend.

Figure (5.4) Single Signal CAR of FTSE100 Directors Trading Buy and Sell Ordinary Shares Portfolios During the Event Window (T0 to T12)



However, none of the returns is distinguishable from zero during the first five days (t0 to t4). This finding is consistent with this research event definition. In other words, the market recognises the directors trading, and reflects the signal as soon as it has been disclosed. Since it was not possible to specify the exact date of the disclosure for each transaction. The results indicate that it takes, on average, seven working days to disclose the directors trading, *i.e.* at which the market significantly reflects the new information.

More investigation into these findings shows that:

(1) Strategically, a longer window is recommended for this type of portfolio. CARs for longer event windows are calculated, and higher values are found. For example, CAR after 20 days of the transaction date (t0 to t19) is 2.29% significant[39]. And that for 50 days (t0 to t49) is 3.21% significant[40]. Also, CAR for 60 days is 3.57% significant[41], as shown in appendix (A5.13a).

(2) Initially, the insignificant findings during the first five days of the event window would suggest that the event window have to start from the sixth days, instead of the date of the transaction. This would be a wise decision, if and only if the exact disclosure date is known for each transaction in the portfolio. However, it is not. Nevertheless, as these transactions executed in the market, the event window has to start from the date of transaction (t0) to incorporate the market makers reactions.

(3) Taking the presumable disclosure date as the event date, appendix (A5.13a) shows that the null hypothesis is still rejectable, and that the level of CAR is magnified up until day 60.

(4) It is not unreasonable to assume that insiders might have disclosed their price-sensitive, inside, information privately, *i.e.* to friends and/or relatives. That and most importantly are the timing of their trading. Chakravarty and McConnell (1999) and (1997) and Meulbroek (1992), for example, investigated illegal insider trading, per which insiders revealed their private information to others (tippee). This issue is investigated by extending the event window to include six days before the event date. The empirical results state that such an assumption does not hold for FTSE100 directors dealing. On one hand, the ARs during the pre-event date (t-6 to t-1) are all negative, with significant returns on day -3 and -1. On the other hand,

[39] By DW1983 and BW1980 at 1%, and by BW1985 at 10%.
[40] By DW1983 at 1% and BW1980 at 5%.
[41] According to BW1985 at 5%.

the CAR for this event window (t-6 to t12) is negative, as well, with significant returns during the period t-2 to t5. Appendix (A5.13a) shows the results.

(5) The results of other signal definitions, reported in table (5.4), show that, on one hand, the level of CARs resulted from multiple signals (MS) and first-quartile quantitative signal (QS1) are much below that of single signal (SS). On the other hand, there were no significant CARs produced by MS and QS1 during the event window. However, table (5.3) shows that AR at t6 and t8 resulted from MS are significant. The same can be said about QS4, except for CAR at t11 and t12, which are higher, but still insignificant. QS2 and QS3, however, are consistent, to a certain degree, with SS. The returns are much higher than those of SS all through the event window up until t11. ARs and CARs of QS2 are significant at t6, t7, t8 and t9, while ARs and CARs of QS3 are significant at t9 and t10. This leads to conclude that using different signal definitions does not much alter the results. Appendix (A5.12a) shows CAR of different signal definitions of buy ordinary shares portfolio during the event window.

(6) The percentiles of 295 CARs of buying ordinary shares portfolio are calculated. All the percentiles 1%, 5%, 10% and 90%, 95% and 99% depart significantly more and more from the CAR as the accumulation process continues. By the end of the event window, the 95% (90%) percentile takes a value of 14.90% (12.54%) and the 5% (10%) percentile takes a value of -13.61% (-9.49%). The same picture is shown when using different event windows. These results are consistent with Brown and Warner (1980)[42]. That is so because of the frequency of the data used, *i.e.* daily transactions.

(5.6.1.2) Selling Ordinary Shares Portfolio (Sell)

CAR of directors selling their own firm's ordinary shares at presumable day of disclosure (t6) is -0.71%, however, insignificant; and that at the end of the event window (t12) is -2.16% significant. Moreover, CAR at t11 and t12 are the only significant returns. These findings lead to reject the null hypothesis of zero or positive CAR, and thus accept the alternative one with negative CAR.

However, a further investigation into these findings shows that:

[42] See Figure 2 in BW1980.

(1) A shorter window is recommended for this type of portfolio. There were no significant CARs around the event day or the presumed disclosure day. AR, however, on the event day (t0) and (t2) are significant.

(2) As these transactions executed in the market, the event window has to start from the event date (t0) to incorporate the market makers reactions.

(3) As the regulation prohibits the directors from trading on private and price-sensitive information within 60 days, it is not expected to see any firm-specific event or key announcement before at least sixty days of the transaction date. Thus, an investigation into longer windows is necessary to seek evidence on the information content, *viz.* bad news, of directors selling. Appendix (A5.13b) graphs CAR during the period -30 days up to +60 days after the transaction date.

(4) Therefore, CARs during longer event windows are examined and found to be significantly and negatively big enough to indicate that directors avoid abnormal losses by selling their shares. For example, CARs for the event windows (t0 to t19), (t0 to t49), and (t0 to t59) are -3.06%, -3.42%, and -9.13% respectively. As longer the event window as CAR becomes increasingly negative. Likewise, CARs during the event windows (t0 to t+21, t+22, and t+60) are all significant at 1%. Appendix (A5.13b) graphs CAR during these event windows.

(5) One might, however, argue that directors' selling might be made upon for reasons other than price-sensitive information. Such that for liquidity reason. Such clear indicators have to be verified, or otherwise, by relevant measures.

(6) It can be seen from table (5.4) that MS and QS1 produced more significant CARs that SS, particularly around the assumed disclosure date. CAR resulted from QS1 at t6 is -3.21% significant, and that of MS at t7 is 2.81% significant. None of the CARs produced by QS2 and QS4 is significant. In addition, the level of significant CAR produced by each of QS1, QS4 and MS is much higher (-4.75%, -3.55% and -3.45%, respectively) than that of SS (-2.16%). Appendix (A5.12b) graphs CAR resulted from different signal definition during the event window.

(7) Once again, the percentiles of 95 CARs of selling ordinary shares portfolio were selected. All the percentiles 1%, 5%, 10% and 90%, 95% and 99% depart significantly more and more from the CAR as the accumulation process continues. By the end of the event window, the 95% (90%) percentile takes a value of 18.90% (15.21%) and the 5% (10%) takes a value of -25.22% (-18.44%). The same

conclusion can be reached by using different event windows, particularly t+0 to t+60.

(5.6.2) Directors Trading in Executive Share Options (ESO)

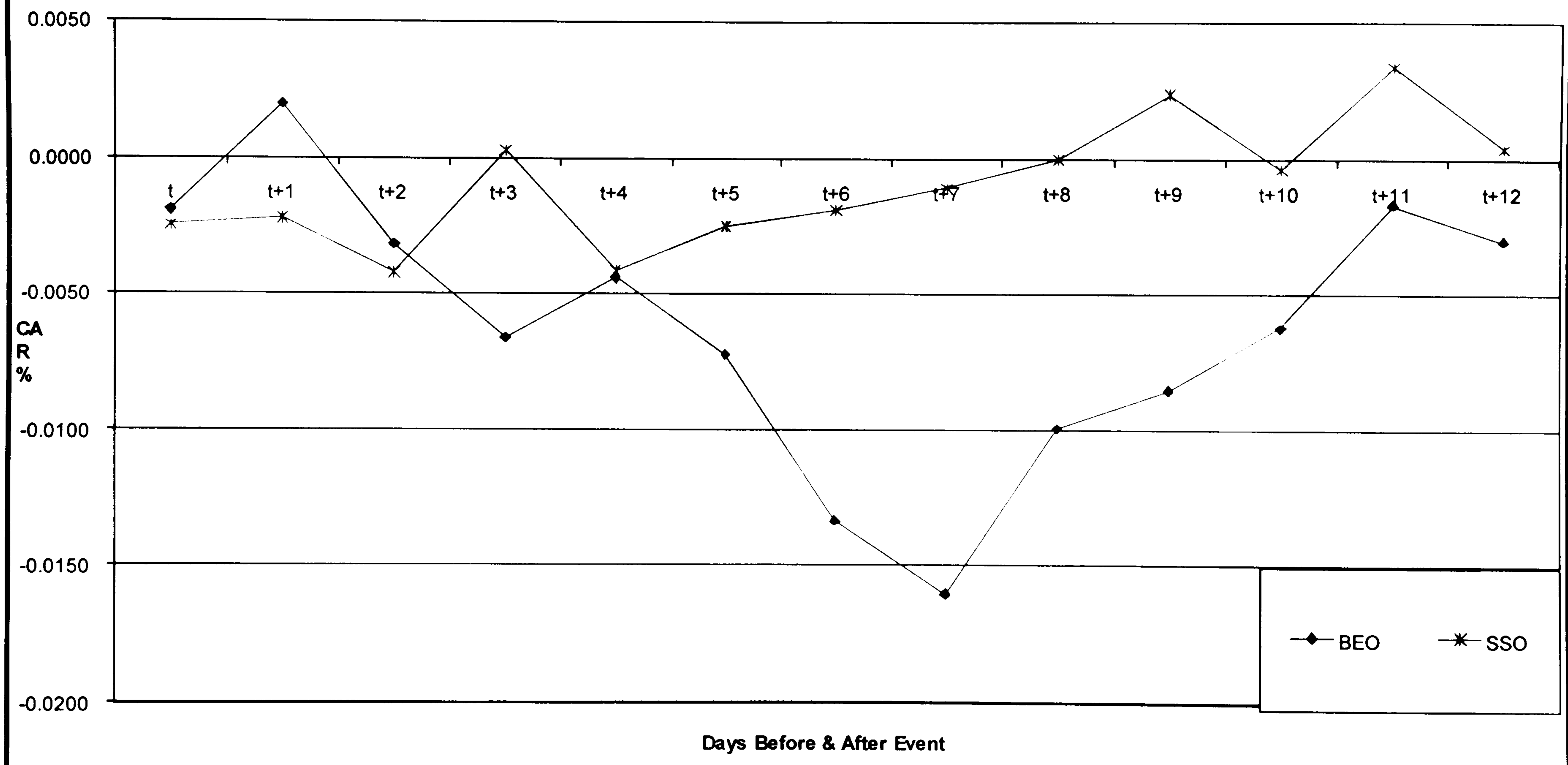
The executive share options portfolios have shown a completely different picture than that presented by ordinary share portfolios. Figure (5.5) shows that CARs for holding (BEO) and selling (SSO) exercised executive share options portfolios are not in line with this research expectation.

Three reasons might explain such diversion. The first lies in the special features of these shares. On one hand, ESO represents a reward for long term performance. So that they are tied with various measures of firm's performance. Such these are productivity, financial and/or structural (merger and acquisition) measures. So that it is not unreasonable to expect that directors exercise and liquidate (sell) their ESO, as part of their compensation. On the other hand, the timing of both exercising and selling these ESO. The first one (the timing of exercising ESO) has less informational content, as it is, almost, a contractual matter. While the second one (the timing of selling ESO) might be considered as a signal.

The second reason has to do with, firstly, the length of the event window, and consequently, the frequency of the data used. As these ESO are of long term, using monthly data with longer event window can be of fundamental importance in the event study outcomes.

The third reason that might explain the unexpected results is due to sample size. Holding the exercised ESO portfolio consists of 110 signals compared with 295 of the buy OS portfolio. Also, selling the exercised ESO portfolio consists of 62 signals, compared with 95 of the sell OS portfolio. These results are, in fact, consistent with literature such as Carpenter and Remmers (2001).

Figure (5.5) Single Signal CAR of FTSE100 Directors Holding and Selling Exercised Executive Share Options Portfolios During the Event Window (T0 to T12)



(5.6.2.1) Holding Exercised Executive Share Options Portfolio (BEO)

A test of the expected hypothesis, H1, that CAR of BEO portfolio is significantly positive shows that CAR at t6 is -1.34%, but weakly significant[43]. In addition, CAR at the end of the event window is -0.30% insignificant. Throughout the event window, only CAR at t7 is significant, however, negative. This leads to conclude that the null hypothesis cannot be rejected. The reasons put forward in the introduction of this section (5.6.2) might explain this result.

However, when taking into consideration the type of these transactions, one should consider the following explanations:

(1) As this type of transactions is not executed in the market, the market makers do have no information about these transactions during the pre-disclosure period (t0 to t6).

(2) Even within the event window, the portfolio's performance starts to adjust, however slightly, as after t7 per which CAR increased from –1.60% significant to –1.00%, -0.85%, -0.62% and –0.17% significant at t8, t9, t10 and t11, respectively. AR figures in table (5.3) confirm this result.

(3) As the firm discloses these transactions, it is expected that the market will start to reflect the signal derived from these transactions after the disclosure date. This implies that the market makers have not received and reflected upon the signal until the disclosure date.

(4) So, if the event window is to start from t6, instead of t0, then the portfolio performance would start to adjust and CAR would become positive as from t10 onward. Appendix (A5.10c) reports CAR and appendix (A5.13c) shows the graphs during different event windows.

(5) Thus, it is obvious that the market starts to reflect the signal, resulted from director's decision to exercise and hold their ESOs, immediately after disclosure.

(6) A wise investment strategy indicates that significant abnormal returns can be achieved by taking longer position in this sort of portfolio. A longer event window is investigated, appendix (A5.13c), and found no abnormal returns. This might be explained by insignificant volume, or insignificant number of firm's directors involved in such transactions.

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[43] At 10% according to (DW1983) and AR at 5% according to (BW1985).

(7) Other signals definition investigated this issue, the results are reported in table (5.4), summarised in appendix (A5.11c) and graphed in appendix (A5.12c). It can be seen that none of these signals produced significant CAR at any time during the event window. However, MS and QS1 produced positive CAR from t8 to the end of the event window, per which CAR is 1.47% and 0.95%, respectively. In addition, CAR of QS4 is 0.91%. This leads to accept the null hypothesis.

(8) On the other hand, table (5.3) shows that MS produced significantly positive ARs at t4, t8, and t11; while those of QS1 are at t4, t5, and t11. QS2 has no significantly positive AR, while QS3 has only one at t1, and QS4 has two at t7 and t10. In contrast with point (7) above, SS and MS can reject the null hypothesis at t1 and t8, at t4 by employing MS and QS1, at t11 by SS, MS and QS1.

(9) Once again, selected percentiles of 110 CARs of BEO's portfolio were computed. All the percentiles 1%, 5%, 10% and 90%, 95% and 99% depart significantly more and more from the ACAR as the accumulation process continues. By the end of the day 12th, the 95% (90%) percentile takes a value of 14.11% (11.27%) and the 5% (10%) takes a value of -19.01% (-12.89%). The same conclusion can be reached by using different event windows, particularly t6 to t60. Here, a 95% (90%) percentile of CAR takes a value of 39.95% (30.44%) at day 60th, and a value of -31.93% (-28.75%) at 5% (10%) percentile.

(5.6.2.2) Selling Executive Share Options Portfolio (SSO)

Unsurprisingly, a test of the null hypothesis that CAR of SSO portfolio is significantly zero or positive cannot be rejected. CAR of directors selling their executive share options portfolio during the sub-window (t0 to t6) is -0.19% with insignificant t-statistics, and that during the event window (t0 to t12) is insignificantly positive 0.04%. These insignificant results indicate that the research expectations are not consistent with the empirical findings. However, the following points would help in understanding the behaviour of this portfolio:

(1) The wise investment strategy indicates that significant abnormal returns can be achieved by taking shorter position in directors-selling their ESO portfolios. However, none of the various signals definitions reported in table (5.4) produced significantly negative CAR at any time during the event window. However, QS1, QS2 and QS4 have significantly negative ARs, table (5.3), at t2, t1, and t4 respectively.

(2) Evidently, the portfolio's performance starts to adjust, however insignificantly slightly, from as early as the beginning of the event window. That is from t0 to t−2, per which CARs are -0.25%, -0.22%, and -0.42% respectively. None of which is significant.

(3) This implies that the market makers have got the signal very early. But the magnitude of their reaction, *viz.* bid/ask spread is minor, and that of the market participants is insignificant. Once again, this is because of either insignificant volume of shares traded, insignificant number of firm's directors involved in such transactions, or the small size of the sample, *i.e.* N=62. However, N represents the whole FTSE100 securities during the test period.

(4) These sorts of transaction are of course executed in the market. Thus, the event window has to start from t0, although there is no disclosure but until t6.

(5) Different signal definition investigated these insignificant findings, but without any alteration to the conclusion reached by SS.

(6) An extended event windows, for example, (t0 to t60), (t6 to t12) and (t6 to t60), have been examined and found that none of these windows' CARs is significant. However, a 5% significant level of AR is found at t14 (-0.33%), t26 (-0.82%), t31 (-2.34%), and at t60 (-2.74%).

(7) Based on an assumption that the directors might have seen the market share price over a certain period of time is overvalued. Rationally, they decided to sell their holdings of ESOs to gain from this arbitrage period. If this assumption is true, it is expected that in an event window of (t-30 to t60), the AR's be positive until the disclosure date (t6) and a reversal action would take place after that date.

(8) An investigation into the validity of this assumption shows, interestingly, that, on one hand, the average AR during the pre-disclosure period (t-7 to t6) is positive at 0.23%, with 69% daily positive ARs. While that during the post-disclosure period (t6 to t60) is negative at -0.05%, with 54% negative ARs. On the other hand, CAR is significant at 5% or less for each day during the period (t-2 to t60). Appendix (A5.10d) shows CAR during different event windows, and appendix (A5.13d) graphs these CARs.

(9) Another investigation for different event window shows similar results. That the average AR during the pre-disclosure period (t-30 to t6) is positive at 0.23%, with 81% positive ARs. While that during the post-disclosure period (t6 to t60) is

negative at -0.05%, with 54% negative ARs. Also, SCAR is significant at 5% or less for each day during the period (t-14 to t60).

(10) Once again, different percentiles of 62 CARs of SSO's portfolio were selected. All the percentiles 1%, 5%, 10% and 90%, 95% and 99% depart more and more from the ACAR as the accumulation process continues. By the end of the day 12th, the 95% (90%) percentile takes a value of 16.00% (11.50%) and the 5% (10%) percentile takes a value of -13.68% (-12.43%). Similar results can be reached by using different event windows.

(5.7) ROBUSTNESS CHECKS

It seems that the analysis in previous section (5.6) is based upon five implicit assumptions. These are (1) there is no liquidity problem in the sample securities, (2) there is no confounding events, so that the abnormal returns of directors was not a result of other events occurring during the same period of director trades, (3) the same abnormal returns patterns from director trading is persistent through every year in the sample, (4) there is no significant variations in the size of the sample firms, and (5) various signals definition produce various level of information, *i.e.* CAR.

This section is aimed at relaxing these assumptions and re-runs the analysis, taking into consideration the thin trading, confounding events, year-by-year analysis, firm size and various signals definition as analysed in the following subsections.

(5.7.1) Thin Trading

Infrequent trading in some securities results in a number of zero returns in the data. Thus, causing a problem of liquidity, bias the estimated beta and thus the abnormal return measures, and increases autocorrelation and could pose a problem in significance testing [Friederich *et al.* (2002)].

Section (5.4) shows that, of FTSE100 securities in the sample firms, there were 5 securities with non-continuous market daily trading and thus, excluded from the sample. The remaining 96 securities with frequent trading have been used in the analysis. Thus, there is no thin trading problem in the sample and thus, no need for adjustment[44].

[44] However, for thin trading adjustment, see Scholes and Williams (1977).

(5.7.2) Confounding Events

Event study results are always criticized by an argument that the abnormal returns was a result of other events occurred in the same event window under investigation. Thus, it could be argued that the abnormal return of directors dealing was a result of, say annual or interim earnings announcements. Such investigation is particularly necessary given the restrictions under the Model Code on the timing of director dealings 60 days prior to key firm announcement/event [see section (2.8)]. Hillier and Marshall (1998) examined the propensity of the UK directors to trade around earnings announcements and found that they time their trade along with earnings announcement date[45].

In order to test whether directors trading abnormal return was a result of other key firm events, each of the buy and sell portfolios has been partitioned into two according to whether or not a director traded in the 13 days (the length of the event windows) after any key firm announcement (such as interim or annual earnings announcement, first or third quarter results or primary or annual results)[46]. This resulted in four portfolios:

(1) Directors buying within 13 days of key firm announcement, with 27 transactions.

(2) Directors buying after 13 days of key firm announcement, with 268 transactions.

(3) Directors selling within 13 days of key firm announcement, with 5 transactions.

(4) Directors selling after 13 days of key firm announcement, with 90 transactions.

On one hand, only very small number of director dealings is within 13 days of other key firm events, 9% of the total directors buying transactions and 5% of the total directors selling deals. On the other hand, the average volume of these transactions (8820 shares for buying and 168446 shares for selling) is much less than those after 13 days of other events (17369 shares for buying and 196367 shares for selling). Table (5.5) presents the cumulative abnormal returns during different event windows for director buying and selling within and after 13 days of key firm announcement/event. It can be seen from the table that almost the same pattern of CAR is consistent with those of table (5.4) and appendix (A5.10) during most event windows. For example, 12 (60) days CAR of directors buying after 13 days of key firm announcement [table (5.5)] and that of single signal for all directors buying [table (5.4)] is 1% (3%) significant. Similarly, 12 (60)

[45] Sivakumar and Waymire (1994) provided evidence on the US insider trading around earnings announcements.

days CAR of directors selling after 13 days of key firm announcement [table (5.5)] and that of single signal for all directors buying [table (5.4)] is 2.4% (9%) significant.

Table (5.5) Cumulative Abnormal Returns During Different Event Windows For Buy & Sell Portfolios Within and After 13 Days of Key Firm Announcement Confounding Effects

CAR During Event Windows	Buy Portfolios Within (N=27)	Buy Portfolios After (N=268)	Sell Portfolios Within (N=5)	Sell Portfolios After (N=90)
-30 to 0 days	-4.43%	**-4.11%**	3.56%	**6.89%**
T-Statistic	-0.985	**-2.8791*****	0.3402	**2.7952*****
-6 to +12 days	1.24%	-0.74%	**10.75%**	*-1.47%*
T-Statistic	0.6015	-1.1398	**2.2500****	*-1.3043**
0 to +12 days	1.81%	**0.94%**	2.44%	**-2.42%**
T-Statistic	1.0625	**1.7471****	0.6166	**-2.5953*****
0 to +60 days	**7.03%**	**3.20%**	-7.43%	**-9.23%**
T-Statistic	**1.9090****	**2.7345*****	-0.8685	**-4.5738*****
+6 to +12 days	-0.01%	*0.60%*	**-10.52%**	**-1.41%**
T-Statistic	-0.0103	*1.6299**	**-3.9212*****	**2.2211****
+6 to +60 days	*5.21%*	**2.85%**	**-20.39%**	**-8.21%**
T-Statistic	*1.4905**	**2.5687*****	**-2.5096****	**-4.2887*****

Note: (***) Significant at **1%** or less, (**) Significant at **5%** and (*) Significant at *10%* or less.
T-test statistic is computed according to DW1983 equations 8-15 above

The results of this analysis lead to support the argument that the abnormal returns earned by FTSE100 directors is due only to the information content of their trades but not to occurrence of other events.

(5.7.3) Year By Year Analysis

Table (5.6) shows CAR of director dealings for each year (1999 and 2000) of the sample. The same pattern of director dealing profitability is persistent through the years. Directors consistently timed their trades, they buy their own firm shares when they are at their lowest and sell when their performance peaked. For instance, CAR (t-30 to t0) of directors buying in 1999 is -6.29% significant and of director selling in 2000 was 14.19% significant, while those of buying in 2000 and selling in 1999 are not significant. However, the level of director dealing returns is varied from year to year. The table clearly shows that directors who buy in 2000 seemed to be particularly

[46] Of the UK literature, Hillier and Marshall (2002 a) used 5 days after an interim or annual earnings announcement only.

successful with 12 days and 60 days post event significant CAR of 2.08% and 9.48%, respectively, in comparison with insignificant CAR of 0.15% and -1.29% respectively. This result is consistent with Hillier and Marshall (2002/a) who find that director dealings profitability in certain years seems to dominate other years.

Table (5.6) Cumulative Abnormal Returns During Different Event Windows For Buy & Sell Portfolios During 1999 and 2000

Year By Year Analysis

CAR During Event Windows	Buy Portfolios 1999 (N=162)	Buy Portfolios 2000 (N=132)	Sell Portfolios 1999 (N=50)	Sell Portfolios 2000 (N=45)
-30 to 0 days	-6.29%	-1.52%	-0.02%	14.19%
T-Statistic	-3.4250***	-0.7478	-0.0049	4.0716***
-6 to +12 days	2.15%	1.37%	-3.11%	1.72%
T-Statistic	-2.5600***	1.4728*	-2.0617**	1.082
0 to +12 days	0.15%	2.08%	-3.33%	-0.85%
T-Statistic	0.2216	2.7039***	-2.6689***	-0.6474
0 to +60 days	-1.29%	9.48%	-6.57%	-12.07%
T-Statistic	-0.8601	5.6907***	2.4285***	-4.2304***
+6 to +12 days	-0.23%	1.49%	-2.39%	-1.32%
T-Statistic	-0.4976	2.8475***	-2.8172***	-1.4726*
+6 to +60 days	-1.68%	8.89%	-5.63%	-12.53%
T-Statistic	-1.1779	5.6190***	-2.1905**	4.6268***

Note: (***) Significant at 1% or less, (**) Significant at 5% and (*) Significant at 10% or less.
T-test statistic is computed according to DW1983 equations 8-15 above

Year by year analysis shows that, in general, directors' abnormal returns from buying transactions were more successful and significant in 2000 than in 1999. However, 1999 was a significant selling year for FTSE100 directors.

(5.7.4) Firm Size Effect

Literature often suggests that small firms consistently outperformed the market [see, for example, Gregory *et al.* (1994) and (1997) and Hillier and Marshall (2002/a)]. That most of the abnormal returns earned by director dealings might in fact be due to the firm size effect, where information in small firms would be at a premium as the disseminate of information is less frequent.

Dimson and Marsh (1986) were among the first who addresses the issue of firm size effect in event study methodologies. Based upon an extended CAPM, the abnormal return on a size and beta adjusted basis is computed by allowing for the returns on the size control portfolio which a firm belongs to. Gregory *et al.* (1997) argue that one problem with Dimson and Marsh (1986) size control is that pre-event data is required to estimate the model parameters, where the size of the firm might be different from that one during the event study. They recommend a simplier model that does not require pre-estimation data. That is Lakonishok *et al.* (1994) model per which the abnormal return is computed as:

$$AR_{it} = R_{it} - R_{j(i)t} \qquad (16)$$

Where [$R_{j(i)t}$] is the group control portfolio, defined as follows: Firstly the market capitalisation group at the end of previous year is identified for each firm/stock in the sample. Then the firms in the sample-year (1999 and 2000) are splitted into two: those firms with market capitalisation below the average market capitalisation (72 firms in 1999 and 74 firms in 2000 in group G1) and those above the average market capitalisation (24 firms in 1999 and 22 firms in 2000 in G2). The average market capitalisation of the firms in the sample was £10,439 million at the end of 1998 and £12,934 million at the end of 1999. The average for G1 in 1999 (2000) was £4,444 million (£28,426 million) and for G2 was £5,696 million (£37,279 million), respectively.

There are two size control portfolios used. Each of which consists of equally weighted group to which firm (i) belongs at the beginning of each year. This process ends up with 6 portfolios:

(1) Group 1 buy portfolio,

(2) Group 2 buy portfolio,

(3) All transactions buy portfolio,

(4) Group 1 sell portfolio,

(5) Group 2 sell portfolio,

(6) All transactions sell portfolio,

Here, all-buy-transactions or sell portfolio is not similar to that of single signal buy or sell portfolio because of different benchmarks used to compute the abnormal returns.

The overall mean of the abnormal returns of group 1, computed according to equation 16 above, is 0.01% (0.06% in 1999 and 0.00% in 2000) and that of group 2 is 0.00% (0.00% in 1999 and 0.00% in 2000). These figures support the earlier findings that the abnormal returns earned from director trades are not due to market movements but from the information content of their trades.

Following Gregory *et al.* (1997), and for the purpose of estimating Dodd and Warner (1983) test statistic, the variance of (AR_{it}) is calculated on post-signal data. After identifying and excluding the extreme abnormal return transactions, the t-test statistic is then computed according to equations (8) to (15) above. The results of CAR defined by the simple size adjusted return from Lakonishok *et al.* (1994) are presented in table (5.7), which summarizes the complete set of CARs and t-statistics reported in appendix (A5.14).

Table (5.7) Cumulative Abnormal Returns During Different
For Buy & Sell Size-Adjusted Portfolios During 1999 and 2000
According to Lakonishok et *al.* (1994) Size Control Model After Deleting the Outliers

CAR During Event Windows	Buy Portfolios			Sell Portfolios		
	G1 N=189	G2 N=102	All N=291	G1 N=68	G2 N=25	All N=93
-30 to 60 days	*2.68*	0.14	1.60	**6.25**	-	1.70
T-Statistic	*1.3740*	0.0610	1.2303	2.2063**	-0.5874	0.7501
-6 to +12 days	**2.15**	1.07	**1.70**	-	-	-
T-Statistic	**2.3246*****	1.0391	**2.7572*****	-0.3598	-1.7007	-0.9088
0 to +12 days	**3.65**	**1.74**	**2.84**	-	-	-
T-Statistic	**4.7562*****	**2.0381****	**5.5787*****	-2.8577***	-2.8161***	-3.4414***
0 to +60 days	**8.63**	1.94	**5.80**	-	-	-
T-Statistic	**5.2435*****	1.0471	**5.2903*****	-2.090**	-2.6568***	-3.8624***
+6 to +12 days	**2.27**	**1.34**	**1.88**	-	-	-
T-Statistic	**4.3640*****	**3.9173*****	**5.4266*****	-5.0047***	-2.1342**	-5.0384***
+6 to +60 days	**7.26**	1.54	**4.84**	-	-	-
T-Statistic	**4.6511*****	0.8727	**4.6516*****	-2.4647***	-2.1338**	-4.0586***

Note: (***) Significant at 1% or less, (**) Significant at 5% and (*) Significant at *10%* or less.
T-test statistic is computed according to modified DW1983 equations 8-15 above

It can be seen from the table that director dealings in small firms (G1) outperform their counterparts in larger firms (G2). In particular, director buying in G1 earned significantly more abnormal returns than directors buying in G2 through out various short and long event windows. For example, a small firm CAR at the end of event window (T0 to T12) is 3.65% in comparison with 1.74% in larger firms. Similarly, G1's CAR at (T6 to T12) is 2.27% in comparison with 1.34% in G2. In addition, G1's CAR at the end of longer event windows still dominates that of G2. For instance, G1 CARs

(T0 to T60) and (T6 to T60) are 8.63% and 7.26%, respectively, are much higher and significant than those insignificant 1.94% and 1.54% in G2, respectively. However, G2 CARs are 3.31% and 3.20% significant at (T0 to T35) and (T6 to T34), respectively.

On the other hand, director dealings in small firms still avoid significant losses during post-event period, but at a lower rate than their counterparts in larger firms. For instance, G1 CAR at (T0 to T12) is –3.06% less than G2 CAR –4.86% at the same event window. However, small firms' CAR after disclosing director dealings to the market (T6 to T12) is –3.64% more than larger firms CAR –2.15%%. This indicates that, firstly, small firm directors avoid larger loss in a very short event period than their counterparts in larger firms at the same event period. Secondly, it seems that the market perceives the information content of small firm's director dealing at a premium and reacts on small firm director selling faster than their buying and than those of larger firms.

On the overall buying (selling) portfolio, which consists of both groups' transactions, the results of the firm-size model [All Buy (Sell) portfolio in table (5.7)] support the single signal market-model in section (5.6) reported in table (5.4) and appendix (A5.10), particularly in terms of the sign and significance. However, they are varied in terms of the level of abnormal return (loss) earned (avoided). Such variation, however, is expectedly due to the firm size, which supports the hypothesis of the firm-size model. For example, CAR of All-Buy (Sell) firm-size portfolio at (T0 to T60) is significantly positive (negative) 5.80% (-8.46%) more than 1.02% (-2.16%) of the single signal market-model. Also, that of firm-size portfolio at (T6 to T60) is 4.84% (-8.36%) more than 0.54% (-1.89%) of single signal market-model.

In conclusion, group 1 of buy (sell) portfolios outperforms group 2, thus, supports the argument that directors of small firms earned (avoided) significantly more returns (losses) than their counterparts in larger firms, particularly in the long-term (short-term) event windows. The empirical findings reported above support the current body of the literature in this respect [see, for example, Friederich *et al.* (2002), Gregory *et al.* (1997) and Hillier and Marshall (2002 a)].

(5.7.5) Signals Definition Effect

Based on EMH, it can be argued that different signals definition would have different level of information content, thus produce different level of CARs. For example, when a director buys his firm's shares, the market recognizes this signal and the firm's share price changes accordingly to reflect the new information contained in such trading. If another director from the same firm does the same, the market would not consider this new trade as a new signal. Instead, it would be considered as an enforcement signal, which confirms the first signal. Overall, the share price changes as a result of two or more subsequent signals would be more than that of one signal. Likewise, share price changes due to a director trading in a relatively large volume of shares would be more than that if his trading volume is smaller. That is to say that the information content of MS or large QS is more than that of SS. Therefore, CAR of SS would be less than CAR of MS or large QS.

This section examines the signals definition effect on CAR produced. That is by testing whether the average CAR produced by SS is significantly different than that of MS, QS1, QS2, QS3 and QS4. Here, the null hypotheresis is that there is no difference between CAR of SS and any other signals definition at any point of time during the event window. Parametric and non-parametric tests are used to test this hypothesis. The first one is a parametric test. The test is performed, using SPSS – independent sample tests, by calculating the appropriate standard error as

$$StdError = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}} * \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \quad \text{.................................(17)}$$

Where S_1 is the standard deviation of SS CAR, S_2 is the standard deviation of CAR produced by MS, QS1, QS2, QS3 or QS4; and n_1 is the sample size of SS CARs (*i.e.* the number of SS transactions in the portfolio), and n_2 is the sample size of the other signal CARs (*i.e.* the number of MS, QS1, QS2, QS3 or QS4 transactions in the portfolio).

Then, the t-value as

$$T - Value = \frac{\overline{CAR}_{SS} - \overline{CAR}_{MS} - 0}{StdError} \quad \text{.......................................(18)}$$

Table (5.8) reports the results, where panel (a) concerns the buy portfolios and panel (b) concerns the sell ones. It can be seen from the table that the null hypothesis cannot be rejected, even at 10%, at any point of time during the event window, for MS, QS2, and QS4 of buy portfolios, and for QS1 and QS2 of sell portfolios. However, in a very few points within the event window, the mean of CAR of SS is significantly different from that of QS1 (at t3, t4 and t5) and of QS3 (at t12) of the buy portfolios. In the sell portfolios, the null hypothesis is rejected for MS at (t1 and t2), QS3 at (t4 and t7) and QS4 (at t5). Overall, the mean CAR defined by SS equals to 61 (60) out of 65 CARs defined by various signals in the buy (sell) portfolios.

One reason that might help explaining the unexpected results of table (5.8) is the fact that the sample suffers from high level of means standard errors [see Appendix (A5.15)]. Thus, transforming the data might help overcome that problem and alter the results. Appendix (A5.16) reports the results of LnCARs. The null hypothesis is rejected only in 5 points of time in the buy portfolios and in 8 points in the sell portfolios. It seems that the transformation has improved the distribution but not the test results. Almost similar to table (5.8), the overall results show that the average CAR defined by SS is not different to 60 (57) out of 65 CARs defined by various signals in the buy (sell) portfolios.

The second is a non-parametric Wilcoxon Signed Ranks test. The test is employed, using SPSS, and the results reported in Appendix (A5.17). The empirical findings show that of the buy portfolios, only CARs of Q2 are significantly more than CARs of SS throughout the event window, while those of Q3 are significant at (t7 to t12) and those of Q4 at (t10 to t12). However, none of the MS and Q1 CARs are significant at any point of time in the event window, even at 10%. On the sell side, only CARs of Q3 are significantly more than CARs of SS but not throughout the event window (only at t6 to t12).

Table (5.8) Test of Equality of Means of CAR Produced by SS and each of MS, QS1, QS2, QS3 and QS4 For Buy and Sell Portfolios

Independent Samples Test of CAR Buy (Sell) of SS With Each of MS, Q1, Q2, Q3 and Q4 at Each Day of the Event Window

SS	Buy	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
MS	t-test for Equality of Means	0.09159	0.12038	0.17339	-1.59158	-0.81452	-0.82483	-0.12037	0.65848	0.06333	-0.60101	0.06352	0.07364	1.18196
	Sig. (2-tailed)	0.92721	0.90442	0.86289	0.11461	0.41726	0.41141	0.90443	0.51173	0.94963	0.54918	[illegible]	[illegible]	0.24000
	Levene's Test for Equality of Variance	2.57666	2.86281	0.05375	0.90625	1.89527	0.01916	0.00000	0.07587	0.61999	1.59693	0.22730	0.13380	0.40773
	Sig.	0.11157	0.09430	0.81713	0.34338	0.17165	0.89020	0.99861	0.78354	0.43289	0.20925	0.63467	0.71529	[illegible]
Q1	t-test for Equality of Means	-0.47917	-0.82254	-1.50649	**-2.23605**	*-1.71561*	**-2.41674**	-0.04949	-0.42966	-0.28201	0.37518	0.04157	0.56937	0.47939
	Sig. (2-tailed)	0.63327	0.41349	0.13632	**0.02862**	*0.09053*	**0.01820**	0.96057	0.66880	0.77874	0.70853	0.96696	0.57088	0.63311
	Levene's Test for Equality of Variance	0.12296	0.00001	5.01814	0.71021	2.07429	0.91562	0.23104	0.65346	0.00227	0.43454	0.02169	0.00818	0.62516
	Sig.	0.72687	0.99724	0.02817	0.40216	0.15413	0.34183	0.63221	0.42154	0.96215	0.51187	0.88333	[illegible]	0.43173
Q2	t-test for Equality of Means	0.47107	-0.31196	0.45673	-0.49868	-0.25876	-0.29191	-0.27379	0.25005	[illegible]	-1.12395	-0.16499	-0.13563	1.05917
	Sig. (2-tailed)	0.63903	0.75599	0.64926	0.61954	0.79667	0.77121	0.78604	0.80327	0.81473	0.26482	0.86942	0.89249	0.29311
	Levene's Test for Equality of Variance	0.22322	1.35449	2.89322	0.79573	0.03775	0.23189	1.93136	2.65946	0.63972	1.08424	0.17784	0.00098	0.48322
	Sig.	0.63805	0.24839	0.09333	0.37539	0.84649	0.63161	0.16895	0.10736	0.42648	0.30128	0.67451	0.97517	0.48924
Q3	t-test for Equality of Means	1.32141	0.97895	-0.12150	0.29253	-0.56742	-0.86115	-0.62834	-0.41002	-0.78351	-1.60741	-1.08327	-1.24319	**-1.97175**
	Sig. (2-tailed)	0.19055	0.33088	0.90364	0.77072	0.57219	0.39201	0.53177	0.68301	0.43690	0.11234	0.28230	0.21783	**0.05248**
	Levene's Test for Equality of Variance	2.04793	0.99595	0.00132	1.15580	1.28344	0.68420	2.57603	1.51426	2.43894	1.29272	1.66020	0.70344	0.20743
	Sig.	0.15574	0.32164	0.97111	0.28693	0.26102	0.41088	0.11287	0.22250	0.12274	0.25932	0.20170	0.40441	0.65016
Q4	t-test for Equality of Means	-1.13398	-0.58023	-0.89345	-0.62054	-0.09853	0.36645	0.86411	-0.15268	0.05619	-0.38740	-0.08093	0.55029	0.27732
	Sig. (2-tailed)	0.26066	0.56357	0.37459	0.53686	0.92179	0.71510	0.39040	0.87908	0.95534	0.69960	0.93572	0.58382	0.78233
	Levene's Test for Equality of Variance	1.67938	0.01688	0.06406	0.23284	0.52016	1.64067	1.32046	0.02273	0.16533	0.58756	0.63244	1.40169	0.01433
	Sig.	0.19915	0.89699	0.80091	0.63089	0.47311	0.20434	0.25431	0.88058	0.68660	0.44687	0.42908	0.24033	0.90606

SS	Sell	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
MS	t-test for Equality of Means	0.99586	**2.42605**	*1.84648*	1.44183	1.54437	1.37568	0.30739	0.28589	0.00378	0.08323	0.37321	0.27193	0.19789
	Sig. (2-tailed)	0.32679	**0.02108**	*0.07409*	0.15907	0.13233	0.17847	0.76054	0.77680	0.99700	0.93419	0.71145	0.78743	0.84438
	Levene's Test for Equality of Variance	0.91548	0.18195	1.73022	0.49433	1.59432	0.70994	2.13443	3.08617	2.69640	2.48931	1.73969	0.47296	0.42709
	Sig.	0.34684	0.67256	0.19773	0.48708	0.21583	0.40572	0.15377	0.08863	0.11037	0.12446	0.19654	0.49658	0.51809
Q1	t-test for Equality of Means	-0.63991	-1.53256	-1.12822	-0.22640	-1.55177	-1.34090	0.70619	0.25193	-0.54678	-0.02778	0.13021	-0.13085	0.08481
	Sig. (2-tailed)	0.52884	0.13964	0.27138	0.82298	0.13498	0.19363	0.48748	0.80344	0.59003	0.97809	0.89758	0.89708	0.93318
	Levene's Test for Equality of Variance	0.07848	6.72821	5.69427	0.01205	1.08367	0.05242	0.57625	1.07664	0.21597	0.28869	0.20178	0.02315	0.48367
	Sig.	0.78198	0.01657	0.02605	0.91369	0.30918	0.82102	0.45584	0.31072	0.64670	0.59645	0.65768	0.88044	0.49405
Q2	t-test for Equality of Means	1.11126	-0.03961	-1.27279	-1.61562	-1.44969	-1.41762	-1.32503	-1.22116	-1.35229	-0.89034	-0.28950	-1.20925	-0.31784
	Sig. (2-tailed)	0.27902	0.96878	0.21700	0.12110	0.16194	0.17097	0.19940	0.23566	0.19067	0.38337	0.77503	0.24001	0.75375
	Levene's Test for Equality of Variance	0.00238	1.33870	2.63125	2.17498	2.58781	0.19160	0.41364	0.17536	0.25815	0.00875	0.22024	0.54111	0.42160
	Sig.	0.96159	0.26026	0.11970	0.15511	0.12262	0.66606	0.52709	0.67964	0.61669	0.92637	0.64369	0.47011	0.52318
Q3	t-test for Equality of Means	-0.79177	-0.95118	-0.82748	-1.47900	*-1.66823*	-0.33240	-1.34987	*-1.77171*	-0.03023	-1.18897	-1.08043	0.25442	0.33521
	Sig. (2-tailed)	0.43695	0.35185	0.41685	0.15332	*0.10944*	0.74274	0.19079	*0.09030*	0.97615	0.24713	0.29165	0.80154	0.74064
	Levene's Test for Equality of Variance	1.11512	0.67052	0.01011	0.34729	0.03690	0.00198	0.71479	0.08410	0.35386	0.07280	0.20788	0.43938	1.06100
	Sig.	0.30243	0.42162	0.92082	0.56166	0.85146	0.96487	0.40696	0.77453	0.55800	0.78982	0.65290	0.51431	0.31418
Q4	t-test for Equality of Means	0.88233	0.36149	0.44502	0.57845	0.48276	*1.69940*	-1.06463	-0.87486	0.18162	-0.86192	-0.57633	-1.28075	0.74306
	Sig. (2-tailed)	0.38714	0.72118	0.66065	0.56884	0.63404	*0.10334*	0.29869	0.39110	0.85755	0.39803	0.57024	0.21362	0.46631
	Levene's Test for Equality of Variance	1.87150	2.83729	2.81900	3.22005	2.20668	0.12488	0.27569	0.85083	1.65994	0.96693	0.36289	0.07591	0.77244
	Sig.	0.18511	0.10524	0.10730	0.08660	0.15169	0.72716	0.60479	0.36632	0.21100	0.33614	0.55306	0.78660	0.38896

The findings of the three tests, outlined above, might lead to suggest that while the magnitude of CARs across various signals (MS, QS1, QS2, QS3 and QS4) is identical, the time when these CARs becomes significant is varied. CARs of compounded signals (MS and QSs) are significant at earlier days in the event window, while those of single signal (SS) are significant at later days in the event window.

(5.8) SUMMARY AND CONCLUSION

This chapter has examined the short-term profitability of FTSE100 directors trading in their own firm's ordinary shares and executive shares options, over recent years (1999 to 2000), employing event study methodology to measure cumulative abnormal returns and taking into account different signals definition. Using the simple MM's parameters in the CAPM, the results of ordinary share portfolios are similar to those obtained by previous literature used the same methodology. Namely, directors' trading in their own firm's ordinary shares is significantly profitable. This finding does strongly support the view that, on one hand, corporate directors do have inside price-sensitive information that the market does not have, and that they earn significant statistically cumulative abnormal returns from directly trading on this information in the stock exchange. On the other hand, the market does perceive directors trading as a signal. Directors' buying indicates good news and, hence, the market appreciates the share prices. As directors' selling represents a bad news, the market depreciates the share prices. The market, in fact, reacts to this news as soon as it is disclosed.

As for executive share options portfolios, the results are different in that, directors holding or selling the exercised ESO is not profitable, in the short term, to the extent that there appears to be no significant market reaction around the director trading' disclosure. Three reasons are expected to explain these findings. The first is due to the contractual nature of the kind of shares. The second is due to the long-term nature of ESO, which needs to be investigated in the long-term sense. Finally, the small number of transactions in each ESO portfolio might have driven the results away from a representative, significant statistically, mean of the abnormal returns.

Two important conclusions are suggested by employing different signal methodologies. These are first, that different signal definition produces different results, not only in terms of the level and sign of CAR, but also in terms of the significance of the statistical results. On one hand, multiple and quantitative signals produced significant CARs at earlier days than single signal. This leads to suggest that the market reacts significantly sooner to successive signals than to a single signal. On the other hand, none of the other signals produce significantly results that reject (accept) what has been accepted (rejected) by the single signal. However, the robustness analysis provides evidence that there were no significant differences between the average CAR of SS and any of the compound signals (MS and QSs).

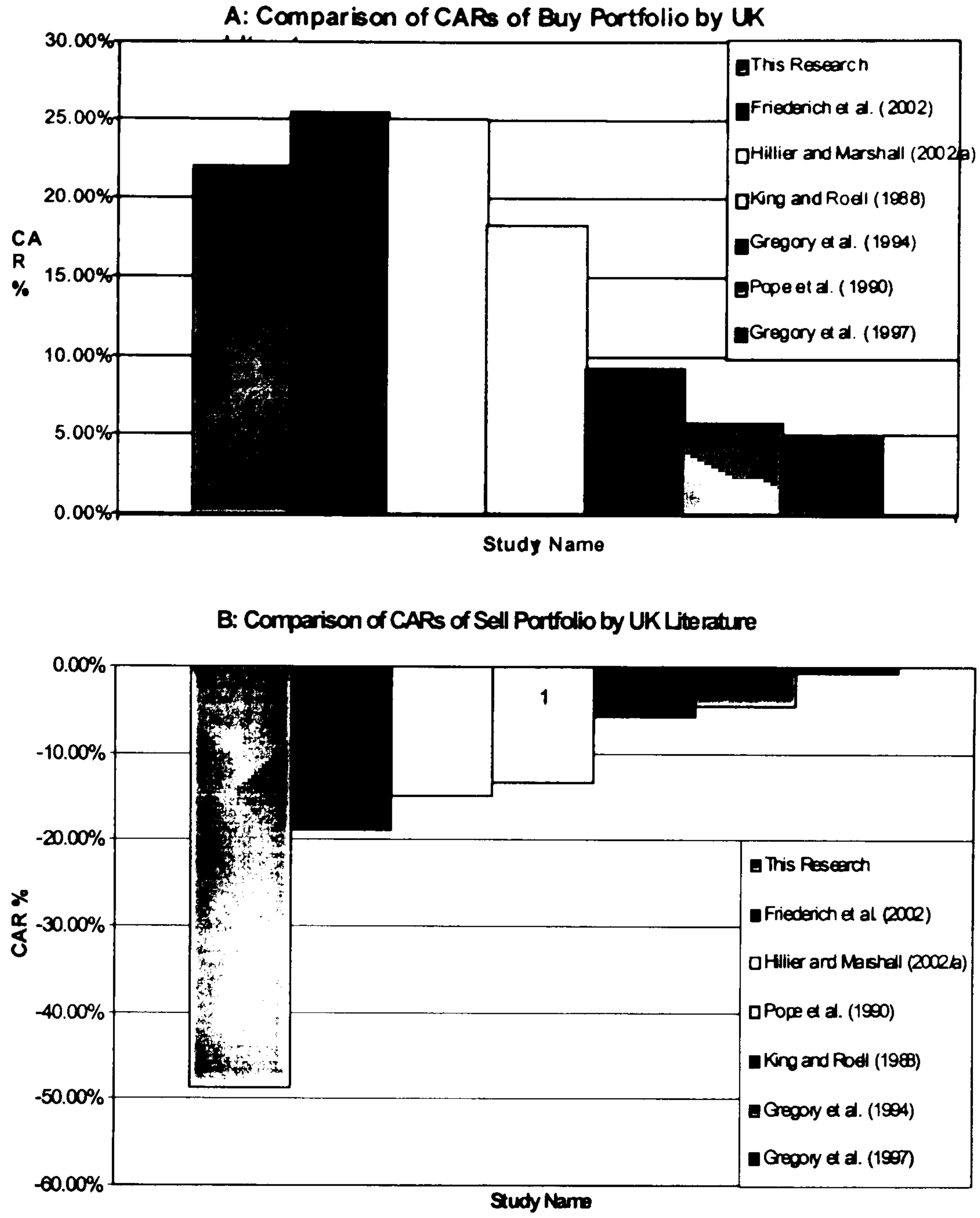
Second, each signal definition requires certain data frequency. Single signal produces robust results when daily data are used, while those of multiple and quantitative signals are mixed. Monthly data is recommended with multiple signals, whereas both monthly and daily data can be used with quantitative signal.

It seems that employing single signal definition with daily data produces not only significant results, but also higher level of rates of return. The empirical results of this study, along with most recent studies [Friederich *et al.* (2002) and Hillier and Marshall (2002/a)] shows, in general, that annual CARs of directors trading are significantly much greater than those of old UK literature, a shown in the following figure (5.6).

Figure (5.6) shows that, on one hand, directors buying ordinary shares portfolio earn an annual rate of CAR of 22.10%, 25.48% in Friederich *et al.* (2002) and 25.05% in Hillier and Marshall (2002/a)[47], compared with 18.38% in King and Roell (1988)[48], 9.23% in Gregory *et al.* (1994), 5.80%[49] in Pope *et al.* (1990) and 4.92% in Gregory *et al.* (1997). On the other hand, directors selling ordinary shares avoid them an annual loss of –48.80%, compared with –18.98% in Friederich *et al.* (2002), -14.86% in Hillier and Marshall (2002/a), -13.38% in Pope *et al.* (1990), and –5.75%[50] in King and Roell (1988), -4.51% in Gregory *et al.* (1994) and –0.72%[51] in Gregory *et al.* (1997).

[47] The annual CAR is computed by multiplying CAR at the end of the event window with the number of intervals (event windows) within a working days-year (260 days). That is: CAR*(260/12).
[48] As reported in Gregory *et al.* (1994), Table 8, page 51.
[49] Insignificant.
[50] Insignificant (at 10% according to (DW1983) and AR at 5% according to (BW1985).
[51] Insignificant.

Figure (5.6)



It is understood that the above are approximates since that, firstly, this study cumulates daily data while others cumulate monthly. Secondly, annual CAR calculation is based on an assumption that the same CAR level will be repeated 22[52] times yearly, while other UK literature cumulate the abnormal returns for 12 months, except Pope *et al.* (1990) for 6 months. However, the above presentation suggests that the empirical findings of this study are consistent with UK literature, as well as with those of USA.

The results of this study have been checked on by re-running the analysis taking into account thin trading, confounding events, year-by-year analysis, and firm size. The

[52] That is: total number of working days per year divided by the length of the event window, i.e. 260/12=22.

robustness check analysis shows that there is no thin trading problem in the sample securities. There is no firm key event/announcement co-occurred with the director dealing transactions, thus the director dealing abnormal returns are not a result of other events. In addition, the robustness analysis provides evidence that smaller firms outperform larger ones, particularly in the longer event windows of buying transactions. It seems that the market reacts faster to small firm's director selling than to their buying or to their counterparts in larger firms. This might lead to support the argument that the information content of director dealings in small firms is at a higher level of premium than in larger firms. Finally, the robustness check indicates that directors buying in the year 2000 outperform those in 1999. However, the year 1999 was a successful selling year for FTSE100 directors. In conclusion, the robustness analysis supports the empirical findings of the single signal market-model, particularly in terms of the sign and significance of the abnormal returns. However, the level of the returns may vary.

In the context of EMH, insider trading presents a challenging issue. On one hand, the empirical results of this study, in addition to other UK literature, shows clearly that the stock exchange is significantly inefficient in terms of the strong level of market efficiency. Namely, some market participants, *i.e.* insiders, are more informed about the current or future market value of the firm than others, *i.e.* outsiders. This is in contrast with the strong level of efficiency, which indicates that the current market price fairly reflects all information about the past, current and future perspective of the firm, which are available to all market participants[53]. And, thus, trading upon such information is not profitable.

On the other hand, the evidence advocating the insignificant semi-strong level of market efficiency is rather weak. The availability of abnormal returns to outsiders following the publicly known information, *viz.* insiders' transactions can be seen as a direct test to the semi-strong level of market efficiency. The empirical results, reported in section (5.6), indicate that abnormal returns can be earned by outsiders' imitating insiders' transactions. However, taking into account the transaction cost, such returns would end up with zero, if not negative returns. For example, significantly 0.46% AR of buy portfolio at t8 becomes negative when deducting 2% transaction cost [*e.g.* Friederich *et*

[53] At a certain cost, which is lower than the abnormal returns if such information is not publicly available.

al. (2002), Gregory *et al.* (1997), Jaffe (1974), Pope *et al.* (1990), Rozeff and Zaman (1988) and Seyhun (1986)]. Moreover, the bid-ask spread represents another cost to be taking into account when considering such an active trading strategy [Seyhun (1986)].

In conclusion, except for the executive share options (BEO and SSO) portfolios, the empirical results clearly and significantly reject the null hypothesis that directors trading in their own company's securities are not profitable. Instead they suggest the alternative hypotheses that directors buying portfolios achieve positive abnormal return and those of selling ones avoid negative abnormal returns. These findings of ordinary share portfolios are consistent with UK literature. However, the magnitude may vary.

A by-product implication of using a new set of data in this study, *i.e.* a post-1993 Justice Act of insider trading, is that the 1993 Justice Act has not deter the directors from trading on their private information. An investigation into the legality of the directors dealing employed in the analysis shows that almost all trades were legal and occurred outside the "close-period" specified by the law. However, the information content of directors dealing might not be related to recent key firm's event/announcement. On the other hand, the empirical findings of this study, as well as those of pre-1993 Justice Act reported in the literature, might suggest that relevant regulation, including 1993 Justice Act, is not about prohibiting, but it is about regulating the timing of insider trading.

Chapter 6
The Managerial Incentive of Insider-Trading by Directors: Model and Empirical Evidence

(6.1) INTRODUCTION

The literature reviewed in chapter four suggests that insider-trading by directors can be seen as an implicit part of the managerial reward contract. The purpose of this chapter is to empirically investigate whether insider trading by directors can be considered as an implicit part of the managerial incentive package. The third and last hypothesis of this research is about this assumption, *i.e.* the managerial incentive of insider trading by directors [see chapter 1, section (1.4)]. The theory as well as relevant literature of this hypothesis is introduced in chapter four. This chapter empirically examines this hypothesis by investigating the remuneration packages of FTSE 100 directors, namely the Chief Executive Officers (CEOs), during the period (1999 and 2001). The importance of this investigation is two-fold. Firstly, it relates empirically two separate disciplines, *i.e.* managerial incentives (Management) and insider trading by directors (Finance). Secondly, it provides evidence for the first time on the managerial aspects of insider trading by directors in the UK.

This chapter explains the model used and presents the results of the data analysis and their relevance to the research question and hypothesis explained in chapter four. Data analysis involves multivariate techniques. In addition, this chapter draws general conclusions and compares the results with the existing literature and discusses the findings within the context of other research.

This chapter is structured as follows: section (6.2) constructs the model used to testing and assessing the theory behind considering insider trading by directors as a managerial incentive. The data used will be presented in section (6.3), and will be assessed and analysed for multivariate (multiple regression) in section (6.4). Section (6.5) estimates and assesses the proposed model and considers the overall fitness of the model results, while section (6.6) introduces the panel data model and reports the empirical findings.

Finally, section (6.7) concludes the chapter by interpreting the results and summarising the findings.

(6.2) THE MODEL

This section links the theories discussed in chapter three (insider-trading) and chapter four (managerial incentives) with the subsequent empirical sections in this chapter. That is by empirically linking insider-trading theories [chapter 3, section (3.3)], *i.e.* Rational Expectation Theory [section (3.3.1)] and Informational Signalling Theory [section (3.3.2)], with Agency Theory [chapter 4, section (4.2)]. The Model will be constructed upon the conceptual principles of these theories.

The literature, reviewed in chapter 4, shows that on one hand a complete reward contract is nonexistent and not possible to structure due to moral hazard (uncertainty) and adverse selection (asymmetric information) problems. Thus, by permitting directors to trade in their own firm's shares on personal accounts the output level can be increased and shareholders' welfare can be improved [see, for instance, Hu and Noe (2001)]. On the other hand, as shareholders start recently to realise that their interests are not well served by directors and that performance-based compensation contracts alone are not adequate in aligning the conflict of interests between the two parties. Hence, permitting insider trading by directors mitigates the problems of moral hazard and adverse selection [see, for example, Zhang (2001)]. Based on these arguments, it is not unreasonable to assume that insider trading by directors can be seen as an implicit part of the reward contract and, thus, considered as a managerial incentive.

In his managerial incentives and investment bias, Bohlin (1997) concludes that the potential scope of agency theory, in both empirical and managerial aspects, can hardly be realized by trying to apply specific models to managerial problems, but rather by using theory as a general framework in which economic trade-off and information asymmetries in organizational structure and processes are illuminated. This implies two guidelines that might help in modelling insider trading as a managerial incentive. First, it is rather difficult to empirically model an agency problem such as insider trading. Second, modelling such a problem has to be indirect but backed by theoretical framework. Therefore, modelling insider-trading by directors as a managerial incentive can be derived from a combination of an insider-trading model. such that of Laffont and Maskin (1989) [see section (3.3.1)], Dye (1984), Kyle (1985) [see section (3.3.2)] or Roulstone (2003) [see section (4.4.1)] and a managerial incentive model. such that of Bernardo *et al.* (2001), Bebchuk and Fershtman (1994) or Gjesdal (1982) [see section (4.2.2)]. The cornerstone for such a model is that, the expected profit of director from insider trading is *an implicit form* of the managerial compensation provided by the firm to its directors. For the theory of implicit contracts, see, for instance. Azariadis (1990) and Azariadis and Stiglitz (1983). Where *as the explicit part* consists of salary and bonuses [see, for instance, Hebner and Kato (1997)]. Dye (1984) shows that the director's explicit compensation is independent of his private information or his insider trading activities. In addition, Noe (1995) concludes that shareholders can use insider-trading returns to meet directors' reservation compensation constraint. Therefore, the total compensation (C_{dit}) consists of two independent forms: (1) the salary and bonuses paid (W_{dit}) and (2) the director's expected return from insider trading (μ_{it}). That is:

$$\text{Total Compensation} = \text{Explicit Paid} + \text{Implicit Form}$$

$$\mathbf{C}_{dit} = \mathbf{W}_{dit} + \mu_{it} \tag{1}$$

Where (C_{dit}) is the director's (d) total compensation in the firm (i) at time (t), (W_{dit}) is the director's (d) salary and bonuses in the firm (i) at time (t), and where (μ_{it}) is the insiders' signal, *i.e.* returns, in the firm (i).

Thus, for a certain total compensation level, any change in one form has to be offset by the other form. Hu and Noe (2001) and Roulstone (2003) found that if insider trading is prohibited then, shareholders have to offer the directors with larger portion of the output to compensate for the zero expected insider trading returns.

However, as the number of insiders at the company rises, the competition to use their private information and consequently release their signal increases [see, for example, Levine and Smith (2003)]. As a result, insider-trading volume and the informativeness of the stock price increase. Consequently, as the number of insiders at the firm increases, the expected trading profit of each insider decreases due to more disclosure [as shown by Baiman and Verrecchia (1996)]. Thus, the expected trading profit of insiders is a function of, *inter alias*, the number of insiders in the firm.

$$E(\mu_{dit}) = f(N_{it}) \qquad (2)$$

Where (μ_{dit}) is the director's (d) trading returns from firm (i) at time (t), and (N_{it}) is the number of insiders in that firm at that time.

This function indicates a negative correlation between the two variables. As (N) increases, (μ) decreases. However, there are other factors affecting the stock returns. Hebner and Kato (1997) categorise these into four firm-parameters. In addition to the number of insiders, the other parameters are (1) the variance of innovations affecting the stock price, (2) the variance of un-informed trading and (3) the variance of the error in the insiders' signal. It is reasonable to assume that all market participants (informed and uninformed investors and market makers) know these parameters, as they are public knowledge.

Moreover, the explicit form of directors' compensation should be increased to offset the diluted insider-trading returns. As the stock returns parameters are of public knowledge, the firm's remuneration committee knows the expected trading profit of insiders, and knows that as the number of insiders increases, the trading profit of each insider decreases. Thus, the remuneration committee has to take it into consideration when determining the explicit form of the compensation package for each director. This argument is, in fact, backed, however indirect, by Noe (1995). He argues that by permitting insider trading, shareholders are less willing to provide expensive effort-assuring incentives. This indicates that shareholders are willing to offset changes in insider trading expected returns to a certain level.

Consequently, as the number of insiders increases, the explicit form of the compensation for each director increases. Thus, the director's total compensation is a function of, *inter alias*, the number of insiders in the firm,

$$\mathbf{W}_{dit} = f(\mathbf{N}_{it}) \qquad (3)$$

Where (W_{dit}) is the director's explicit form of compensation in the firm (i) at time (t), and (N_{it}) is the number of insiders in that firm at that time.

This function indicates a positive correlation between the two variables. As (N_{it}) increases, (C_{dit}) increases. In certain cases, however, there is a possibility that direct compensation is negatively related to number of directors. Such that when the firm has a limited or restricted budget for management remuneration. For example, when the firm or a regulatory body set-up a certain level/ratio where the total direct compensation to all directors should not exceed it. In this case, as the number of directors increases. the direct compensation for each one decreases. Obviously, this possibility might occur in small-size firms as well as in public-corporations, both of which are not the subject of the current investigation, which is about the largest 100 firms in the UK.

As Noe (1995) argues, for any fixed level of incentive, allowing insider trading never diminishes, and sometimes improves, director's incentives. This casual function is the cornerstone for the model of assessing insider trading by directors as a managerial incentive. Thus,

$$\mathbf{C}_{dit} = \mathbf{W}_{dit} + \mu_{dit} (\mathbf{N}_{it}) \qquad (4)$$

In a competitive labour market for each director [see section (4.3)], (C_{dit}) will be equal to its market equilibrium value [C^* (Z_{dit})], which varies according to each director's personal and job characteristics (Z_{dit}). These characteristics are, in fact, the inputs supplied by the director in exchange for his compensation, which might include director's creative thinking aimed at developing new products and services and organisational and managerial efforts intended to expand physical output, reduce operating cots and improve employee morale as well as other observable and contractible inputs [see, for example, Demski and Sappington (1999) and Ryan and Wiggins III (2001)]. Thus

$$\mathbf{C}_{dit} = \mathbf{C}^* (\mathbf{Z}_{dit}) \qquad (5)$$

Compensate equation 4 in 5, gives

$$\mathbf{C}^* (\mathbf{Z}_{dit}) = \mathbf{W}_{dit} + \mu_{dit} (\mathbf{N}_{it}) \qquad (6)$$

Re-arrange for (W_{dit}), gives[1]

$$\mathbf{W}_{dit} = \mathbf{C}^* (\mathbf{Z}_{dit}) - \mu_{dit} (\mathbf{N}_{it}) \qquad (7)$$

This formula signifies that the relation between the compensation paid and the director's expected returns from insider trading is opposite in direction. As insider-trading returns decreases, the compensation paid has to be increased. However, given the positive relation between the number of insiders (N) and the compensation paid (W) [equation 3], equation 7 can be re-written to reflect such relations as follows:

$$\mathbf{W}_{dit} = \mathbf{C}^* \ (\mathbf{Z}_{dit}) + (\mathbf{N}_{it}) - \mu_{it} \qquad (8)$$

Given the boldness effect on (N) on the compensation level, and the dilution of insider-trading returns, which is subject to Hebner and Kato (1997) four-parameters, it is not unreasonable to expect significantly positive correlation between explicit compensation (W) and number of insiders (N) and insignificantly and indifferent correlation between (W) and insider trading returns (μ). Using the Ordinary Least Squares (OLS) to estimate a log linear version of this casual relation, gives

$$\ln(\mathbf{W}_{dit}) = \alpha_i + \beta \ \ln(\mathbf{Z}_{dit}) + \gamma \ \ln(\mathbf{N}_{it}) + \pi_{it} \qquad (9)$$

Where α_i is the is the intercept term, β is the coefficients on the director's personal and job characteristics, and γ is the coefficient on N_{it}, and π is the error term, which is almost identical to insiders' signal that might be measured by insider-trading returns.

Kato and Rockel (1992) provide systematic evidence on the relationship between CEOs compensation and their personal characteristics such as internal experience as CEO and educational and professional credentials. In addition, Milbourn (2003) models the optimal contract for a CEO whose reputation (proxied by tenure, number of business-related articles containing his name and being appointed from outside the firm) evolves as a signal of his ability is observed by shareholders. Empirically, he finds a positive and economically significant relation between CEO reputation and performance-based-pay sensitivity. Given that personal and job characteristics are among the variables used in a competitive labour market to determine the market equilibrium for director's compensation level [see, for example, Spence (1973)]. It is expected that such information can be utilised as proxies for (Z_{it}) in the model. Thus, (Z_{dit}) can be broken down into director's personal characteristics (P_{dit}) and director's job characteristics (J_{dit}). Whereas (P_{dit}) can be represented by the director's experience and education attributes, detailed in section (6.3.3), and (J_{dit}) by director's firm size and performance, per which

[1] Pay-Performance literature estimates [$W_{it} = C^*(Z_{it})$] only.

section (6.3.4) discusses the theoretical basis for using these measures. Equation 9 has to be extended to represent these variables. Therefore, the managerial incentive of insider-trading model, the Model, can be expressed as

$$\ln(W_{dit}) = \alpha_i + \beta \ln(P_{dit}) + \delta \ln(J_{dit}) + \gamma \ln(N_{it}) + \pi_i \quad (10)$$

Where α is the intercept term, β is the coefficients on the director's personal characteristics, δ is the coefficients on the director's job characteristics, and γ is the coefficient on N_{it}.

This Model assumes that the explicit form of CEO's compensation level (W_{dit}) is subject to three groups of variables. These are his personal attributes (P_{dit}), his job characteristics (J_{dit}) and the number of insiders in his firm (N_{it}). In other words, the Model suggests that CEO's insider-trading indicator, represented by number of insiders in his firm, can explain, *inter alias*, his compensation level. Thus, insider-trading by director can be considered as an explicit part of his compensation package, hence can be seen as a managerial incentive.

In equation 10, the sign and significance of γ indicates whether or not insider-trading by directors is an implicit part of the managerial incentives. If the empirical evidence supports equation 10, then one would expect that γ is significantly more than zero ($\gamma >$ 0). Thus, the null hypothesis is that, there is no relationship between the number of insiders in the firm and the compensation paid to the directors. In other words, the variations in (W_{dit}) cannot be explained by the variations in (N_{it}). That is,

H0: $\gamma = 0$,

And the alternative hypothesis is that as the number of insiders increases, the compensation paid to any director increases to offset his insider-trading profit reduction. That is, (N_{it}) variations explain and specify (W_{dit}) variations. That is,

H1: $\gamma > 0$.

Likewise, the sign and significance of β and δ indicate whether or not director's personal skills and job characteristics, respectively, represent the market equilibrium value of the director's compensations. If the empirical evidence supports equation 10, then one would expect that each of β and δ are significantly positively more than zero ($\beta > 0$ and $\delta > 0$).

(6.3) THE DATA

This section provides statistical description of the data used to examine the proposed Model, equation 10, outlined in the previous section.

The data set was collected from the Corporate Register for the period (1999 and 2001), which is prepared and updated annually by PriceWaterHouseCoopers[2]. The Corporate Register provides yearly information on the total compensation and personal and job characteristics of the Chief Executive Officer (CEO) in each company listed in London Stock Exchange (LSE). Since the population element of interest in this research is FTSE100, the data base is constructed so as to conform the following four criteria:

(1) Availability of firm's number of executive directors in 1999 and 2001.
(2) The CEO's compensations are available in 1999 and 2001.
(3) There is enough information about CEOs personal characteristics.
(4) Data availability about the CEOs job characteristics, such as his firm's size [measured by total number of employees and/or market capitalisation] and performance [represented by earnings per share (EPS) and/or price-earnings ratio (P/E)] and industrial category.
(5) The Company was in FTSE100 index and included in the insider-trading database [see section (5.4) of chapter 5]. A list of company names is provided in appendix (A5.1).

It is obvious that these requirements are, firstly, to satisfy the application of the Model outlined in section (6.2). The total number of executives is to serve as a proxy for number of insiders, personal and job characteristics are attributes for CEO's market equilibrium value and insider-trading data is for director's expected returns from insider-trading[3]. Secondly, to serve as pre-conditions for other purposes. One rationale behind

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[2] Published quarterly by *HS Financial Publishing*, London.
[3] In fact, the Corporate Register reports information not only on CEO, but also on Chairmen and Finance Directors. However, there where no definite information about the finance director's compensations, thus it has been dropped from the sample. In addition, of FTSE100, there were 50 chairmen being executives in 1999 and 42 in 2001, and by definition, those chairmen are already included in the CEOs sample employed in this study. Thus, the chairmen are declined from the sample under analysis.

such requirements for example is that FTSE100 firms represent about 80% of LSE market capitalisation, and thus the index considered as a leading example for the other 1500 corporations listed in LSE. Consequently, any conclusion made from FTSE100 corporations can be generalised in the markets, either directors labour market or stock exchange market. Another rationale is that the time period under investigation (1999 and 2001) coincided with our insider trading by directors data base period (1999 and 2001). Furthermore, the rationale behind using two-year data is that cross-section analysis might be subject to a possible significant omitted variables problem caused by unobserved heterogeneity. A standard solution proposed by the literature [see, for example, Mandela (1987)] to account for this problem is to extend the single-year cross-section data to panel data, which allows to difference out all time invariant unobserved variables [see section (6.6)]. This is necessary to satisfy the assumption that the firm's director contracts are of long-term basis. Taking the time of conducting this research (2002), it is reasonable to have a four-year period ending with the most recent data (2001) available. Finally, the other variables, firm size and profitability, can be used to serve not only as proxies for CEO job characteristics, but also as control variables in the multivariate regression of the model. Although FTSE100 index represents the largest 100 firms in the LSE, in terms of market capitalisation, the size and profitability among these firms are varied sharply. For example, market capitalisation within FTSE100 varied from as minimum of £129 million to as maximum as £131 billion [see table 6.2/B]. Thus, it is not unreasonable to control for such variations among the sample.

The assigned causal model, equation 10, provides six main categories of variables in explaining and predicting the explicit part of the CEO's compensation. These are detailed in the following sub-sections.

(6.3.1) Total Compensation Paid (Explicit Form)

Managerial compensation is typically multidimensional [Demski and Sappington (1999), p. 28]. It includes many forms; financial packages, personal insurance, medical covers and other services. Each form has many components. Financial compensation, for example, has many components, such as salary, stocks, stock options and pension contributions. Baron (1988), Stafford and Cohen (1974) and Triplett (1983) analyse key non-financial components of compensation; and Gibbons and Murphy (1992), Holmstrom and Ricar i Costa (1986) discuss career concerns. Non-financial components might include personal (health, life and disability) insurance and the associated tax benefits. In addition, other forms might include dental and medical services, auto maintenance and veterinary insurance. However, as Antle and Smith (1985), Bushman *et al.* (1996) and Demski and Sappington (1999) argue, most of the compensation forms are difficult if not possible to measure precisely. Thus, it is not unreasonable for this study to use only the financial form of the compensation.

The Corporate Register provides information about the total compensation paid by each firm annually. Total compensation paid includes all salaries, fees, bonuses, benefits and other normal remuneration, and company pension contribution. But does not include gains from exercising ESO and similar incentives, nor the value of ESO granted. Among these information is the Highest Paid Director (HPD) compensation. This figure represents the total compensation paid by the firm to the highest paid director (without the cost of pension)[4]. It is not unreasonable to assume that HPD represents the total compensation usually paid to the Chief Executive Officer (CEO). Thus, this figure will be used as the dependent variable in the multivariate Model. Barron and Waddell (2003) empirically find that the compensation incentives based are proportionally associated with executive ranking. That is a higher rank executive has a greater proportion of incentive-based compensation in general, and equity-based in particular, than a lower rank executive. Thus, eliminating other directors from the study sample would control for such variations.

Table (6.1) reports the statistical descriptive of CEO compensations paid in FTSE100 firm during 1999 and 2001, while appendix (A6.1) details the data for each company in the sample. It can be seen from the table that, on average, FTSE100 CEOs received salary and bonus without pensions costs of about £781,133 in 1999 increased by 16% in 2001. In addition, the table reports that while the minimum compensation paid decreased from £25,027 in 1999 to £17,200 in 2001 and the maximum compensation decreased considerably from £6,807,000 in 1999 to £3,805,000 in 2001. In fact, the table exhibits that the level of compensation paid in 1999 was the highest. As the CEO

[4] Although the Corporate Register provides information about HPD with pension costs (HPDP), and these data are available in the database of the study, it has been excluded from the analysis because there were 10 FTSE100 firms in 1999 and 13 firms in 2001 with no data on pension costs.

total compensation is linked with performance, it can be assumed that FTSE100 performed very well in 1999 than in 2001.

(6.3.2) Number of Insiders

The Corporate Register provides list of names of the firm's executive directors. Therefore, one can easily count the total number of executive directors in the firm-year. It is not unreasonable to suggest that this number, compared with number of non-executive directors or total number of executives and non-executive directors, is the most obvious, and might be the most accurate, proxy for the number of insiders in the Model. With the dependent variable is the CEO compensation; it is identical to use the total number of executive directors as a proxy for the number of insiders, *i.e.* independent variable. The justification for this is simply that the firm's executives know the operations and day-to-day functions and decisions of their firm. They are involved in depth in their firm and have comprehensive knowledge of the current status and future perspectives of their firm. An alternative proxy might be the total number of non-executive. Those directors obtain inside information during the board meetings, when important and strategic decisions are considered. However, their involvement with the firm is frivolous relative to the involvement of executive directors. In addition, all inside information obtained by the non-executives come from the executives, usually the CEO.

Table (6.1) shows the statistical descriptive of the total number of executives in each FTE100 firm for 1999 and 2001, while the full set of data is detailed in appendix (A6.1). It can be seen from the table that the average number of executive directors in FTSE100 firms has not changed. The average was 5 directors in 1999 and in 2001. However, the numbers of executives within FTSE100 firms are varied from 1 to 11 executive directors.

(6.3.3) CEO's Personal Characteristics

Human capital models [see, for example, Anderson (1980)] argue that the rate of return on human capital is subject to education and experience. CEO's years in the post and his educational degree represent the CEO internal experience and privilege knowledge along with his educational and professional credentials, respectively. More recently, Roulstone (2003) uses executive's tenure as a proxy for the executive's planning horizon and accumulated wealth[5]. Following Kato and Rockel's (1992) findings and Spence's (1973) signalling interpretation of credentials, it is not unreasonable to expect that these two variables would be among the variables that determine the CEO's level of compensation.

FTSE100 CEOs' personal characteristics are gathered from the Corporate Register. The database collected consists of many detailed data about the personal characteristics of the CEOs. These are:

(1) CEO's year of appointment in the current post,
(2) The specified educational degrees held (Bachelor, Master, Master in Business Administration and Ph.D.),
(3) Which subject is the educational degree held (Medicine, Engineering, Business, etc.),
(4) From which university is the educational degree held (namely Oxford, Cambridge, Imperial in the UK, and Harvard and Massachusetts Institute of Technology in the USA),
(5) Professional memberships (such as Association of Chartered Accountant, Association of Certified Accountant, Institute of Chemical Engineers, Royal Pharmaceutical Society of Great Britain, etc.),
(6) The titles held (examples include Commander of the Order of the British Empire, Distinguished Service Cross, Knight Commander Order of the British Empire, etc.),
(7) Whether the CEO held the same position in previous year-data (such that whether the CEO in 2001 held the same position in 1999).

Table (6.1) summarizes the main personal characteristics of FTSE100 CEOs during 1999 and 2001 and appendix (A6.2) provides the whole set of data for each company in the sample. On one hand, the average number of years CEO held in the position was 6 years in 1999 and 2001. On the other hand, CEOs education level is represented by many attributes. On average, most but not all of the CEOs have a Bachelor degree. Of 100 CEOs, 59 ones have a bachelor degree in 1999 and 62 out of 97 in 2001.

[5] While Dedman and Lin (2002) examines share price behaviour effects of CEO departures in the UK, and find that many firms choose not to announce CEO departure, and when they do announce it, the market reacts negatively.

(6.3.4) CEO's Job Characteristics

Agency Theory literature examined the relationship between the managerial compensation and the firm's financial, economic and market performance, *i.e.* pay-performance [see sub-section (4.4.1) in chapter 4]. It predicts a positive relation between managerial pay and some variables that measure the shareholders' welfare. These variables might serve not only as measures for performance but also as indicators for managerial outputs, *i.e.* job produce.

The data collected for this study allows to employ two alternative firm's performance indicators (1) shareholders' returns, represented by Earnings Per Share (EPS) ratio, as in Roulstone (2003), and (2) market-based returns, measured by Price to Earnings (P/E) ratio. Table (6.1) reports the descriptive statistics of these measures for FTSE100 during 1999 and 2001, and appendix (A6.2) details these ratios for each firm in the sample.

Table (6.1) Descriptive Statistics for Total Number of Executive Directors and Total Compenation Paid to CEO and CEOs Personal and Job Characteristics, Shareholdings, Industry Sector and Cumulative Abnormal Returns in FTSE100 Firms During 1999 and 2001

1999	No. Of Executives in the Firm	CEO Compensation Paid (£)	CEO Personal Characteristics				Total No. of Employees	Total Market Capitalization	Earnings Per Share	Price / Earnings Ratio	Indutry Sector Service/Not	1999 Annual CAR For Each Company						
			Years in Post	Education Level	No. of Shares Held Ordinary	Incentives												
	#Exec99	HPD99	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	OrdinarySh	BEO	SSO	IncentiveSh	AllPortfolio
No of Firms	100	100	100	100	100	99	100	100	100	100	100	61	26	70	37	19	46	78
Mean	**5**	**781,133**	**6**	**1**	**334,945**	**685,596**	**41301**	**11754**	**0.93**	**17**	**1**	**-0.20**	**-0.03**	**-0.16**	-0.57	**-0.08**	**0.36**	**0.18**
Minimum	0	25,027	1	0	0	0	94	292	-0.28	0	0	-2.53	-5.32	-5.32	-6.21	-6.83	-6.52	-5.92
Maximum	11	6,807,640	39	1	5,634,020	6,800,000	267,000	117,187	39.64	704	1	4.03	5.26	5.26	3.95	5.32	5.32	5.29
StdDev	2.13	787,665	5	0	914,570	1,329,627	51,321	18,293	3.99	70	0	1.42	2.05	1.59	1.77	2.43	1.94	1.29
Skewness	0.34	5.01	3	0	5	3	2	3	9.46	10	-1	0.85	0.05	0.40	-0.37	-0.67	0.03	-0.11
Kurtois	-0.02	34.70	14	-2	21	12	6	14	92.29	96	-2	0.89	1.94	2.20	2.41	3.18	2.48	8.31
Source	Appendix (A6.1)		Appendix (A6.2/a)															

2001	No. Of Executives in the Firm	CEO Compensation Paid (£)	CEO Personal Characteristics				Total No. of Employees	Total Market Capitalization	Earnings Per Share	Price / Earnings Ratio	Indutry Sector Service/Not	2001 Annual CAR For Each Company						
			Years in Post	Education Level	No. of Shares Held Ordinary	Incentives												
	#Exec01	HPD01	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	OrdinarySh	BEO	SSO	IncentiveSh	AllPortfolios
No of Firms	97	97	97	97	97	97	97	97	97.00	97	97	53	22	63	32	22	43	73
Mean	**5**	**907,332**	**6**	**1**	**863,960**	**1,429,775**	**44698**	**14673**	**0.67**	**10**	**1**	**0.78**	-0.50	**0.37**	**-0.05**	0.18	0.13	**0.12**
Minimum	1	17,200	1	0	0	0	520	129	-2.07	0	0	-3.54	-4.25	-4.25	-7.28	-6.60	-7.28	-5.41
Maximum	10	3,805,000	41	1	26132860	16185639	261,000	131,164	16.42	227	1	4.83	2.21	4.83	3.89	3.77	3.89	3.79
StdDev	1.74	678,582	6	0	3134154	2433342	50,782	26,200	2.05	28	0	1.50	1.49	1.59	2.23	2.14	2.02	1.31
Skewness	0.32	2.17	2	-1	6	4	2	3	5.70	7	-1	-0.03	-0.47	-0.19	-1.18	-1.12	-1.32	-0.62
Kurtois	0.69	5.74	9	-2	47	21	5	11	39.00	48	-2	0.74	0.70	1.05	2.69	3.08	3.67	4.36
Source	Appendix (A6.1)		Appendix (A6.2/b)															

Another measure used in the literature for CEO's job characteristic is the size of his firm. Since Simon (1957)[6], the classical literature of Organisation Theory has documented that the level of executive directors' pay is more strongly related to the size of their firm than to the shareholders' welfare [see, for instance, Kato and Hebner (1992) and Rosen (1999)]. More recently, relevant literature indicates that the ability of the executive is matched with his firm size. Larger firms have more able executives and thus require more pay. That is so because the job characteristics of CEO in larger firms require more human capital than in smaller ones. Such that coordinating various divisions within the firm and communicating various business relations with other firms [see, for example, Roulstone (2003)]. Two attributes of firm size measures for each FTSE100 firm during 1999 and 2001 are considered in the multivariate model: (1) market capitalisation, as in Roulstone (2003), and (2) total number of employees[7], as in Hu and Noe (2001).

To avoid duplication in the director's firm size and performance measures employed in the Model, whenever the market capitalisation used as firm size attribute, EPS is used as a firm performance attribute. Likewise, whenever the total number of employees represents the firm's size, P/E is used as a performance measure. That is to avoid using P/E (performance measure) with market capitalisation (size measure) as the stock price represents the numerator in both measures.

In fact, both attributes can be seen as control variables in the Model. Although the population sample of this research includes the largest 100 firms in LSE, there still significant size differences within the sample. A simple visual analysis of the data in table (6.1) shows clearly such variations. For example, the firm size, represented by total number of employees, is varied in FTSE100 between 94 and 267,000 employees in 1999 and between 520 and 261,000 employees in 2001; and when it's measured by market capitalisation, its varied between £292 million to £117 billion in 1999 and between £129 million and £113 billion in 2001. Similarly, the firm performance is varied significantly, either represented by EPS, minimum £-0.28 to a maximum of

[6] Kato and Rockel (1992), page 38.

[7] Another measure of firm size might be used is the sales. However, there are many limitations with using measure in this study. Such that FTSE100 consists of firms from various industries, where the sales figures do not represent the same accounting measures. For example, there is no sales figure in the banking and financial institutions.

£39.64 in 1999, and from (£-2.07) and maximum £16.42; or by P/E ratio, from a minimum of less than 1 to more than 70 times in 1999 and 227 times in 2001. Table (6.1) provides the descriptive statistics for this information.

(6.3.5) Insider-Trading by Directors

While most of the Principal-Agent empirical literature focused on the financial accounting, economic and market performance as determinants of executive directors pay, no attempt has been made to examine the executives' expected returns from insider-trading. The Model employed in this study indicates that the director's returns from insider-trading are considered as an integral part of his total compensation. Empirically, this can be represented in the Model explicitly by insider-trading profitability [μ_{it}], as in equation 8, [detailed in section (6.3.5.1)], or implicitly by the director's capacity to trade [$\pi(N_{it})$], as in equation 10 [discussed in section (6.3.5.2)]. Both variables are mutually exclusively used in the Model. That is, using one excludes the necessity for using the other one. Since this research is employing the combinatorial approach for selecting the regression model [see section (6.5.1)], the analysis involves using either one to achieve the maximum explanatory power of the model.

(6.3.5.1) Director's Returns from Insider-Trading

This variable presents insider-trading returns for FTSE100 directors. Chapter five [see section (5.5.2.3)] computed the abnormal returns for each director-transaction [see Appendix (A5.10)]. For the purpose of this analysis, the abnormal returns (AR) for each director-firm for thirty days (AR_1, AR_2,..., AR_{30}) are cumulated to produce monthly CAR. Then, the average CARs for each company during 1999 and 2001 are calculated. Finally, CAR for each company is multiplied by 12 to produce annual CAR for company-portfolio [buy ordinary shares (Buy), sell ordinary shares (Sell), holding exercised executive share option (BEO) and selling exercised executive share option (SSO)].

Statistics, summarised in table (6.1) and detailed in appendix (A6.2), show that in 2001, the average annual CAR for Buy portfolio was 78.06%, and -50.43% for Sell portfolio. On the other hand, BEO's CAR was -4.93% and that of SSO was -17.67%. The ordinary shares portfolio, which combines buys and sells portfolios, has a positive CAR at

36.66%, while that of ESO was negative at -13.32%. The overall portfolio, which consists of all transactions, has a positive CAR at an annual average of 11.90%.

In addition, *Pearson's* correlations between director's compensation and CAR portfolios are examined. The results are reported in table (6.3). The Model assumes negative or insignificant association between both variables. That is so because, on one hand, as the number-of-insiders increases, the profitability of director from insider-trading decreases. On the other hand, as the number-of-insiders increases, the compensation increases. Thus, as insider-trading profitability decreases the compensation increases. However, since the number of insiders has adverse association with the compensation, the relationship between insider-trading profitability and the compensation becomes ambiguous.

Table (6.3) shows that in 1999 there was no significant correlation between any CAR portfolio and CEO's compensation measures. However, 2001 data shows some statistically significant correlation with sell portfolio. For instance, the bivariate correlation of sell portfolio with CEO compensation (HPD) shows significantly high correlation (ρ 55%, p-value < 0.01). The implications of such results will be discussed along with the model analysis in section (6.5).

(6.3.5.2) Director's Capacity for Insider-Trading

Another indicator for insider-trading in the Model is the director's capacity to trade. That is the volume of shareholdings of ordinary shares, *i.e.* bought from the open market, and of executive share options (ESO), *i.e.* holding exercised ESO. It is not unreasonable to assume that a director with large shareholdings has more capacity to trade, in general, and to sell in particular. While that with less quantity has more capacity to buy his firm's own shares.

Table (6.1) reports the average number of ordinary and incentive shares held by CEOs in FTE100 firms during 1999 and 2001, and appendix (A6.2) reports the details for each firm in the sample. These data can serve as a proxy for the director's capacity to trade in his firm's shares. In most cases, it shows that, on average, FTSE100 CEOs increased their ordinary shareholdings from 334,945 shares in 1999 to 863,960 shares in 2001. However, the case is different in terms of incentive shares held. Here the CEOs have more holdings. In fact, this is due to the level of incentives given to CEOs. In 1999, the CEO held, on average, more than 685,596 incentive shares and doubled the volume in 2001 to reach more than 1.4 million incentive shares.

It seems that such increase in CEOs ordinary shares, which are bought from the open market, can suggest that they intentionally wanted to increase their capacity to trade in their firm's shares and, thus, to increase their insider-trading returns. This assumption is supported by *Pearson's* correlation between ordinary and incentive shareholdings. It has been found significantly positive (58% in 1999 and 21% in 2001) [see table (6.3)]. The implications of these results will be interpreted along with the model analysis in section (6.5).

(6.3.6) Industry Sector

Industry sector is employed in the Model to control for two possible effects [see, for example, Kato and Rockel (1992)]. Firstly, if substantial portion of executive directors' human capital is industry-specific, then industry-wide directors labour market will develop. Thus, inter-industry compensation differentials may persist. Secondly, as shown in Deckop (1988), there are some potential institutional causes of the fragmentation of the director's labour market along with industry sectors.

This study uses the industrial classification dummy variable where the service sector is the reference sector. That is, firms in the service sector have been given one, and zero for firms in other sectors. Table (6.1) and appendix (A6.2) reports this re-classification for FTE100 firms, where it is obvious that most of them are in the service sector, 66 out of 100 firms in 1999 and 63 out of 97 firms in 2001.

(6.4) DATA ANALYSIS

The purpose of this section is to assess the individual variables, outlined in section (6.3), for the multivariate model, equation 10 in section (6.2). The reason for employing the multiple regression technique in this study is to explain and predict the relationship between the CEO's explicit form of compensation, *i.e.* the dependent variable, and the number of insiders, the CEO's personal and job characteristics and other independent variables. The multiple regression technique assesses the degree and character of relationship between the independent and the dependent variables as modelled in equation 10. In addition, this technique allows for examining (1) the contribution of each independent variable to the variate, (2) the direction of the relationship between each independent variable and the variate, (3) the significance of each independent variable to the variate and (4) the inter-relationship among the independent variables employed in the model. However, in order for the result of the multiple regression technique to be valid, three assumptions have to be considered regarding the data[8]. Investigated in the following sub-sections, these are: normality, Independence and linearity.

(6.4.1) Normality

This assumption indicates that the data being analysed are normally distributed. Although this is not a prerequisite for Ordinary Least Squares (OLS), non-normality might produce invalid statistical tests, such as t and F-tests, of the multiple regression. In such case, however, data transformation has to be used to correct the non-normality of the variables. Testing for normality of the data is assessed by the SPSS modification of the Kolmogorov-Smirnov (K-S) test (Lilliefors significance correction). Table (6.2) reports the shape of the distribution and normality test (K-S) for each variable before and after the transformation. Obviously, the K-S test rejected normality for all variables at the 5% level of significance. Thus, data transformation is conducted by the logarithm [$\ln_e$ (X)] and the logarithm of the absolute value [$\ln_e$ (|X|)] for the variables with negative values. The transformation, however, is not possible for two variables because of zero values. These are "CEO education level" (CeEdu) and "industry sector of the firm" (IndstDum) which are (0,1) variables. After logarithmic transformation, K-S test statistic could not reject the normality of 2 out of 9 transformed variables. One variable in 1999, *i.e.* CEO years in post (LnCePs), and one variable in 2001, *i.e.* CEO' firm Earnings Per Share (LnEPS). The test has rejected the normality of the rest of the transformed variables, however, a marginal improvement is resulted in the shape of the distribution for each of those transformed variable. Table (6.2) details these statistics.

Another aspect of the data has to be investigated under this assumption is the homoscedasticity of the variate. This assumption is violated by the presence of unequal

[8] See, for example, chapter 9 in Greene (1997) and chapter 12 in Webster (1992).

variances, *i.e.* skewed distribution, and can be assessed by SPSS Levene Test for homogeneity of variance[9]. If hetroscedasticity is present, data transformation can be used to adjust the skewed distribution[10]. However, test of homogeneity of variances (Levene Test) cannot be performed by SPSS because there are too many groups. Only 50 groups are allowed in the SPSS (version 10, 1999). Alternatively, STATA regression with robust standard errors[11] is used to assess the independent variables and test the overall fitness of the model taking into consideration the hetroscedasticity, if present. The results will be reported when estimating and assessing the regression models in section (6.5).

(6.4.2) Independence

Ideally, the explanatory variables should to some extent be independent from each other in their movements and from residuals of the regression. That, there should be no high correlation between the independent variables. This so because the purpose of employing each independent variable in the model is to contribute proportionally in explaining and predicting the dependent variable. Significantly high correlation (usually more than 60%) between two independent variables means that their effects on the dependent variable would be identical. Statistically, this known as a multicollinearity problem. Multicollinearity exists if one of the independent variables is linearly related to any of the others. It represents the extent to which a variable can be explained by another variable among the explanatory variables. That is the degree to which any variable's effect can be predicted by another variable in the analysis. As multicollinearity increases, the ability to define any variable's effect is diminished [see Hair *et al.* (1998), p. 2 and p. 24; and Webster (1992), p. 664]. Thus using one of them would suffice of using the other[12].

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[9] Chapter 12 in Greene (1997) explains the major tests and remedies for hetroscedasticity.

[10] Manning and Mullahy (2001), for example, examines how well the alternative estimators behave economically in terms of bias and precision when the data are skewed or have other common data problem (e.g. hetroscedasticity, heavy tails) and conclude that no single alternative is best under all conditions. More specifically, McCuen *et al.* (1990) examine the problems with logarithmic transformations in regression.

[11] See, for instance, Ai and Norton (2000) for calculating the standard errors for the transformation problem with hetroscedasticity.

[12] Literature suggests that highly correlated independent variables can be used when regression employed for predictive but not for explaining purposes [see for instance, Hair *et al.* (1998)].

Table (6.2) Kolmogorov-Smirnov Tests of Normality and Remedies for FTSE100 CEOs' Pay Measures and Independent & Control Variables

Independent & Control Variables	1999 N=100				2001 N=97			
	Shape of Distribution		Test of Normality		Shape of Distribution		Test of Normality	
	Skewness	Kurtois	K-S statistic	p-Value	Skewness	Kurtois	K-S statistic	p-Value
HPD	5.010	34.701	0.256	0.000	2.173	5.736	0.158	0.000
LnHPD	-0.641	4.013	0.110	0.005	-1.235	5.827	0.098	0.022
NoExec	0.342	-0.021	0.127	0.000	0.322	0.687	0.168	0.000
LnNoExec	-0.918	1.406	0.165	0.000	-1.302	3.047	0.210	**0.000**
CeYPst	2.776	13.919	0.198	0.000	2.476	9.402	0.205	0.000
LnCeYPst	0.020	-1.107	0.128	**0.198**	-0.003	-1.041	0.165	0.012
CeEdu	-0.372	-1.900	0.390	0.000	-0.589	-1.689	0.412	0.000
CeOSh	4.510	21.277	0.356	0.000	6.456	47.065	0.391	0.000
LnCeOSh	0.003	0.250	0.173	0.016	-0.897	3.773	0.166	0.012
CeISh	3.483	12.465	0.303	0.000	4.125	20.881	0.279	0.000
LnISh	-0.769	0.326	0.164	0.028	-1.174	2.448	0.153	0.029
Emply	2.331	6.178	0.213	0.000	2.138	5.422	0.192	0.000
LnEmply	-1.042	1.247	0.102	0.013	-0.662	0.013	0.096	0.028
CAP	3.446	13.536	0.320	0.000	3.303	10.986	0.326	0.000
LnCAP	0.274	1.372	0.108	0.006	0.100	1.371	0.095	0.030
EPS	9.460	92.294	0.433	0.000	5.700	38.997	0.321	0.000
LnEPS	-0.628	7.190	0.116	0.002	0.219	0.601	0.054	**0.200**
PE	9.682	95.607	0.405	0.000	6.740	47.756	0.377	0.000
LnPE	0.506	5.543	0.113	0.003	0.338	2.721	0.102	0.015
INDSTDUM	-0.686	-1.561	0.426	0.000	-0.636	-1.629	0.417	0.000

The Preffex Two Letters (LN) is for the $\ln_e(x)$ of the Variable

HPD CEO Pay Without Penion Cost
NoExec No. of Executives in the Company
Emply Total No. of Employees in the Company
CAP Market Capitaliation
EPS Earnings Per Share
PE Price / Earnings Ratio
CeYPst CEO Years in Post
CeEdu CEO Education (Dummy 1: University Degree, 0; Without)
CeOSh No. of Ordinary Shares Held by CEO
CeISh No. of Incentive Shares Held by CEO
INDSTDUM Indutry Group (Dummy: 1: Services, 0 Non-Services)

Independence of the explanatory variables is investigated by using the bivariate *Pearson's* correlation. Table (6.3) reports the correlation matrix among the independent variables. It shows that there is a significantly high correlation between the total number of employees and market capitalisation (both representing the firm size) [ρ = 34% in 1999 and 30% in 2001] as well as between the EPS and P/E (both representing the firm performance) [ρ = 99% in 1999 and 92% in 2001]. However, this has no impact on the regression variate as both pairs are used alternatively. In addition, table (6.3) shows significantly positive correlation between number of insiders and total number of employees [ρ = 33%, *p*-value = 1% in 1999; and ρ = 20%, *p*-value = 5% in 2001]. This conclusion confirmed by the correlation between number of insiders and market capitalisation. These two variables are correlated insignificantly very weak [ρ = 11% in 1999 and ρ = -6% in 2001]. Other relations between independent variables are very weak and the table in this context is self-explanatory. However, the results will be interpreted in details in conjunction with the regression variate and its results [section (6.5)].

(6.4.3) Linearity

The second assumption for the multivariate regression variables is that there should be a degree to which the changes in the CEO's compensation, *i.e.* dependent variable, are associated, in a linear or curvilinear relation, with each of number of insiders, CEO's personal and job characteristics and other independent variables. Linear relationship can be examined by correlation, whereas partial regression plots can detect curve-linearity relation.

Pearson's correlations between CEO compensation paid and the independent variables are reported in Table (6.3). It shows that 2 relations, out of 20[13], are correlated significantly, one each year. These are CEO's education level in 1999 (ρ 20%, *p*-value < 0.05) and market capitalisation in 2001 (ρ 22%, *p*-value < 0.05). The other relations are not only insignificant but also very weak. For example, the correlation between CEO compensation paid and number of insiders is 7% in 1999 and 6% in 2001. However, these results might be influenced by some extreme observations in the sample, which is investigated in the previous section (6.4.1).

In fact, Pearson's correlation measures the linear relationship between two variables. However, the relation between the variables might be non-linear as those reported in the table. It might be curvilinear. In the context of the Model used in this study, such relation better measured by partial regression plot. This has investigated for each independent variable employed in the Model, after transforming the data [see section (6.4.1)]; the results confirmed the reliability of using these variables in the Model.

Table (6.3) Pearson's Correlation Among the Multivariate Regression Variables

CEO 1999	N = 100 HPD99	NoExec99	Emply99	CAP99	EPS99	PE99	INDDUM	CeYPst99	CeEdu99	CeOSh99	CeISh99
	Independent Variables for Managerial Incentive of Insider Trading (1999)										
NoExec99	0.07	1.00									
Emply99	0.13	0.33***	1.00								
CAP99	0.10	0.11	0.34***	1.00							
EPS99	0.04	-0.02	0.03	-0.01	1.00						
PE99	0.00	-0.06	-0.04	0.00	0.99***	1.00					
INDDUM	0.03	-0.12	-0.09	-0.12	0.06	0.08	1.00				
CeYPst99	-0.03	0.02	0.11	-0.05	0.06	0.07	0.19**	1.00			
CeEdu99	0.20**	0.08	-0.13	-0.06	0.06	0.06	-0.08	0.18	1.00		
CeOSh99	0.03	-0.13	0.05	-0.04	-0.05	-0.02	0.05	0.26**	0.08	1.00	
CeISh99	0.09	-0.18	0.08	0.02	-0.08	-0.06	0.05	0.35***	-0.02	0.58***	1.00
CAR-Buy Portfolio	-0.03	-0.01	0.03	-0.13	0.12	0.13	0.28**	0.06	-0.26**	0.34***	0.21
CAR-Sell Portfolio	-0.09	-0.09	-0.25	-0.30	-0.33	0.09	0.08	-0.23	-0.10	0.15	0.10
CAR-Ordinary Shares Po	-0.06	-0.06	-0.06	-0.17	0.09	0.11	0.18	-0.09	-0.18	0.24**	0.15
CAR-Held Exercised ES	0.07	-0.16	-0.03	0.20	-0.01	0.02	0.22	0.05	-0.29	0.35**	0.38**
CAR-Sold Exercised ES	-0.17	-0.28	-0.33	0.01	-0.22	0.09	0.18	-0.20	-0.02	0.03	0.13
CAR-Executive Share O	-0.10	-0.14	-0.18	0.08	-0.05	-0.01	0.14	0.02	-0.13	0.25	0.29
CAR-All Shares Portfoli	-0.08	-0.10	-0.10	-0.06	0.02	0.05	0.15	-0.05	-0.15	0.24**	0.22

CEO 2001	N = 97 HPD01	NoExec01	Emply01	CAP01	EPS01	PE01	INDDUM	CeYPst01	CeEdu01	CeOSh01	CeISh01
	Independent Variables for Managerial Incentive of Insider Trading (2001)										
NoExec01	0.06	1.00									
Emply01	0.20	0.20**	1.00								
CAP01	0.22**	-0.06	0.30***	1.00							
EPS01	-0.01	-0.18	0.10	0.06	1.00						
PE01	-0.06	-0.19	0.00	0.08	0.92***	1.00					
INDDUM	0.08	0.05	-0.05	-0.17	0.04	0.06	1.00				
CeYPst01	0.02	0.18	0.07	-0.04	-0.09	-0.04	0.01	1.00			
CeEdu01	0.19	-0.08	-0.07	0.05	-0.04	-0.04	-0.19	0.24**	1.00		
CeOSh01	-0.01	0.01	-0.09	-0.05	-0.06	-0.05	-0.02	0.21**	0.11	1.00	
CeISh01	0.18	-0.09	0.08	0.29***	-0.09	-0.10	0.12	0.24**	-0.03	0.33***	1.00
CAR-Buy Portfolio	-0.00	-0.12	-0.09	-0.13	-0.06	0.05	-0.07	-0.20	-0.27	-0.13	-0.18
CAR-Sell Portfolio	0.55***	-0.05	0.12	0.38	0.16	0.15	-0.43**	0.35	0.08	0.21	0.50**
CAR-Ordinary Shares Po	0.16	-0.04	0.09	0.04	0.05	0.03	-0.17	-0.15	-0.11	-0.05	-0.06
CAR-Held Exercised ES	0.21	-0.01	0.44**	0.16	0.16	0.13	0.26	-0.17	-0.31	-0.31	0.26
CAR-Sold Exercised ES	0.31	-0.02	0.08	0.09	0.18	0.37	-0.08	-0.07	-0.38	-0.63***	-0.03
CAR-Executive Share O	0.26	0.00	0.37***	0.13	0.19	0.20	0.13	-0.12	-0.29	-0.36**	0.02
CAR-All Shares Portfoli	0.22	-0.02	0.19	0.08	0.09	0.05	-0.01	-0.13	-0.19	-0.20	-0.02

*** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.05 level (2-tailed).*

The Suffex Number (Two Digits) is for the Year of the Data

NoExec	No. of Executives in the Company	**EMPLY**	No. of Employee inhe Company
CeYPst	CEO Years in Post	**CAP**	Market Capitaliation
CeEdu01	CEO Education (Dummy: 1: Bachelor Degree, 0; Without	**EPS**	Earnings Per Share
CeOSh	No. of Ordinary Shares Held by CEO	**PE**	Price / Earnings Ratio
CeISh	No. of Incentive Shares Held by CEO	**HPD**	CEO Compensation
INDSTDUM	Indutry Group (Dummy: 1: Services, 0 Non-Services)		

[13] There are 10 independent variables each year, excluding insider-trading portfolios. Thus, table (6.3) reports 20 correlations.

(6.5) THE EMPIRICAL EVIDENCE

Having identified and analysed the data for the multiple regression, the next step in the analysis is to estimate and assess the model itself. That is by selecting and estimating the regression model and assessing the overall fitness of the assumed model, using STATA[14]. This ended-up with two main categories of regression models. The first one employs insider trading returns indicator, *i.e.* number-of-insiders, only [section (6.5.1)]; while the second category incorporates the actual returns and the director's capacity to trade [section (6.5.2)], as analysed below.

(6.5.1) The Managerial Incentive of Insider Trading Returns Indicator Models

The full sample of FTSE100 CEOs compensation data of 1999 and 2001 is employed in an empirical version of the Model, articulated in the following regression equation (model 1):

$$\begin{aligned} \ln(W_{dit}) = {} & \alpha + \gamma \ln(N_{it}) + b1 \ln(CeYPS_{dit}) + b2\,(CeEdu_{dit}) + b3 \ln(CeISh_{dit}) + \\ & \delta 1 \ln(Emply_{it}) + \delta 2 \ln(CAP_{it}) + \delta 3 \ln(EPS_{it}) + c1\,(IndDum_{it}) + \pi_{it} \qquad (11) \end{aligned}$$

The dependent variable in the regression is (W_{dit}) the CEO's annual compensation paid, measured by his salary and *ex-ante* monetary measured bonuses, which represents the explicit form of his reward contract. The independent variables include five main categories. Firstly, a proxy for the implicit forms of CEO reward contract, represented by (N_{it}) the number of insiders, *i.e.* executives, in his firm. Secondly, proxies for CEO personal characteristics designated by ($CeYPS_{dit}$) his internal experience as CEO and ($CeEdu_{dit}$) a dummy variable of his education level (one if hold a bachelor degree at least, and zero if otherwise). Thirdly, proxies for CEO job characteristics, defined by his firm size and profitability, which are measured by ($Emply_{it}$) the total number of employees in his firm and (CAP_{it}) the firm's market capitalisation, and (EPS_{it}) earnings per share, respectively. Fourthly, CEO 's number of incentive shares held ($CeISh_{dit}$), another form, however not direct, of CEO personal characteristic, to represent another part of CEO explicit form of his compensation, not included in the dependent variable. The reason behind inclusion this variable in the regression variate is to account for almost-all possible parts of the explicit forms of CEO compensations paid. The empirical application of the Model, equation 11, indicates that the dependent variable is represented by the *ex ante* monetary measured pay, and does not include the share options exercised, which are *ex post* measured pay, an information not available in the database employed in this research. Conyon *et al.* (2000) find that the current ESO awards for CEOs in the UK are only a fraction of total pay. This finding is based upon the widely used Black-Scholes (1973) Option Pricing Model[15]. In fact, The inclusion of this variable in the model is novel in this context and has not been tested in the literature. Finally, a control variable is introduced to account for the industry sector of the CEO's firm ($IndDum_{it}$). This is a dummy variable with reference to the service sector, where firms in the service sector are given one, and zero for those who are not. In equation 11, π is the error term, α is the intercept, γ is the coefficient on number of insiders, b's (b1, b2 and b3) are the coefficients on CEO personal characteristics, δ's (δ1, δ2 and δ3) are the coefficients on CEO job characteristics, and c1 is the coefficient on the firm's industry sector. In fact, γ, b's, δ's and c1 represent partial regression coefficients. The data set presenting all the variables included in the regression variate is presented in section (6.3).

The evidence presented in this section uses STATA (version 7) regression with robust standard errors analysis[16] to examine the relation between the explicit form of CEO compensation and the implicit form of his reward contract, *i.e.* expected returns from insider trading. For each year-model, various specifications are considered and discussed below. For each year, model 1 represents the regression variate of all

[14] In addition, SPSS is used. However, due to the presence of hetroscedasticity problem that is not accounted for by SPSS regression, the results are not reported. For how to account for hetroscedasticity, see, for instance, Manning (1998) and Wallentin and Agren (2002).

[15] The Black-Scholes Option Valuation Model calculates the market value of an European call option as follows: $C = S.N(d_1) - Xe^{-r\tau}.N(d_2)$, where $d_1 = \dfrac{\ln(S/X) + (r + \sigma^2/2)^{\tau}}{\sigma\sqrt{\tau}}$; and $d_2 = d_1 - \sigma\sqrt{\tau}$; S = is the price of the underlying security; X is the exercise price; τ is the time to expiration; r is the short-term interest rate which is continuous and constant through time; σ^2 is the variance rate of return for the underlying security; N(di) is the cumulative normal density function evaluated at di; and di is the length of time interval.

independent variables in equation 11, while model 2 represents the new version of the regression after dropping those insignificant variables resulted from model 1. If γ is significantly positive, then the research assumption that insider trading is part, however implicit, of the total compensation in the reward contract is held.

Table (6.4) reports the Ordinary Least Squares (OLS) estimates of STATA robust standard errors of equation 11 applied on 1999 and 2001 data set. It can be seen from model 1-1999 that 6 out of 8 independent variable coefficients are significantly positive at 5% level of significance or less. The research assumption that the coefficient of number-of-insiders (γ) is significantly more than zero is held. In addition, model 1-1999 shows that the CEO personal characteristic estimates, *i.e.* $\beta2$ and $\beta3$ for CEO education-level and incentive-shareholding, respectively; as well as the coefficients ($\delta1$, $\delta2$ and $\delta3$) of the CEO job characteristics, *i.e.* number-of-employees, market capitalisation and EPS, are significantly more than zero. However, the insignificant estimates are those of CEO years in post, which is positive and the industry-sector, which is negative.

On the other hand, the results from 2001 data show less significant estimates. Here, only 2 out of 8 estimates are significant at 5% level (CEO's incentive-shareholdings and his firm market-capitalisation), and 3 at 10% level (number-of-insiders, CEO education-level and total-number-of-employees in his firm). However, there are 3 insignificant estimates (CEO year-in-post, EPS and industry). Nevertheless, the model hypothesis ($\gamma > 0$) is still held but at lower confidence interval (90%) than in 1999 data.

[16] To control for hetroscedasticity, if any. See Webster (1992) p. 722, for White's (1980) test for hetroscedasticity; and for how to use STATA for robust regression, see "www.stata.com/support/faqs/stat".

Table (6.4) The Managerial Incentive of Insider Trading Model
Chief Executive Officer's Compensation and Number of Insiders: Model 1 and 2
Evidence From FTSE100 During 1999 and 2001, Using STATA Regression with Robust Standard Errors

$\ln(W_{oit}) = \alpha + \gamma \ln(N_{it}) + \beta 1 \ln(CeYPS_{oit}) + \beta 2 (CeEdu_{oit}) + \beta 3 \ln(CeISh_{oit}) + \delta 1 \ln(Emply_{it}) + \delta 2 \ln(CAP_{it}) + \delta 3 \ln(EPS_{it}) + c1 (IndDum_{it}) + \pi_{it}$

Dependent Variable	Independent Variables									Model Significance		
		No.of Insiders	CEO Personal Characteristics			CEO Job Characteristics				Statistics		F-value
HPD	Constant	LnNoExec	LnCeYPst	CeEdu	LnCeISh	LnEmply	LnCap	LnEPS	INDTDUM	N	R2	P-value
Model 1- 1999	8.797	0.536	0.056	0.277	0.115	0.099	0.145	0.134	-0.159	89	60%	16.230
t-value	14.49***	2.28**	0.96	2.72***	3.50***	1.99**	2.81***	2.99***	-1.6[illegible]			0.0000***
Model 2- 1999	8.617	0.556		0.309	0.118	0.107	0.142	0.127		89	59%	19.110
t-value	13.12***	2.29**		2.96***	3.36***	2.19**	2.66***	2.64***				0.0000***
Model 1- 2001	8.137	*0.647*	-0.068	*0.291*	0.145	*0.100*	0.153	0.019	0.021	92	35%	8.810
t-value	7.36***	*1.73**	-0.90	*1.89**	2.58***	*1.85**	2.26**	0.28	0.14			0.0000***
Model 2- 2001	8.129	*0.587*		*0.237*	0.139	*0.101*	*0.155*	0.015		92	35%	10.950
t-value	7.49***	*1.73**		*1.74**	2.75***	*1.88**	2.28**	0.230				0.0000***

The *t*-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).
(***) Significant at 1% or Less, (**) at 5% or Less, and *(*) at 10% or Less*.

Abbreviations:

HPD	CEO Compensation without Pension Cost.	Emply	No. of Employee inhe Company
NoExec	Total No. of Executive Directors	CAP	Market Capitaliation
CeYPst	CEO Years in Post	EPS	Earnings Per Share
CeEdu	CEO Education (Dummy, 1: University Degree, 0: Without)	INDSTDUM	Indutry Group (1: Services, 0 Non-Services)
CeISh	No. of Incentive Shares Held by CEO		

Furthermore, the coefficient of determination[17] (R^2) indicates that 60% (35%)[18] of the variation in CEO *ex ante* monetary-measured compensation can be explained by the independent variables included in model 1-1999 (2001). Moreover, Analysis of Variance (ANOVA) table examines the significance of the overall fitness of the model. ANOVA null hypothesis is that there is no linear relationship exists in the population of interest between the CEO compensation (the dependent variable) and the independent variables, and that the regression coefficients and the coefficient of determination are equal to zero.

The test of ANOVA null hypothesis is based on the *F*-ratio[19]. Table (6.4) shows that *F*-ratio for the regression variate of model 1-1999 (2001) is 16.230 (8.810). When compared with the F-statistics at (8, 81) [(8, 84)], the result leads to reject the null hypotheses at less than 1% level of significance. This indicates that with 89 (92) CEOs

[17] The coefficient of determination (R^2) equals to Sum of Squares Regression divided by Total Sum of Squares, and Adjusted-R^2 = 1 - (1 - R^2)*[(n - 1) / (n - k - 1)], where n is the number of observations and k is the number of independent variables.

[18] STATA (version 7) reports R^2 only but not Adjusted-R^2, because it needs only R^2 for the purpose of testing hetroscedasticity according to White's (1980) test. However, since R^2 is very sensitive to the number of independent variables in the regression, *i.e.* more independent variables lead to higher R^2. Adjusted-R^2 is calculated based on equation in th footnote above and found 56% for model 1-1999 and 29% for 2001.

[19] *F*-ratio is calculated as follows: Firstly, calculate the Mean Square Regression by dividing the Sum of Squares Regression to the regression Degree of Freedom (No. of Independent Variables). Then calculate the Mean Square Residuals by dividing the Sum of Squares Residuals to the residuals' Degree of Freedom

pay observed by model 1-1999 (2001), the regression variate explains 16.230 (8.810) times more variation in the level of CEO pay than by using the average of the independent variables, and this is not likely to occur by pure chance alone. Thus, the research assumption that the coefficient of number-of-insiders (γ) is significantly more than zero is confirmed by the overall fitness of the model.

However, when dropping those insignificant variables from model 1 (year-in-post and industry sector), the results of the new model 2, reported in table (6.4), show that all the remaining independent variables are significantly positive in 1999 (except EPS in 2001). In addition, the overall fitness of the model, tested by *F*-ratio, increased to a highly significant 19.110 (10.950) in 1999 (2001), while the explanatory power of the regression variate (R^2) remains high at 59% (35%) in 1999 (2001). Furthermore, when dropping the EPS from model 2-2001, *F*-ratio increased to 12.240 while maintaining R^2 at 35%. But dropping EPS from model 2-1999 reduces the *F*-ratio to18.940 and R^2 to 55%. Appendix (A6.3) reports various specifications derived from equation 11, for 1999 and 2001.

The insignificant coefficient of the industry-sector might suggest that when setting-up the *ex ante* CEO pay, the remuneration committees in FTSE100 structure the contract in reference to each others in the index rather than to their rivals in their industry sector. *Pearson's* correlation between industry-sector and CEO pay supports such suggestion by a weak correlation of 3% (8%) in 1999 (2001). Moreover, as the empirical results show, the CEO years-in-post coefficient is insignificant in explaining the CEO pay level. It is not un-reasonable to assume that as longer the CEO held the post in his firm, as a class [see, for example, Noe (1995)], as he would be less demanding for his *ex ante* form of compensations. Once again, *Pearson's* correlation between CEO years in post and his pay shows negative and weak value of -2.6% (1.6%) in 1999 (2001). The insignificance of the firm's profitability measure (EPS) estimate might be explained by the fact that CEO contract is of a long-term basis while EPS is of a one fiscal year result. Thus, the accurate substitute for this figure would be the actual returns gained by the shareholders during the whole term of the CEO contract, which is, unfortunately, not available to this study. In addition, one might argue that as a profitability measure, EPS

(No. of Observations No. of Independent Variables). Finally, *F*-ratio is given by dividing Mean Square Regression to Mean Square Residuals.

is a diluted figure to represents a standard measure for FTSE100 profitability as these firms come from different industries and thus subject to varied tax levels[20].

The empirical results of model 1 are consistent with relevant literature, particularly in terms of the main research hypothesis. However, only one relevant study is identified by this research. That is of Hebner and Kato (1997), which will be analysed in the context of the research findings. They find that, regardless of the definition of insiders, *i.e.* officers or directors in the USA firms and *Yakuin* with or without statutory auditors and/or outsider *Yakuin* in the Japanese corporations, the coefficients of number-of-insiders in 1986 USA data and 1985 Japanese data are significantly more than zero. In addition, they find the same results for CEO job characteristics, represented by sales or employment (as measures of firm size) and shareholder returns (as a measure of firm profitability). However, the UK results of CEO personal characteristics, reported in table (6.4), are in contrast with those of USA and Japan. Hebner and Kato find significantly positive estimates for US and Japanese CEO year-in-post and insignificantly negative (positive) estimates for US (Japanese) CEO education-level.

To sum up, the research main model leads to suggest that the CEO explicit compensation is dependent, among other things, on the number of insiders in his firm. In other words, an increase in the CEO *ex ante* pay level is associated with *inter alias* an increase in the number of executives in his firm. Thus, it is not unreasonable to suggest, based on the empirical findings, that insider trading can be seen as in integral, however implicit, part of the reward contract of the firm's management. However, there might be an alternative explanation for this finding. A research area that need more investigation.

(6.5.2) The Managerial Incentive of Insider Trading Realized Returns Models

The model represented in equation 11, employs number-of-insiders as an implicit indicator for insider trading returns. One might argue that, if insider trading is to be considered as an integral part of director's total compensation Then, in a competitive labour market for directors, the realized returns from director's trades should have a

[20] Other measures are considered by this research, such as earnings from operations before interest and tax, and found the same source of dilution is present, *i.e.* varied industries and different measures for revenues and earnings.

significantly negative association with director's explicit form of compensation, as indicative by equation 1[21]. In addition, since the director is not allowed to take position in short selling, one would expect that the director's ordinary shareholdings, accumulated over time through open market operations, would represent his capacity to trade and thus, be relevant to his insider trading returns. On the other hand, as Hayes and Schaefer (2000) concluded, compensation should be more positively associated with future performance when observable measures are less useful for contracting. Here insider trading returns, particularly from all-transactions portfolio, can be seen as an indication for future performance. Subsequently, the new version, model 3, would be read as follows:

$$\ln(W_{dit}) = \alpha + \gamma \ln(N_{it}) + b1\,(CeEdu_{dit}) + b2\ln(CeISh_{dit}) + \delta 1\ln(Emply_{it}) + \delta 2\ln(CAP_{it}) + \delta 3\ln(EPS_{it}) + d1\,(OSh_{dit}) + d2\,(CAR_{it}) + \pi_{it} \quad (12)$$

The dependent and independent variables in equation 12 are the same as those in equation 11. However, two new independent variables are introduced. These are (OSh_{dit}) the CEO ordinary shareholdings [explained in section (6.3.5.2)] and (CAR_{it}) the Cumulated Abnormal Returns from insider trading in his firm's shares for all-transactions portfolio[22] [explained in section (6.3.5.1)]. And, d1 and d2 are the partial regression coefficients on (OSh_{dit}) and (CAR_{it}), respectively.

The research hypothesis here is identical to what can be derived from equation 1. That, as the director's capacity to trade increases, his insider trading returns increases and his explicit compensation decreases. Likewise, as the director's realized return (CAR) increases, his explicit compensation decreases. Thus, the new model assumes economically significant negative coefficients (d1 and d2) of these two new independent variables (OSh_{dit} and CAR_{it}).

[21] Theoretically, the error term (π) in equation 9, in section (6.2), is identical to insider-trading signal. Chapter 5 uses these signals and computed insider-trading returns. Thus, it is not unreasonable to substitute those returns for that signal, *i.e.* the error term, in the model.

[22] Appendix (A6.4) shows that Model 3 has 7 specifications/portfolios. Each of which represents insider-trading CAR from the type of shares traded. These portfolios are buy ordinary shares (Buy portfolio), sell ordinary shares (Sell portfolio), all ordinary shares (OS portfolio), holding exercised executive share options (BEO portfolio), selling exercised executive share options (SSO portfolio), all exercised executive share options (ESO portfolio) and all-transactions (All portfolio).

Table (6.5) reports the empirical results of model 3-1999 and Appendix (A6.4) reports the results of each portfolio/specification. It shows that CAR estimate is significantly positive, and while maintaining the main hypothesis of the model, regarding the number-of-insiders, valid, the model failed in term of its economic concept. However, one might argue that the results of this specification of model 3 might be diluted by the portfolio definition. That, it includes ordinary and incentive shares that have different features [such as pricing, quantity and timing) and, thus represents different indications in this context (trading for profitability or other motives to trade mentioned in section (2.4)]. This argument is investigated and the results of each same-type of transactions/shares portfolio (Buy, Sell, all OS, BEO, SSO or ESO), reported in Appendix (A6.4), show that none of these portfolios is significantly less or more than zero[23].

In fact, model 3 includes three measures for insider trading: An indicator (number of insiders), realized returns (CAR portfolios) and capacity to trade (ordinary shareholdings). On one hand, the relationship between number of insiders and CAR is an adverse one, *i.e.* as the former increases, the later decreases and vice versa, and table (6.3) shows negative *P*earson correlation between these two variables in 1999. Expectedly, the same sort of relation is exhibited between number of insiders and CEO's ordinary shareholdings. On the other hand, the relation between CARs and CEOs ordinary shareholdings is significantly positive as indicated in table (6.3). Thus, the problem of multicollinearity might exist in model 3 and the impact of the new 2 variables introduced in the model (CAR and OSh) on the dependent variable (CEO pay) is, in effect, diminished. Thus, the new version, model 4, consists all independent variables in model 3 except number of insiders and CEO ordinary shareholdings. Table (6.5) shows the empirical findings of model 4-1999 with CAR portfolio[24]. Model 4

[23] Appendix (A6.4) shows that only in 3 out of 7 specifications (Buy, OSh and All transactions portfolios), the main hypothesis, *i.e.*. the coefficient of number-of-insiders (γ) is significantly more than zero is still valid and is confirmed by the overall fitness of the model. In addition, the model completely failed when considering SSO portfolio (F-ratio = 2.850, ρ = 0.1557), which might be due to the limited degree of freedom (df = 5).

[24] Appendix (A6.4) shows that Model 3 has 7 specifications/portfolios. Each of which represents insider-trading CAR from the type of shares traded. These portfolios are buy ordinary shares (Buy portfolio), sell ordinary shares (Sell portfolio), all ordinary shares (OS portfolio), holding exercised executive share options (BEO portfolio), selling exercised executive share options (SSO portfolio), all exercised executive share options (ESO portfolio) and all-transactions (All portfolio).

produces no difference CAR coefficient from that in model 3[25]. However, the significance level of CAR estimate decreased to 10% while the employment coefficient becomes significant, making all the independent variables in the model significantly positive and resulting in improved overall fitness of the model. Therefore, model 4 confirms, to some extent, model 3 findings that the partial regression coefficient of CAR portfolio is significant in explaining the CEO pay. In other words, the director's pay increases along with his realized insider trades returns.

In fact, model 3 and model 4 test, *inter alias*, whether the *ex post* insider trading actual returns along with their capacity to trade can, jointly with other independent variables, explain the CEO *ex ante* compensation paid. Thus, it suffers from the problem of insynchronisation. That, it tries to explain the known and certain *ex ante* CEO pay by the unknown and uncertain *ex post* monetary results. As Lambert (1983) shows, the optimal reward for any period depends on the output realised in the earlier period [for more about this argument, see section (4.2.2)]. To control for this problem, lagged insider trading actual returns are used in model 4. The new version, model 5, would replace the instant CARs with lagged ones.

Table (6.5) reports the empirical findings of the new version, model 5, while appendix (A6.5) shows the results of various specifications of model 6. In comparison with model 4, the model 5 failed in terms of CAR coefficient[26]. On one hand, the lagged CAR coefficient is still positive, in contrast with the research hypothesis. On the other hand, the significance level of other independent variables estimates decreased, as well as the coefficient of determination and the fitness of the regression.

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[25] Appendix (A6.4) shows that, in comparison with model 3, BEO portfolio becomes significant at 10% level, and the significance level of all-transactions portfolio decreased to 10%. However, most of other independent variables have become significant: 26 of 35 (74%) of the estimates in model 4 are significant compared with 23 of 42 (55%) in model 3. In addition, the overall fitness of the 7 specifications of model 4 improved and all become significant at less than 1% level.

[26] Appendix (A6.5) shows that, in comparison with model 4, none of lagged CAR coefficients is significant. On the other hand, only 17 out of 42 (40%) independent variable estimates are significant, compared with 28 (67%) estimates in model 4. However, the coefficient of determination as well as the fitness of the regression increased for 4 and 6 of 7 specifications, respectively.

Table (6.5) The Managerial Incentive of Insider Trading Model

CEO's Compensation, Number of Insiders, Ordinary Shareholdings and CARs: Model 3, 4 and 5

Evidence From FTSE100 During 1999 Using STATA Regression with Robust Standard Errors

$\ln(Wdit) = \alpha + \gamma \ln(Nit) + b1\,(CeEducit) + b2 \ln(CeIShdit) + \delta1 \ln(Emplyit) + \delta2 \ln(CAPit) + \delta3 \ln(EPSit) + d1\,(OShdit) + d2\,(CARit) + \eta it$

Dependent Variable	Independent Variables:									Model Significance		
		No. of		Incentive	Employment	Capitalisation		Ordinary	CAR	No. of	F-Value	R-Squared
CEO Pay	Constant	Insiders	Education	Shareholding	(Employ)	(CAP)	EPS	Shareholding	All-Transacti	Observatio	Prob.of F-V	R-Sq. Adj
Model 3	**8.116**	**0.591**	**0.335**	**0.142**	0.078	**0.189**	**0.122**	0.004	**0.134**	67	**10.250**	64%
(3 Insider Trading Measure	9.970***	2.910***	3.030***	4.110***	1.530	3.020***	2.700***	0.110	2.470***		0.0000***	59%
Model 4	8.463		**0.484**	**0.138**	**0.161**	**0.166**	**0.137**		**0.153**	71	**16.010**	56%
(CAR only)	11.23***		3.43***	3.56***	4.30***	2.88***	2.64***		1.72*		0.0000***	52%
Model 5	**9.184**		**0.286**	**0.095**	**0.149**	**0.164**	0.064		0.004	60	**16.970**	57%
(Lagged CAR only)	18.12***		2.35**	3.54***	3.09***	2.84***	1.150		0.090		0.0000***	52%

The *t*-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).
(*** Significant at 1% or Less, (**) at 5% or Less, and (*) at 10% or Less.

It can be argued that any conclusion about CAR portfolio estimates is obscured by the fact that CAR represents all firm-directors not only CEO insider trading returns. Thus, CAR reflects, on one hand, the effects of both the number of insiders and their capacity to trade. On the other hand, CAR incorporates the partial level of CEO's satisfaction from the explicit part of his compensation. The empirical findings of equation 12 (tested in model 3, 4 and 5) lead to suggest that the main assumption behind the model, *i.e.* the labour market for top directors is competitive, might not be held. The model aimed at looking for compensation differential explained by insider trading realized returns, among FTSE100 top management, but failed. The results show that as CEO's CAR increases, his compensation increases, as well. This might suggest that the labour market for top management high class firms is uncompetitive.

(6.6) PANEL DATA ANALYSIS

One might argue that the Model, represented by equation 10, does not capture all relevant variables that might explain the director's pay. Such omitted variables, for example director's intuitive capability, might not be available in this study data set. Hence, its result might be suffered from an omitted variables bias. Therefore, the model has to be re-written to account for such a bias.

Literature [for review, see Maddala (1987)] accounts for the bias by using panel data. That is by extending single year cross-section data to second year cross-section data as described below. Panel data set allows to perform more sophisticated statistical analysis and to improve the likelihood that valid conclusion regarding found association between CEO pay and number of insiders are drawn. In addition, it allows for greater flexibility in modelling differences in between across individuals or firms. That is, for example, panel analysis takes account of unobserved heterogeneity across firms in the sample by applying Chamberlain (1980) fixed effect model or Balestra and Nerlove (1966) random effect model[27].

While cross-section estimates of CEO pay determinants are likely to suffer from the problem of omitted variable bias, panel data provides a solution to the problem of controlling for hidden additive individual effects. Many CEO pay levels, his personal and job characteristics might tend not to vary over short period of time. In addition, certain CEO specific qualitative attributes are simply undetectable in a cross-sectional data set but nonetheless are likely to influence the CEO pay and therefore to be correlated with observable personal and or job characteristics.

In fact, CEO pay is a multidimensional contract. It is a reward contract based on qualitative personal attributes and quantitative job characteristics to do a managerial role and governed by financial performance. The unobserved qualitative individual attributes might include, *inter alias*, CEO's innate ability [Hebner and Kato (1997)] or his family background [Maddala (1987)]. It is likely that the unobserved individual effect is associated with CEO's pay, which is not measured in this study. Thus, panel data set may be more robust to incomplete model specifications. This study bases the panel analysis upon the fixed effect estimators from which inference is drawn with respect to the effects that lie within the sample. However, the random-effects models are applied and the results are reported in the footnotes and the tables in the appendices alongside the main findings of fixed-effects models.

[27] Chapter 14 in Greene (1997) describes several techniques that have been applied in single equation models.

To illustrate, the constant terms (α_i) in equation 10 captures the effects of i-th firm-specific unobserved variables and are time invariant. Two main approaches for modelling those unobserved heterogeneity across firms are a fixed effects and a random effects models. The fixed effects specifies that (α_i) is a group specific constant term, and assumes that (π_{it}) is independent and identically distributed over individual CEOs and time with zero mean and ($\sigma^2\pi$) variance. On the other hand, the random effects consider (α_i) differently. It assumes the constant can be treated as a random variable, similar to (π_{it}). However, the essential assumption of this model is that the constant is independent of the explanatory variables and is randomly distributed over cross-sectional units. Thus, the error-term consists of two mutually independent components, *i.e.* (α_i) time invariant and the reminder of (π_{it}), which are randomly distributed and uncorrelated over time.

This study employs the fixed effects approach because the distribution of (α_i) plays no role. The importance of this assumption to this study lies in the fact that the sampled firms (FTSE100) are "one of a kind" and cannot be seen as a random draw from the population of all LSE listed companies (about 1650 listed firms). While the random effects model would be appropriate if the sampled firms are randomly drawn from the population of interest, so that the model assumption about the random distribution of (α_i) would be held. In fact, Himmelberg *et al.* (1999) argue that fixed effects estimators should be used in examination of the relationship between managerial ownership and firm performance, and Zhou (2001) questions this argument and finds them indifference.

Accordingly, the managerial incentive of insider-trading model, equation 10, can be re-written as follows:

$$\ln(W_{dit}) = \alpha_i + \beta \ln(P_{dit}) + \delta \ln(J_{dit}) + \gamma \ln(N_{it}) + \varepsilon X_i + \pi_{it} \qquad (13)$$

where X_i is the fixed effects to be estimated and represents the vector of omitted variables that are time-invariant; and ε is the coefficient on these omitted variables. Obviously, if equation 13 represents the correct model, then the regression estimates of equation 10 are biased. To account for this bias, the single-year cross-section data has to be extended to second-year cross section data and re-estimate a fixed effects model, similar to that of Hebner and Kato (1997), as follows:

$$\ln(W_{dit+1}) = \alpha_i + \beta \ln(P_{dit+1}) + \delta \ln(J_{dit+1}) + \gamma \ln(N_{it+1}) + \varepsilon X_i + \pi_{it+1} \qquad (14)$$

Then, subtracting equation 13 from equation 14 gives:

$$\begin{aligned}\ln(W_{dit+1}) - \ln(W_{dit}) = {} & \beta [\ln(P_{dit+1}) - \ln(P_{dit})] + \delta [\ln(J_{dit+1}) - \ln(J_{dit})] \\ & + \gamma [\ln(N_{it+1}) - \ln(N_{it})] + \varepsilon [X_i - X_i] + [\pi_{it+1} - \pi_{it}] \qquad (15)\end{aligned}$$

Finally, by differencing out the omitted variables vector $[X_i - X_i]$, the new model will be expressed as follows:

$$\begin{aligned}\ln(W_{dit+1}) - \ln(W_{dit}) = {} & \beta [\ln(P_{dit+1}) - \ln(P_{dit})] + \delta [\ln(J_{dit+1}) - \ln(J_{dit})] \\ & + \gamma [\ln(N_{it+1}) - \ln(N_{it})] + [\pi_{it+1} - \pi_{it}] \qquad (16)\end{aligned}$$

Thus, it is not unreasonable to expect that the managerial-incentive of insider-trading panel-model, equation (16), is free now from the omitted variables.

STATA is used to estimate the OLS coefficients of the fixed-effects panel model[28], equation (16). The empirical versions of the panel, models 6 and 7, include the same independent variables in equation 11 and 12, respectively. However, the sampled data covers two-single periods (1999 and 2001). Table (6.6) reports the empirical findings of models 6 and 7 specifications which are identical, in terms of the independent variables included, to model 2 and 4, respectively. While appendix (A6.6) presents other panel specifications.

[28] The panel random-effects models Ordinary Least Squares (OLS) and Generalised Least Squares, (GLS) for testing for panel-level hetroscedasticity show similar results, in terms of both the coefficient values and significance level, as reported in the Appendix (A6.7) and (A6.8), respectively.

Table (6.6) The Managerial Incentive of Insider Trading Panel Model

CEO's Compensation and Number of Insiders: Fixed-Effects Panel Models 6 and 7

Evidence From FTSE100 For Two-Single Years 1999 & 2001, Using Fixed-Effects STATA OLS Regression

Dependent Variable	Independent Variables:								Model Significance		
		No. of		Incentive	Employment	Capitalisation		CAR	No of Obs.	F-Value	R-Squared
CEO Pay	Constant	Insiders	Education	Shareholding	(Employ)	(CAP)	EPS	All-Transacti	No. Groups	Prob of F-V	R-Sq Adj
Model 6	10.376	0.365	0.285	0.014	0.115	0.110	-0.011		190	7.770	26%
(See Model 2)	23.530***	3.270***	2.900***	1.100	2.800***	2.080**	-0.250		2	0.0000***	23%
Model 7	10.476		0.272	0.040	0.174	0.079	0.124	0.078	148	12.830	37%
(See Model 4)	24.240***		2.810***	3.030***	4.280***	1.550	2.700***	2.060**	2	0.0000***	34%

The t-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).

(* Significant at 1% or Less, (**) at 5% or Less, and (*) at 10% or Less.**

As shown in the table, the new estimates of γ (number of insiders), b2 (CEO's education level) and $\delta 1$ and $\delta 2$ (his firm's size measures: total number of employees and market capitalisation, respectively) remain, similar to model 2 -1999, positively significant at 5% confidence level or less[29]. In comparison with Hebner and Kato (1997) findings on 1986 US data[30], this study reports robust results, particularly in terms of the main hypothesis of the model, *i.e.* number of insiders, in addition to CEO job characteristic measure of size.

On the other hand, when the insider trading measure is proxied by the actual returns, as in equation 12, instead of number of insiders, the panel model 7, reported in table (6.6), shows that the significance level of most of the independent variables decreased slightly and the market capitalisation estimates becomes insignificant. While the significance of the coefficient of CAR increased to 5% level[31]. By definition, this portfolio, however, compromises all type of shares (ordinary as well as ESO) and positions (buy, sell and exercise) transactions. Thus, as a mis-concepted portfolio, its result might not be indicative. Overall, model 7 confirms the findings of model 4, that director's realized return from insider trades is significantly positively associated with his compensation paid. This, along with model 6 results, lead to support the research hypothesis that

[29] Appendix (A6.6) shows that, in comparison with models 2 and 4, CEO's internal experience coefficient b1 (years-in-post) and his firm's industry sector c1 remain insignificant, but their signs are diverted. However, the correlation coefficients of the CEO incentive-shareholdings (with positive signs) and EPS (with negative signs) become insignificant in explaining the CEO's pay for all specifications.

[30] Hebner and Kato (1997) have not reported panel model for Japanese data.

[31] The panel random-effects models OLS and GLS show similar results, in terms of both the coefficient values and significance level, as reported in the Appendix (A6.7) and (A6.8), respectively. However, Buy portfolio is significant in both OLS and GLS models.

insider trading, proxied by number of insiders, is an integral part, however implicit, of the CEO compensation packages.

(6.7) SUMMARY AND CONCLUSION

This chapter presented the second part of the empirical results of this study. It began with introducing a model for how to consider insider trading as a managerial incentive. The model assumes that as the number of insiders in the firm increases, competition to insider trading increases and each insider's expected returns decreases. On the other hand, as number of insiders' increases, the explicit form of director's compensation should increase to offset his insider trading returns decreases. This concept, formulated in section (6.2), leads to an empirically testable assumption that the director's expected compensation has two forms, (1) an explicit form (salary, bonuses, perks and other *ex ante* measurable incentives) which is predicted to be positively correlated with the number of insiders; and (2) an implicit form (his expected insider trading returns) which is predicted to be negatively correlated with the number of insiders in his firm.

The empirical prediction, presented in a multivariate model, was tested using FTSE100 CEOs data. The data and the justification behind using each and every dependent and independent variable in the test are discussed. Also, the variables for the regression model, which is used to explain the relationship between the CEO explicit form of compensation (dependent variable) and the number of insiders in his firm, as well as his personal and job characteristics (independent variables), are analysed and assessed.

The empirical tests of this research were made more informative and powerful by variable selection resulted in 7 models. The use of univariate analysis and multiple regression analysis has shown the explanatory power of the model formulated in this study.

The results were very much in favour of the model. The positive relation between the explicit forms of CEO compensation and the number of insiders in the UK FTSE100 firms was found to be quite robust. That is, the significant relation does not depend on (i) whether the model accounts for CEO internal experience and industry sector (this is the difference between model 1 and model 2), (ii) whether the model accounts for

CEO's capacity to trade and his actual insider trading returns (model 3 and 4), and (iii) whether an omitted variables problem is accounted for by using panel data (model 6 and 7). This leads to conclude that insider trading is an integral part of the director's total compensation package, and thus, can be considered as a managerial incentive.

Model specifications used in this study are novel, however, the empirical results of this study are consistent with those of currently available empirical literature, such that of Hebner and Kato (1997) on the 1985 Japanese and 1986 US CEOs data. In fact, this study finds robust results than those reported by Hebner and Kato, particularly when using the panel data analysis.

This empirical conclusion supports the theoretical framework of, for example, Bebuck and Fershtman (1994) who shows that insider trading can be part of the optimal compensation scheme; Starks (1987) who finds that the symmetric-contracts (contracts allowing insider trading) dominates the bonus-contracts (contracts not allowing insider trading) in aligning the director's interest with those of investors; and Roultone (2003) who demonstrates the adverse relation between directors' pay and insider trading.

A by-product finding from the analysis indicates that there is an indication that the labour market for top management in FTSE100 might not be competitive. This conclusion is brought about by the positive association found between director's pay and his realized insider trading returns. However, this conclusion is subject to the definition of CAR used in the analysis.

PART IV:
SUMMARY AND CONCLUSION

Chapter Seven
Summary, Conclusion and Implications

(7.1) INTRODUCTION

This chapter summarises this study and concludes its findings. It falls in five sections: Section one is the introduction. Section two summarises the theoretical backgrounds pertaining to the issues covered throughout this research and the findings of the previous literature regarding both research issues, *i.e.* the information contents and managerial incentive of insider trading. The third section highlights the empirical findings of this study, while section four presents the implications of the findings and the generalisation of the research outcomes in terms of financial (investment strategies), managerial (corporate governance) and regulatory aspects (regulating the directors dealing and disclosure). Section five provides the limitations of this study and section six presents the recommendations for further research.

(7.2) THEORETICAL SUMMARY

In its economic essence, insider trading represents on one hand a signal of new information (to be) reflected in the stock price [section (3.3)]. On the other hand, it represents a challenge to the strong form of the EMH [section (3.2)]. Insiders can earn abnormal returns, or avoid abnormal loss, when they trade on their private information. In the context of the financial ethics, this privilege over other players in the market has been seen as ruling out the fairness of the game's rules. In addition, insider trading is also seen, from ethical viewpoint, as a misappropriation of the firm's information, harming outsiders and eroding the market confidence [section (2.3)]. These, in fact, ideological views but not practical ones. Hence, it is rather difficult to have a crystal clear support or otherwise oppose such views.

If insider trading is a crime then it is a victimless one. That's why the legal theories behind the regulation of insider trading have been changed over time, either in the UK and USA, or in continental Europe. It was the equal access theory behind the regulation, and then changed to the fiduciary duty and finally the misappropriation in UK and USA. While that in Europe it was about protecting the company, then the market and finally the information itself [section (2.4)].

Insider trading regulation developed over time [section (2.5)]. In the UK, it started in 1980, while in the USA it started in 1933. The latest CJA (1993) was enacted to implement the 89/592/EEC Directive. In comparison with European counterparts [appendix (A2.1)], the UK's CJA (1993) is the most sophisticated act, not only in terms of its way of dealing with the incidence, but also in terms of its coverage of the various aspects relating to the issue [section (2.6)].

In addition, this study provides some institutional background on corporate governance issues that are related to the research hypothesis. These are the board remuneration [section (2.7)] and financial information disclosure [section (2.8)]. It shows that Cadbury report (1992) is the most influential document in corporate governance aspects of the British companies, such as board remuneration, structure, control, practice and monitoring. Other committees formed and reports were published to re-enforce Cadbury committee's recommendations, such as Greenbury (1995) and Hampel (1998). Two main conclusions can be drawn from these reports, which are related to this research, are: Firstly, managerial remunerations have to be decided by independent non-executive directors, and secondly the boards have to disclose not only the components of the compensation for each director, but also to justify and explain the measures of those performance-related components. However, none of these reports have come cross the concept of insider trading and its place in the corporate governance, as an implicit incentive component of the managerial compensation.

Empirical literature [section (3.4)] finds that insider trading contains firm-related and/or economy-wide information and insiders do outperform the market, thus the market is not strongly efficient; however, outsiders mimicking insiders could not earn abnormal returns, thus the market is semi-strongly efficient. Twentieth century literature argues that insiders' abnormal returns are explained by subsequent news. Insiders buy prior to favourable news and sell prior to unfavourable news. While Twenty-First century research finds that insiders buy after unusual bad stock performance and sell after abnormal good stock performance.

The UK literature on insider trading is lagged behind the USA one, not only in terms of the extent of this literature, but also in terms of the aspects that have been investigated till now. The current level of literature provides an ample field for more UK studies on the various aspects of all type of insiders, not only directors' trade.

This research discussed the non-signalling theory behind the research hypothesis. That is the Agency Theory [section (4.2)] and the possibility of considering insider trading as a managerial incentive. The research has analysed the principal-agent model [section (4.2.1)], the incentive theory [section (4.2.2)], the agency problems and costs, and the position of insider trading within these agency concepts. In addition, it has reviewed the relevant theoretical literature that backed the possible consideration of insider trading as a managerial incentive.

Literature shows that in the context of principal-agent problem, insider trading can be used as a mechanism to alleviate the conflict of interest between the managers and the shareholders while (1) increasing shareholders' welfare, (2) improving shareholders' control over their firm, (3) concluding an optimal contracting, *i.e.* increasing managers' efforts level, and (4) enhancing the investment decision in the firm.

(7.3) EMPIRICAL FINDINGS CONCLUSION

This research has examined the short-term profitability of FTSE 100 directors trading in their own firm's ordinary shares and executive shares options, over recent years (1999 to 2000), employing event study methodology to measure cumulative abnormal returns and taking into account different signals definition. Using the simple MM's parameters in the CAPM, the results of ordinary share portfolios are similar to those obtained by previous literature used the same methodology. Namely, directors' trading in their own firm's ordinary shares is significantly profitable. This finding does strongly support the view that, on one hand, corporate directors do have inside price-sensitive information that the market does not have, and that they earn significant statistically cumulative abnormal returns from directly trading on this information in the stock exchange. On the other hand, the market does perceive directors trading as a signal. Directors' buying indicates good news and, hence, the market appreciates the share prices. As directors' selling represents a bad news, the market depreciates the share prices. The market, in fact, reacts to this news as soon as it is disclosed.

As for executive share options portfolios. the results are different in that, directors holding or selling the exercised ESO is not profitable, in the short term, to the extent that there appears to be no significant market reaction around the director tradings' disclosure. Three reasons are expected to explain these findings. The first is due to the contractual nature of the kind of shares. The second is due to the long-term nature of ESO, which needs to be investigated in the long-term sense. Finally, the small number of transactions in each ESO portfolio might have driven the results away from a representative, significant statistically, mean of the abnormal returns.

Two important conclusions are suggested by employing different signal methodologies. These are first, different signal definitions produce different results, not only in terms of the level and sign of CAR, but also in terms of the significance of the statistical results. On one hand, multiple and quantitative signals produced significant CARs at earlier days than single signal. This leads to suggest that the market reacts significantly sooner to successive signals than to a single signal. On the other hand, none of the other signals produce significantly results that reject (accept) what has been accepted (rejected) by the single signal. The results of three tests, parametric and non-parametric, about the equality of the means of CARs of SS and of MS, QS1, QS2, QS3 and QS4 might lead to suggest that while the magnitude of CARs across various signals is identical, the time when these CARs becomes significant is varied. CARs of compounded signals (MS and QSs) are significant at earlier days in the event window, while those of single signal (SS) are significant at later days in the event window.

Second, each signal definition requires certain data frequency. Single signal produces robust results when daily data are used, while those of multiple and quantitative signals are mixed. Monthly data is recommended with multiple signals, whereas both monthly and daily data can be used with quantitative signal.

It seems that employing single signal definition with daily data produces not only significant results, but also higher level of rates of return. The empirical results of this study, along with most recent studies [Friederich *et al.* (2002) and Hillier and Marshall (2002/a)] shows, in general, that annual CARs of directors trading are significantly much greater than those of old UK literature. On one hand, directors buying ordinary shares portfolio earn an annual rate of CAR of 22.10%, 25.48% in Friederich *et al.*

(2002) and 25.05% in Hillier and Marshall (2002/a), compared with 18.38% in King and Roell (1988), 9.23% in Gregory *et al.* (1994), 5.80% in Pope *et al.* (1990) and 4.92% in Gregory *et al.* (1997). On the other hand, directors selling ordinary shares avoid them an annual loss of –48.80%, compared with –18.98% in Friederich *et al.* (2002), -14.86% in Hillier and Marshall (2002/a), -13.38% in Pope *et al.* (1990), and – 5.75% in King and Roell (1988), -4.51% in Gregory *et al.* (1994) and –0.72% in Gregory *et al.* (1997).

It is understood that the above are approximates since that, firstly, this study cumulates daily data while others cumulate monthly. Secondly, annual CAR calculation is based on an assumption that the same CAR level will be repeated 22 times yearly, while other UK literature cumulate the abnormal returns for 12 months, except Pope *et al.* (1990) for 6 months. However, the above presentation suggests that the empirical findings of this study are consistent with UK literature, as well as with those of USA.

The results of this study have been checked on by re-running the analysis taking into account thin trading, confounding events, year-by-year analysis, and firm size. The robustness check analysis shows that there is no thin trading problem in the sample securities. There is no firm key event/announcement co-occurred with the director dealing transactions, thus the director dealing abnormal returns are not a result of other events. In addition, the robustness analysis provides evidence that smaller firms outperform larger ones, particularly in the longer event windows of buying transactions. It seems that the market reacts faster to small firm's director selling than to their buying or to their counterparts in larger firms. This might lead to support the argument that the information contents of director dealings in small firms is at a higher level of premium than in larger firms. Finally, the robustness check indicates that directors' buying in the year 2000 outperforms those in 1999. However, the year 1999 was a successful selling year for FTSE 100 directors. In conclusion, the robustness analysis supports the empirical findings of the single signal market-model, particularly in terms of the sign and significance of the abnormal returns. However, the level of the returns may vary.

In the context of EMH, insider trading presents a challenging issue. On one hand, the empirical results of this study, in addition to other UK literature shows clearly that the stock exchange is significantly inefficient in terms of the strong level of market efficiency. Namely, some market participants, *i.e.* insiders, are more informed about the current or future market value of the firm than others, *i.e.* outsiders. This is in contrast with the strong level of efficiency, which indicates that the current market price fairly reflects all information about the past, current and future perspective of the firm, which are available to all market participants. And, thus, trading upon such information is not profitable.

On the other hand, the evidence advocating the insignificant semi-strong level of market efficiency is rather weak. The availability of abnormal returns to outsiders following the publicly known information, *viz.* insiders' transactions can be seen as a direct test to the semi-strong level of market efficiency. The empirical results, reported in section (5.6), indicate that abnormal returns can be earned by outsiders' imitating insiders' transactions. However, taking into account the transaction cost, such returns would end up with zero, if not negative returns. For example, significantly 0.46% AR of buy portfolio at t8 becomes negative when deducting 2% transaction cost [*e.g.* Friederich *et al.* (2002), Gregory *et al.* (1997), Jaffe (1974), Pope *et al.* (1990), Rozeff and Zaman (1988) and Seyhun (1986)]. Moreover, the bid-ask spread represents another cost to be taking into account when considering such an active trading strategy [Seyhun (1986)].

In conclusion, except for the executive share options (BEO and SSO) portfolios, the empirical results clearly and significantly reject the null hypothesis that directors trading in their own company's securities are not profitable. Instead they suggest the alternative hypotheses that directors buying portfolios achieve positive abnormal return and those of selling ones avoid negative abnormal returns.

This research presented the second part of the empirical results of this study. It began with introducing the managerial incentive of insider trading model such that as the number of insiders in the firm increases, competition to insider trading increases and each insider's expected returns decreases. On the other hand, as number of insiders' increases, the explicit form of director's compensation should increase to offset his insider trading returns decreases. This concept, formulated in section (6.2), leads to an empirically testable assumption that the director's expected compensation has two forms, (1) an explicit form (salary, bonuses, perks and other *ex ante* measurable incentives) which is predicted to be positively correlated with the number of insiders;

and (2) an implicit form (his expected insider trading returns) which is predicted to be negatively correlated with the number of insiders in his firm.

The empirical prediction, presented in a multivariate model, was tested using FTSE 100 CEOs data. The data and the justification behind using each and every dependent and independent variable in the test are discussed. Also, the variables for the regression model, which is used to explain the relationship between the CEO explicit form of compensation (dependent variable) and the number of insiders in his firm, as well as his personal and job characteristics (independent variables), are analysed and assessed.

The empirical tests of the conceptual framework were made more informative and powerful by variable selection resulted in 7 models. The use of univariate analysis and multiple regression analysis has shown the explanatory power of the model formulated in this study.

The results were very much in favour of the model. The positive relation between the explicit forms of CEO compensation and the number of insiders in the UK FTSE 100 firms was found to be quite robust. That is, the significant relation does not depend on (i) whether the model accounts for CEO internal experience and industry sector, (ii) whether the model accounts for CEO's capacity to trade and his actual insider trading returns, and (iii) whether an omitted variables problem is accounted for by using panel data. This leads to conclude that insider trading is an integral part of the director's total compensation package, and thus, can be considered as a managerial incentive.

Model specifications used in this study are novel, however, the empirical results of this study are consistent with those of currently available empirical literature, such that of Hebner and Kato (1997) on the 1985 Japanese and 1986 US CEOs data. In fact, this study finds robust results than those reported by Hebner and Kato, particularly when using the panel data analysis.

This empirical conclusion supports the theoretical framework of, for example, Bebuck and Fershtman (1994) who show that insider trading can be part of the optimal compensation scheme; Starks (1987) who finds that the symmetric-contracts (contracts allowing insider trading) dominates the bonus-contracts (contracts not allowing insider trading) in aligning the director's interest with those of investors: and Oilstone (2003) who demonstrates the adverse relation between directors' pay and insider trading.

A by-product finding from the analysis indicates that there is an indication that the labour market for top management in FTSE 100 might not be competitive. This conclusion is brought about by the positive association found between director's pay and his realized insider trading returns. However, this conclusion is subject to the definition of CAR used in the analysis.

(7.4) IMPLICATION AND CONCLUDING REMARKS

The main implications of the findings of this research can be extracted from its contribution, such that the empirical results show that the level, significance and direction of the abnormal return (loss) earned (avoided) by director dealing is subject to signal definition.

Another implication comes about from the data used, daily security' return index, instead of share prices. In fact, there are two reasons for using securities returns instead of share prices. Firstly, security returns are complete and scale-free summary of the investment opportunity. Secondly, security returns have more attractive statistical properties than prices, such as stationarity. Moreover, it can be argued that the Datastream's security return indices, used in this study, are computationally more efficient than share prices. The distribution of the indices' time-series is a Student-*t*, uniform, but not necessarily is a normal distribution.

A third implication is brought about by the new set of data used in this study. That is a post-1993 Justice Act of insider trading. On hand, an investigation into the legality of the directors dealing employed in the analysis shows that almost all trades were legal and occurred outside the "close-period" specified by the law. However, there is a need to investigate other types of insider trades, such as firm's bankers, auditors and lawyers. On the other hand, the empirical findings of director dealing analysis might suggest that relevant regulation, including 1993 Justice Act, is not about prohibiting, but it is about regulating the timing of insider trading. Also, the 1993 Justice Act has not deter the directors from trading on their private information; however this information might not be related to recent key firm's event/announcement.

In terms of the managerial incentive of insider trading, an important implication of this research is that the firm's remuneration committee has to take directors dealing into consideration when setting the management compensation package.

Moreover, a by-product finding from the analysis implied that there is an indication that the labour market for top management in FTSE 100 might not be competitive. This conclusion is brought about by the positive association found between director's pay and his realized insider trading returns.

Finally, all the corporate governance reports admitted the importance of ESO as a mechanism to align the divergence of interests between management and shareholders, none, however, has come across the terminology of insider trading as another mechanism to align interests or as a managerial incentive.

(7.5) LIMITATIONS OF THE RESEARCH

Insider trading can be researched from different angels, mentioned below, than those formulated in this thesis. That a boundary has to be established to control for the conceptual structure formulated in this study. This boundary maintains the focus on the conceptual framework of detecting the information contents of insider trading by measuring the short-term profitability, and examining insider trading by directors as a managerial incentive by considering the long-term incentives.

This study is placed on a major concept in formulating the framework: the information asymmetry, which is a well-established paradigm in finance (*e.g.* signal theory) and management (*e.g.* agency theory) sciences, and widely empirically examined in the literature. This emphasis, however, does not undermine other issues existing in insider trading literature, such as:

(1) Insider trading behaviour around specific firm-related events

(i) Earnings/dividends announcements.

(ii) Merger and acquisition.

(iii) Leverage buyout and self-tender offering.

(v) Equity offering.

(iv) Stock split.

(vi) Corporate bankruptcy.

(vii) Market listing/delisting.

(2) The roles, measures and effectiveness of relevant regulations.

(3) Insider trading effects on bid/ask spreads.

(4) Insider trading timing, seasonal pattern and distribution.

(5) Insider trading in stock market flotation, i.e. initial public offerings (IPO) and unseasoned equity offerings (UEO).

(6) Ethical views of insider trading.

Moreover, this research is limited to those companies listed on the secondary market and ordinary shares, either through open market operations or executive share options. The main reason behind the intuition for not addressing these issues empirically is the lack of publicly available precise data. This is a technical problem related to the availability of sufficient data for cross-sectional and time-series calculations, and for accurate and timely data regarding directors' compensation and dealing.

(7.6) DIRECTIONS FOR FURTHER RESEARCH

This research reviewed the current literature to help future research in recognising the different aspects, issues and methods addressed in the literature. Heuristically, one might detect a new way to investigate this subject. This study, as well as all relevant literature follows the positivism approach. A broader view of the issue might help in establishing not only a different way to address the issue, i.e. phenomenological approach, but also a different methodology to analyse insider-trading aspects, i.e. qualitative techniques.

The UK literature on insider trading is lagged behind the USA one, not only in terms of the extent of this literature, but also in terms of the aspects that have been investigated yet. The current level of literature provides an ample field for more UK studies on the various aspects of all type of insiders, not only directors, trade, such as:

(1) Insider trading behaviour around specific firm-related events, such as:

(i) Leverage buyout and self-tender offering.

(ii) Equity offering.

(iii) Stock split.

(iv) Corporate bankruptcy.

(v) Market listing/delisting.

(2) The roles, measures and effectiveness of relevant regulations.

(3) Insider trading effects on bid/ask spreads.

(4) Insider trading in stock market flotation, i.e. initial public offerings (IPO) and unseasoned equity offerings (UEO).

Most importantly is that more research is needed to investigate the equality of means of CARs produced by various signals definition. Also, an interesting research would examine the incremental changes in the share prices due to two or more subsequent signals. Such investigation, in fact, might be considered as a test of whether the market has a memory.

The empirical findings of this study in terms of the managerial incentive of insider trading, might suggest that the weak relation between management pay and their firm performance found in the most empirical pay-performance literature might be due to the ignorance of the implicit part of the managerial pay, *i.e.* insider trading. Thus, insider trading would be among the explanatory variables in the pay-performance model that might explain that relationship assumed by the Agency Theory.

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APPENDICES

APPENDIX (A2.1)
INSIDER TRADING LAWS IN MAJOR EUROPEAN COUNTRIES

This appendix reviews the development of insider trading regulations in the main European countries. The EEC Directive referred to be the EEC Directive 89/592/EEC, which is outlined in section (2.6) of chapter 2.

The first **Irish** legislative prohibition of insider trading was provided in Part V of the CA 1990. Previously, insider-trading regulations had followed the English legislation[1].

On the **French** side of the English Channel, the Ordinance of 28/9/1967, particularly Article 10-1, was the first governing regulation-prohibiting insider trading in France. In 1970, the new Law of 23/12/1970 was enacted to amend the above Ordinance. However, it was remained without application until 1975, it had had major changes by Law No. 83-1 of 3/1/1983, Law No. 88-70 of 22/1/1988, and Law No. 89-531 of 2/8/1989[2]. The later amendment gave the governmental securities exchanges authority; *Commission des Operations de Bourse* (COB), the power to impose sanctions for violations of the regulations it may issue. Based upon the EEC Directive, COB issued Regulation No. 90-08 of 17/7/1990 on the use of inside information[3], and amended it by Regulation No. 92-03 of 10/6/1992. In short, insider trading in France is governed by two sets of rules: the judiciary regulations, *i.e.* the 1967 Ordinance, and the administrative regulations, i.e. COB Regulations[4].

Surprisingly **Germany** has had no statutory regulations governing insider trading. However, there were "*Voluntary* Insider Trading Guidelines", which came into *force* at the end of 1971, "Rules for Traders and Advisers", and "Rules of Procedures". Following the EEC Directive, the German Government adopted a Draft Code on insider trading, which was enacted in June 1994[5].

Likewise, **Italy** had no legislation on insider trading before the EEC Directive. However Law No. 216 of 7/6/1974, Article 17 in particular, is the only general rule related somehow to the use of privileged information. It is merely a disclosure provision, requiring that listed firms should inform the Italian Commission for Companies and Stock Exchange, *Commissione Nationale per la Societa e la Borsa* (CONSOB), of the amount of shares directly or indirectly owned by the listed firm's directors, auditors,

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[1] Dudley and Casey (1994), p. 145.

[2] Unless completely replaced, the reference in the French Law is always be to the original law, even though it has many amendments.

[3] In order to prepare the COB Regulations in accordance with the EEC Directive, the French Finance Minister established a commission on ethics in the securities exchanges (*Commission de Deontologie Boursiere*), commonly known as "*Pfeiffer Commission*", for preparing various proposals in this regard.

[4] For the current status and development of the French insider trading regulations, see Borde (1994), and Wymeersch (1991).

[5] For the current status and development of the German insider trading regulations, see Assmann (1994), Heinsius (1994), and Schwarze (1991).

and managers[6]. The implementation of the EEC Directive has come through the enforcement of Law No. 157 of 17/5/1991, and in CONSOB Regulation No. 5553 of 14/11/1991[7].

Switzerland did not recognised the unethical and criminal aspects of illegal insider trading until 1988 when insider trading became punishable through introducing Article 161 of the Swiss Criminal Code[8].

In **Spain**, Stock Market Law No. 24/1988 of 28/7/1988 sometimes referred to as the Capital Market Act (CMA), was the first regulation dealing generally with the issue of insider trading[9]. Following the EEC Directive, the CMA was modified by Law No. 9/1991 of 27/3/1991 to incorporate the Directive's guidelines[10].

In the **Netherlands**, the provisions relating to insider trading were introduced in Articles 335 and 336a of the Dutch Criminal Code in 16/2/1989. These Articles were moved to the Securities Transactions Supervision Act (STSA), *Wet Toezicht Effectenverkeer*, in 1/7/1992. However, the Model Code 1986 on insider trading, promulgated by the Stock Exchange Association, *Vereniging Voor de Effectenhandel*, as well as the European Options Exchange Association 1978, *Vereniging European*, and the Regulations for Members of the Association 1991, *Lendenreglement*, each contain some administrative rules relating to insider trading[11].

The **Danish** Act on the Stock Exchange has included a sanction against insider trading since 1987. Before that, different but separate provisions dealing with insider trading were found in various acts, such as the Act on Contract, the Criminal Code, and the Act on Limited Companies. By adoption of the EEC Directive, Act No. 343 of 6/6/1991 has been introduced to incorporate the Directive's provisions[12].

Last, but not least, Articles 14-1 and 14-2 of the Internal Rules of the **Luxembourg** Stock Exchange, issued by the Ministerial Decree of 20/11/1987, were the first provisions to deal with insider trading. The 3/5/1991 Law was then enacted which closely follows the EEC Directive[13].

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[6] Alessi (1991), p. 160.
[7] Solimena (1994), p. 79.
[8] Tavernier (1994), p. 91.
[9] In Fact, Article 12 of the Royal Decree No. 1848 of 5/9/1980, which was fully included in the new Royal Decree of 24/1/1984, was the first Spanish regulation dealt directly with one forms of the insider trading. That is the take-over bids. It required that all persons knowing of a forthcoming take-over bid to keep it secret until its disclosure, and to refrain from carrying out any transactions on terms other than those of the actual take-over bid. [See Zurita (1991), p. 187].
[10] Prol (1994), p.180.
[11] Serier (1994), p. 109.
[12] Christensen (1994), p. 135.
[13] Biver (1994), p.171.

Appendix (A5.1) Statistical Descriptive of FTSE100 Securities Daily Return Indices and Market Index During the Estimation Period 16/6/1998 - 23/3/1999

N=201d / Serial #	Company's Name	Mean Stat.	Mean StdError	Min	Max	Standard Deviation	Skewnss	Kurtosis
Rm	**FTALLSH RI**	**0.03%**	**0.0009**	**-3.18%**	**3.87%**	**0.0130**	**-0.0037**	**0.4078**
4	3i Group	0.00%	0.0015	-8.48%	10.67%	0.0215	0.4119	4.0822
9	Abbey National	0.15%	0.0018	-8.13%	7.12%	0.0256	0.0388	0.8797
64	Allied Domecq	-0.07%	0.0017	-13.64%	10.40%	0.0237	-0.6984	6.9995
67	Allied Zurich (ZURN)	0.05%	0.0028	-11.41%	12.82%	0.0338	0.2003	2.2428
79	AMVESCAP	0.07%	0.0028	-13.26%	18.93%	0.0404	0.4078	2.7040
85	Anglo American	0.08%	0.0019	-7.97%	10.50%	0.0276	0.6622	2.1393
101	ARM Holdings	0.66%	0.0028	-15.50%	20.96%	0.0399	0.5902	5.5340
114	Associated British Foods	-0.09%	0.0022	-9.38%	8.98%	0.0309	0.1578	0.4982
117	AstraZeneca	0.04%	0.0015	-5.43%	7.59%	0.0213	0.2493	0.5417
137	BAA	0.00%	0.0012	-5.56%	5.81%	0.0171	0.1822	0.9501
139	BAE Systems	-0.03%	0.0024	-13.78%	11.05%	0.0341	0.0970	1.7826
147	Baltimore Technologies	0.49%	0.0033	-12.83%	30.10%	0.0469	1.6667	9.0505
150	Barclays	0.08%	0.0022	-8.28%	9.60%	0.0316	0.1496	0.3366
157	Bass	-0.02%	0.0020	-11.80%	7.96%	0.0288	-0.2140	1.9011
185	BG Group	0.08%	0.0015	-8.24%	7.70%	0.0219	-0.0028	1.6143
186	Billiton	0.14%	0.0023	-8.48%	15.35%	0.0328	1.3402	3.6868
201	Blue Circle Industries	0.04%	0.0020	-16.88%	8.82%	0.0286	-0.7002	6.0754
203	BOC Group	0.02%	0.0015	-5.68%	8.44%	0.0216	0.3429	0.7037
211	The Boot Company	-0.05%	0.0014	-6.06%	9.47%	0.0203	0.4572	2.0513
217	BP Amoco	0.11%	0.0014	-4.89%	9.90%	0.0202	0.7095	2.4489
236	British Airways	-0.20%	0.0020	-8.62%	7.60%	0.0289	-0.1419	0.1352
237	British American Tobacco	0.34%	0.0027	-6.19%	38.07%	0.0383	5.0790	47.4835
246	British Sky Broadcasting Group	0.13%	0.0017	-9.24%	14.60%	0.0243	0.7299	7.5931
249	British Telecommunications	0.25%	0.0018	-5.41%	11.18%	0.0252	0.4591	0.9990
280	Cable & Wireless	0.12%	0.0023	-10.22%	9.92%	0.0329	-0.0117	1.3387
281	Cadbury Schweppes	0.04%	0.0015	-4.77%	7.28%	0.0214	0.6015	0.8530
309	Capita Group (The)	0.18%	0.0019	-13.23%	8.64%	0.0270	-0.7780	4.8028
324	Carlton Communications	0.07%	0.0019	-8.23%	8.92%	0.0272	0.4158	0.8656
331	Celltech Group	0.11%	0.0020	-11.16%	13.92%	0.0287	1.3041	7.1902
336	Centrica	0.07%	0.0015	-6.46%	9.33%	0.0220	0.5842	2.2963
338	CGNU	-0.01%	0.0022	-9.38%	12.77%	0.0315	0.2865	1.5421
376	CMG	0.09%	0.0027	-28.46%	11.61%	0.0390	-1.8869	14.8513
386	COLT Telecom Group	0.40%	0.0033	-17.89%	14.49%	0.0467	-0.1832	0.9982
402	Corus Group	0.03%	0.0020	-7.21%	13.92%	0.0280	0.7093	3.0964
423	Daily Mail and General Trust	0.14%	0.0017	-7.58%	8.01%	0.0239	0.2232	1.8605
463	Dixon Group	0.51%	0.0020	-7.64%	13.72%	0.0277	0.6937	2.8976
523	EMAP	0.10%	0.0017	-7.62%	5.77%	0.0241	-0.4980	1.1944
525	EMI Group	-0.02%	0.0022	-15.41%	16.84%	0.0308	0.2210	6.9258
526	Energis	0.43%	0.0029	-14.19%	15.62%	0.0418	0.2966	1.7179
553	Exel	0.11%	0.0014	-5.76%	7.42%	0.0195	0.1276	2.2707
657	G K N	0.15%	0.0021	-7.78%	9.41%	0.0297	0.3382	0.7202
688	Glaxo Wellcome	0.07%	0.0015	-6.83%	10.15%	0.0216	0.6247	3.4363
710	Granada Group	0.08%	0.0019	-8.57%	10.51%	0.0264	0.3620	1.5323
713	Great Universal Stores	-0.01%	0.0019	-8.31%	12.69%	0.0265	0.7482	2.7583
731	Halifax group	0.01%	0.0015	-5.22%	6.53%	0.0217	0.2664	0.2156
739	Hanson	0.21%	0.0016	-6.02%	12.76%	0.0229	0.8349	4.0318
753	Hays	0.16%	0.0024	-10.08%	12.27%	0.0333	0.1376	1.2469
785	Hilton Group	-0.04%	0.0023	-9.59%	16.45%	0.0322	0.9303	3.5136
799	HSBC Holdings	0.22%	0.0021	-7.19%	11.92%	0.0305	0.4725	1.1906
813	Imperial Chemical Industries	-0.23%	0.0022	-14.38%	10.59%	0.0319	0.0695	2.8804
831	Invensys	0.03%	0.0026	-12.97%	13.02%	0.0371	0.1961	1.8485
899	Kingfisher	0.24%	0.0020	-8.06%	11.23%	0.0278	0.5186	1.1741
911	Land Securities	-0.06%	0.0011	-4.60%	4.81%	0.0154	0.4398	0.6212
923	Legal & General Group	0.10%	0.0022	-12.07%	12.07%	0.0314	0.0692	2.5285
944	Lloyds TSB Group	0.09%	0.0022	-8.69%	11.75%	0.0312	0.5449	1.3551
946	Logica	0.34%	0.0023	-15.03%	8.81%	0.0329	-0.9657	3.6935
983	Marconi	0.12%	0.0020	-8.42%	11.97%	0.0282	0.4432	2.1751
984	Marks and Spencer	-0.14%	0.0017	-13.66%	5.17%	0.0240	-1.3134	5.5658

1040	Misys	0.07%	0.0031	-25.58%	17.26%	0.0440	-0.9300	[illegible]
1082	National Grid Group	0.08%	0.0013	-6.06%	4.70%	0.0185	0.0476	[illegible]
1083	International Power	-0.07%	0.0014	-6.06%	5.73%	0.0196	0.1111	0.4025
1120	Nycomed Amersham	0.14%	0.0021	-8.00%	8.13%	0.0297	0.0858	0.0033
1159	Pearson	0.11%	0.0017	-8.06%	7.59%	0.0247	-0.0177	0.5945
1161	Peninsular &Oriental Steam Navigation Co.	0.06%	0.0019	-7.68%	13.96%	0.0264	0.8500	4.0227
1220	Prudential	0.06%	0.0018	-11.36%	6.11%	0.0256	-0.5575	2.5111
1222	Psion	0.92%	0.0044	-12.14%	50.44%	0.0628	4.1183	27.7296
1247	Railtrack Group	0.13%	0.0016	-5.20%	10.07%	0.0233	0.6705	2.2414
1254	Reckitt Benckiser	-0.24%	0.0016	-14.29%	8.78%	0.0225	-0.8544	9.0474
1261	Reed International	0.03%	0.0018	-6.22%	8.42%	0.0260	0.5245	0.9602
1270	Rentokil Initial	0.02%	0.0021	-10.70%	7.64%	0.0296	0.0032	0.3121
1272	Reuters Group	0.15%	0.0023	-11.54%	11.28%	0.0323	0.3725	1.6714
1279	Rio Tinto	0.15%	0.0015	-5.23%	5.48%	0.0214	0.1443	0.0070
1288	Rolls-Royce	0.04%	0.0018	-8.16%	9.65%	0.0255	0.3572	2.0917
1296	Royal & Sun Alliance Insurance Group	0.01%	0.0023	-11.69%	9.37%	0.0319	0.0781	1.1308
1297	Royal Bank of Scotland Group	0.13%	0.0021	-8.06%	8.40%	0.0297	0.0650	0.3699
1311	Sage Group (1269m)	0.24%	0.0023	-12.16%	10.84%	0.0320	-0.3866	2.8714
1312	Sainsbury (J)	-0.11%	0.0015	-8.39%	5.80%	0.0207	-0.5278	1.5706
1327	Schroders (226m)	-0.01%	0.0026	-11.56%	12.32%	0.0368	0.0516	0.9365
1332	Scottish & Newcastle	-0.06%	0.0016	-6.39%	9.14%	0.0226	0.3511	1.3528
1333	Scottish & Southern Energy	0.07%	0.0013	-7.68%	9.11%	0.0178	0.4971	4.6623
1340	Scottish Power	0.04%	0.0014	-9.77%	11.93%	0.0205	0.7319	7.3804
1357	Sema	0.11%	0.0031	-22.64%	14.83%	0.0435	-0.4706	4.3404
1372	Shell Transport and Trading Co	0.02%	0.0017	-6.93%	9.55%	0.0248	0.7299	1.9884
1402	Smithkline Beecham	0.10%	0.0017	-5.89%	8.09%	0.0241	0.2508	0.3352
1403	Smith Group	0.07%	0.0020	-10.05%	11.64%	0.0278	0.1721	2.4553
1407	South African Breweries	1.41%	0.0074	-1.92%	9.54%	0.0307	1.1369	1.5932
1425	Standard Chartered	0.25%	0.0027	-13.63%	13.62%	0.0381	0.0895	1.1733
1442	Sun Life and Provincial Holdings	0.16%	0.0020	-9.36%	11.11%	0.0288	0.0784	0.8943
1475	Telewest Communication	0.43%	0.0030	-9.94%	22.41%	0.0420	0.7734	3.4840
1484	Tesco	-0.02%	0.0017	-7.83%	5.94%	0.0240	0.0564	0.2746
1545	Unilever	-0.06%	0.0018	-7.63%	9.24%	0.0249	0.4743	1.4393
1550	United Business Media	-0.14%	0.0018	-7.69%	7.26%	0.0253	0.1552	0.3129
1552	United Utilities ($)	-0.01%	0.0013	-10.96%	10.21%	0.0181	-0.2718	11.2910
1573	Vodafone Group	0.24%	0.0022	-11.04%	14.69%	0.0318	0.4654	3.7171
1629	Woolwich	0.11%	0.0014	-5.51%	7.03%	0.0192	0.2642	1.2109
1632	WPP Group	0.19%	0.0024	-15.30%	13.97%	0.0339	-0.0490	3.0570
	Average 96 securities	**0.11%**	**0.0021**	**-9.75%**	**11.41%**	**0.0286**	**0.2983**	**3.3861**
	Percentile	1%	5%	25%	50%	75%	95%	99%
	RI's	-0.0023	-0.0012	0.0000	0.0008	0.0015	0.0044	0.0094

Appendix (A5.2) Statistical Descriptive of FTSE100 Security Return Indices and FTALLSH Index During the Test Period 1/4/1999 - 31/8/2000

N=370 days	Company's	Mean				Standard		
Serial#	Name	Statistic	StdEror	Minimum	Maximum	Deviation	Skewness	Kurtosis
Rm	**FTALLSH RI**	**0.04%**	**0.0005**	**-3.18%**	**2.30%**	**0.0100**	**-0.2445**	**0.2525**
4	3i Group	0.31%	0.0014	-9.01%	18.05%	0.0263	0.7358	6.0642
9	Abbey National	-0.06%	0.0014	-8.54%	11.00%	0.0269	0.4596	1.7749
64	Allied Domecq	0.09%	0.0014	-9.35%	15.34%	0.0269	0.9981	4.8897
67	Allied Zurich (ZURN)	0.04%	0.0011	-7.62%	12.88%	0.0215	0.5720	4.1885
79	AMVESCAP	0.26%	0.0015	-8.05%	12.64%	0.0293	0.3552	1.8939
85	Anglo American	0.20%	0.0013	-8.78%	9.50%	0.0245	0.2049	1.7586
101	ARM Holdings	0.61%	0.0026	-14.03%	20.71%	0.0496	0.6373	2.0847
114	Associated British Foods	0.05%	0.0015	-9.22%	17.85%	0.0282	1.1122	5.4343
117	AstraZeneca	0.04%	0.0011	-10.06%	9.89%	0.0209	0.0110	2.9385
137	BAA	-0.02%	0.0012	-17.48%	16.05%	0.0225	-0.0811	17.1811
139	BAE Systems	0.05%	0.0013	-7.78%	11.83%	0.0259	0.2802	2.3741
147	Baltimore Technologies	0.78%	0.0029	-24.42%	24.09%	0.0553	0.1524	2.4836
150	Barclays	0.03%	0.0013	-7.62%	9.19%	0.0251	0.3859	0.8080
157	Bass	-0.02%	0.0011	-6.52%	6.78%	0.0218	0.1727	0.5698
185	BG Group	0.09%	0.0013	-9.07%	10.40%	0.0251	0.4316	1.4496
186	Billiton	0.22%	0.0017	-11.00%	17.84%	0.0327	0.6694	3.5393
201	Blue Circle Industries	0.09%	0.0014	-19.79%	20.52%	0.0263	0.5163	18.5898
203	BOC Group	0.08%	0.0010	-12.38%	10.33%	0.0183	-0.6945	12.6370
211	The Boot Company	-0.10%	0.0012	-9.05%	12.18%	0.0233	0.8362	4.3574
217	BP Amoco	0.09%	0.0011	-5.95%	9.69%	0.0211	0.3771	1.4518
236	British Airways	-0.02%	0.0012	-7.13%	9.79%	0.0240	0.4055	1.1685
237	British American Tobaco	0.04%	0.0017	-11.49%	12.55%	0.0326	0.5519	1.6107
246	British Sky Broadcasting Group	0.29%	0.0020	-11.76%	18.59%	0.0387	0.6658	2.8656
249	British Telecomm..tions	0.01%	0.0016	-17.98%	12.30%	0.0307	-0.1658	3.9206
280	Cable & Wireless	0.19%	0.0018	-8.63%	17.28%	0.0349	0.7854	2.2735
281	Cadbury Schweppes	0.00%	0.0012	-8.82%	10.23%	0.0223	0.4983	2.8314
309	Capita Group (The)	0.25%	0.0017	-14.97%	18.08%	0.0323	0.8717	6.5419
324	Carlton Communications	0.10%	0.0015	-8.54%	15.28%	0.0284	0.6759	3.0770
331	Celltech Group	0.41%	0.0019	-13.58%	17.45%	0.0368	0.0896	3.9906
336	Centrica	0.27%	0.0014	-7.74%	16.60%	0.0264	0.8791	4.6989
338	CGNU	0.07%	0.0012	-7.10%	11.49%	0.0229	0.4998	2.3326
376	CMG	0.37%	0.0020	-19.51%	27.80%	0.0393	1.0213	9.4693
386	COLT Telecom Group	0.24%	0.0021	-10.56%	16.28%	0.0410	0.4363	0.9326
402	Corus Group	-0.04%	0.0017	-9.17%	20.90%	0.0329	0.9983	4.9526
423	Daily Mail & General Tr	0.13%	0.0015	-9.15%	11.27%	0.0288	0.3317	1.5332
463	Dixon Group	-0.01%	0.0021	-20.68%	17.37%	0.0399	-0.1877	3.3470
523	EMAP	0.04%	0.0016	-12.21%	14.70%	0.0304	0.5426	3.9195
525	EMI Group	0.15%	0.0016	-9.12%	15.26%	0.0316	0.6431	2.6525
526	Energis	0.21%	0.0021	-16.18%	14.30%	0.0410	-0.1983	1.4763
553	Exel	0.09%	0.0012	-7.05%	17.77%	0.0238	1.1785	9.2002
657	G K N	0.00%	0.0011	-7.75%	8.21%	0.0205	0.4459	1.5715
688	Glaxo Wellcome	-0.01%	0.0012	-9.90%	9.69%	0.0230	0.1416	1.8287
710	Granada Group	0.03%	0.0014	-7.69%	9.61%	0.0276	0.2597	0.6995
713	Great Universal Stores	-0.02%	0.0016	-19.88%	12.14%	0.0299	-0.4957	5.9857
731	Halifax group	-0.03%	0.0015	-9.41%	21.92%	0.0283	1.3471	10.6249
739	Hanson	-0.03%	0.0014	-8.16%	17.40%	0.0272	0.7196	4.4423
753	Hays	0.10%	0.0015	-11.84%	10.01%	0.0297	-0.3105	2.2314
785	Hilton Group	-0.01%	0.0016	-16.32%	16.75%	0.0308	0.7992	5.4505
799	HSBC Holdings	0.14%	0.0010	-5.54%	7.22%	0.0199	0.1887	1.0204
813	Imperial Chemical Industries	0.01%	0.0014	-6.98%	10.63%	0.0261	0.5597	1.1909
831	Invensys	0.06%	0.0016	-13.37%	14.43%	0.0306	0.1137	2.5242
899	Kingfisher	-0.08%	0.0014	-14.33%	10.66%	0.0276	-0.1070	2.5953
911	Land Securities	0.03%	0.0008	-4.45%	5.17%	0.0145	0.0925	0.7250
923	Legal & General Group	0.03%	0.0013	-6.15%	10.01%	0.0255	0.3911	0.9524
944	Lloyds TSB Group	-0.05%	0.0014	-8.82%	12.60%	0.0270	0.5780	1.6738
946	Logica	0.41%	0.0023	-15.05%	24.58%	0.0437	0.6950	3.8676
983	Marconi	0.32%	0.0018	-12.71%	12.23%	0.0348	0.3990	1.3372
984	Marks and Spencer	-0.12%	0.0015	-8.98%	18.12%	0.0291	1.3292	6.7606
1040	Misys	0.14%	0.0020	-9.84%	15.98%	0.0386	0.5887	1.5472
1082	National Grid Group	0.09%	0.0010	-8.55%	10.30%	0.0200	0.2594	3.0425
1083	International Power	0.06%	0.0013	-7.35%	14.80%	0.0250	0.5907	3.4223
1120	Nycomed Amersham	0.11%	0.0019	-11.03%	32.39%	0.0366	2.8133	20.7148

1159	Pearson	0.17%	0.0018	-11.43%	15.34%	0.0341	0.2935	2.9670
1161	Peninsular &Oriental Steam Navigation Co.	-0.06%	0.0012	-11.23%	15.53%	0.0238	0.3988	5.8539
1120	Prudential	0.08%	0.0013	-7.68%	11.10%	0.0252	0.2051	1.6630
1222	Psion	0.57%	0.0030	-22.60%	21.89%	0.0570	0.2656	2.9568
1247	Railtrack Group	-0.05%	0.0014	-8.17%	12.83%	0.0266	0.7525	2.5728
1254	Reckitt Benckiser	0.11%	0.0016	-17.80%	18.40%	0.0304	0.3470	7.1348
1261	Reed International	0.08%	0.0015	-9.42%	20.54%	0.0287	1.5668	9.6035
1270	Rentokil Initial	-0.18%	0.0015	-19.50%	10.41%	0.0291	-0.8995	7.4706
1272	Reuters Group	0.19%	0.0021	-14.94%	23.04%	0.0402	0.8322	4.9656
1279	Rio Tinto	0.13%	0.0014	-7.01%	10.24%	0.0276	0.4782	1.4297
1288	Rolls-Royce	-0.04%	0.0013	-22.43%	15.57%	0.0259	-1.0973	18.0412
1296	Royal & Sun Alliance Insurance Group	0.00%	0.0013	-6.79%	10.84%	0.0260	0.3014	0.8938
1297	Royal Bank of Scotland Group	0.05%	0.0014	-14.15%	11.22%	0.0275	0.2266	3.3083
1311	Sage Group (1269m)	0.35%	0.0020	-10.50%	16.99%	0.0394	0.5502	1.8850
1312	Sainsbury (J)	0.04%	0.0014	-10.82%	10.53%	0.0274	0.2277	2.5788
1327	Schroders (226m)	0.13%	0.0015	-10.29%	16.57%	0.0287	0.6985	3.8256
1332	Scottish & Newcastle	-0.04%	0.0013	-7.39%	10.36%	0.0250	0.3711	1.0141
1333	Scottish & Southern Energy	0.04%	0.0012	-6.76%	9.37%	0.0222	0.4230	1.2221
1340	Scottish Power	0.04%	0.0011	-8.86%	7.66%	0.0210	0.0562	1.5210
1357	Sema	0.24%	0.0020	-14.92%	25.65%	0.0376	0.7602	6.5007
1372	Shell Transport and Trading Co	0.14%	0.0011	-6.07%	7.90%	0.0213	0.3514	0.6558
1402	Smithkline Beecham	0.03%	0.0013	-11.76%	8.11%	0.0241	-0.2929	1.5278
1403	Smith Group	0.03%	0.0012	-11.19%	11.06%	0.0233	-0.0186	2.9173
1407	South African Breweries	0.02%	0.0014	-10.91%	9.80%	0.0277	-0.1260	1.3619
1425	Standard Chartered	0.09%	0.0016	-10.32%	11.42%	0.0303	0.2482	0.8346
1442	Sun Life and Provincial Holdings	0.11%	0.0010	-5.52%	9.26%	0.0196	0.3099	1.3674
1475	Telewest Communications	-0.07%	0.0022	-13.69%	17.50%	0.0424	0.3255	1.3636
1484	Tesco	0.11%	0.0012	-7.46%	8.52%	0.0222	0.4213	1.6559
1545	Unilever	0.01%	0.0013	-13.77%	11.16%	0.0254	-0.3288	4.2564
1550	United Business Media	0.13%	0.0012	-12.17%	8.62%	0.0239	-0.1558	2.4308
1552	United Utilities ($)	-0.01%	0.0011	-6.52%	10.72%	0.0214	0.5406	4.1205
1573	Vodafone Group	0.10%	0.0016	-8.58%	10.79%	0.0317	0.2203	0.3686
1629	Woolwich	0.03%	0.0015	-8.30%	26.79%	0.0293	2.5028	19.7354
1632	WPP Group	0.19%	0.0015	-10.83%	9.61%	0.0294	-0.1802	1.4097
Average	**96 Securities**	**0.10%**	**0.0015**	**-10.95%**	**14.09%**	**0.0290**	**0.4232**	**4.0092**
	Percentile	1%	5%	25%	50%	75%	95%	99%
	Securities' RI	-0.0013	-0.0006	0.0000	0.0006	0.0014	0.0038	0.0062

Appendix (A5.3) Testing For Normality of FTSE100 Security Return Indices and FTALLSH Index During the Estimation Period 16/6/1998-23/3/1999 and Test Period 1/4/1999 - 31/8/2000

Company	N=201days Estimation Period				Test Period N=370days			
	Shape of Distribtion		Normality Test		Shape of Distribtion		Normality Test	
Serial #	Skewnss	Kurtosis	K-S Stat.	*p*-value	Skewnss	Kurtosis	K-S Stat.	*p*-value
Rm	**-0.0037**	**0.4078**	**1.614**	**0.011**	**-0.2445**	**0.2525**	0.686	**0.735 a**
4	0.4119	4.0822	1.340	0.055 **a**	0.7358	6.0642	1.186	0.120 **a**
9	0.0388	0.8797	0.944	0.336 **a**	0.4596	1.7749	1.170	0.129 **a**
64	-0.6984	6.9995	1.410	0.037	0.9981	4.8897	1.692	0.007
67	0.2003	2.2428	0.739	0.645 **a**	0.5720	4.1885	1.482	0.025
79	0.4078	2.7040	1.169	0.130 **a**	0.3552	1.8939	1.189	0.119 **a**
85	0.6622	2.1393	1.602	0.012	0.2049	1.7586	1.183	0.122 **a**
101	0.5902	5.5340	2.347	0.000	0.6373	2.0847	1.782	0.003
114	0.1578	0.4982	0.719	0.680 **a**	1.1122	5.4343	1.797	0.003
117	0.2493	0.5417	0.926	0.358 **a**	0.0110	2.9385	1.051	0.219 **a**
137	0.1822	0.9501	1.098	0.179 **a**	-0.0811	17.1811	1.671	0.008
139	0.0970	1.7826	0.720	0.678 **a**	0.2802	2.3741	1.071	0.201 **a**
147	1.6667	9.0505	2.819	0.000	0.1524	2.4836	1.805	0.003
150	0.1496	0.3366	1.193	0.160 **a**	0.3859	0.8080	1.249	0.088 **a**
157	-0.2140	1.9011	1.004	0.266 **a**	0.1727	0.5698	1.085	0.190 **a**
185	-0.0028	1.6143	0.791	0.559 **a**	0.4316	1.4496	1.318	0.062 **a**
186	1.3402	3.6868	1.600	0.012	0.6694	3.5393	1.246	0.096 **a**
201	-0.7002	6.0754	1.202	0.111 **a**	0.5163	18.5898	2.920	0.000
203	0.3429	0.7037	0.790	0.561 **a**	-0.6945	12.6370	2.596	0.000
211	0.4572	2.0513	1.009	0.260 **a**	0.8362	4.3574	1.625	0.010 **a**
217	0.7095	2.4489	1.128	0.157 **a**	0.3771	1.4518	1.065	0.207 **a**
236	-0.1419	0.1352	0.700	0.711 **a**	0.4055	1.1685	1.246	0.090 **a**
237	5.0790	47.4835	1.769	0.004	0.5519	1.6107	1.621	0.010 **a**
246	0.7299	7.5931	1.254	0.086 **a**	0.6658	2.8656	2.430	0.000
249	0.4591	0.9990	0.524	0.947 **a**	-0.1658	3.9206	1.322	0.061 **a**
280	-0.0117	1.3387	1.135	0.152 **a**	0.7854	2.2735	1.624	0.010 **a**
281	0.6015	0.8530	1.044	0.226 **a**	0.4983	2.8314	1.617	0.011
309	-0.7780	4.8028	1.776	0.004	0.8717	6.5419	2.632	0.000
324	0.4158	0.8656	1.054	0.217 **a**	0.6759	3.0770	1.636	0.009
331	1.3041	7.1902	2.655	0.000	0.0896	3.9906	2.914	0.000
336	0.5842	2.2963	0.888	0.410 **a**	0.8791	4.6989	1.535	0.018
338	0.2865	1.5421	1.173	0.128 **a**	0.4998	2.3326	1.312	0.064 **a**
376	-1.8869	14.8513	1.652	0.009	1.0213	9.4693	2.041	0.000
386	-0.1832	0.9982	0.644	0.802 **a**	0.4363	0.9326	1.036	0.234 **a**
402	0.7093	3.0964	1.318	0.062 **a**	0.9983	4.9526	2.214	0.000
423	0.2232	1.8605	1.699	0.006	0.3317	1.5332	1.596	0.012
463	0.6937	2.8976	1.057	0.214 **a**	-0.1877	3.3470	1.151	0.141 **a**
523	-0.4980	1.1944	1.272	0.079 **a**	0.5426	3.9195	2.373	0.000
525	0.2210	6.9258	1.596	0.012	0.6431	2.6525	1.465	0.027
526	0.2966	1.7179	1.776	0.004	-0.1983	1.4763	1.057	0.213 **a**
553	0.1276	2.2707	1.921	0.001	1.1785	9.2002	1.847	0.002
657	0.3382	0.7202	1.026	0.243 **a**	0.4459	1.5715	1.280	0.057 **a**
688	0.6247	3.4363	0.813	0.523 **a**	0.1416	1.8287	1.091	0.185 **a**
710	0.3620	1.5323	1.233	0.095 **a**	0.2597	0.6995	0.893	0.402 **a**
713	0.7482	2.7583	1.391	0.042	-0.4957	5.9857	1.430	0.033
731	0.2664	0.2156	0.989	0.282 **a**	1.3471	10.6249	1.148	0.143 **a**
739	0.8349	4.0318	1.445	0.031	0.7196	4.4423	1.529	0.019
753	0.1376	1.2469	0.621	0.836 **a**	-0.3105	2.2314	1.125	0.159 **a**
785	0.9303	3.5136	1.398	0.040	0.7992	5.4505	1.643	0.009
799	0.4725	1.1906	1.073	0.200 **a**	0.1887	1.0204	1.399	0.040
813	0.0695	2.8804	1.195	0.115 **a**	0.5597	1.1909	1.403	0.039
831	0.1961	1.8485	1.237	0.094 **a**	0.1137	2.5242	1.348	0.053
899	0.5186	1.1741	1.108	0.171 **a**	-0.1070	2.5953	1.042	0.228 **a**
911	0.4398	0.6212	1.226	0.099 **a**	0.0925	0.7250	1.346	0.053
923	0.0692	2.5285	0.864	0.445 **a**	0.3911	0.9524	0.932	0.351 **a**
944	0.5449	1.3551	0.858	0.453 **a**	0.5780	1.6738	1.263	0.082 **a**
946	-0.9657	3.6935	1.345	0.054	0.6950	3.8676	1.797	0.003
983	0.4432	2.1751	1.044	0.226 **a**	0.3990	1.3372	1.280	0.075 **a**
984	-1.3134	5.5658	1.270	0.079 **a**	1.3292	6.7606	1.919	0.001
1040	-0.9300	7.5126	1.337	0.056 **a**	0.5887	1.5472	1.291	0.072 **a**
1082	0.0476	0.4946	1.211	0.106 **a**	0.2594	3.0425	1.071	0.201 **a**

1083	0.1111	0.4025	0.675	0.752 a	0.5907	3.4223	0.900	0.393 a
1120	0.0858	0.0033	0.832	0.494 a	2.8133	20.7148	2.625	0.000
1159	-0.0177	0.5945	0.580	0.890 a	0.2935	2.9670	1.799	0.003
1161	0.8500	4.0227	1.147	0.144 a	0.3988	5.8539	1.085	0.190 a
1120	-0.5575	2.5111	0.704	0.705 a	0.2051	1.6630	1.361	0.049
1222	4.1183	27.7296	2.685	0.000	0.2656	2.9568	2.255	0.000
1247	0.6705	2.2414	1.220	0.102 a	0.7525	2.5728	2.025	0.001
1254	-0.8544	9.0474	1.491	0.023	0.3470	7.1348	1.641	0.009
1261	0.5245	0.9602	1.452	0.029	1.5668	9.6035	1.880	0.002
1270	0.0032	0.3121	0.636	0.814 a	-0.8995	7.4706	1.727	0.005
1272	0.3725	1.6714	1.175	0.127 a	0.8322	4.9656	1.800	0.003
1279	0.1443	0.0070	0.813	0.522 a	0.4782	1.4297	1.197	0.114 a
1288	0.3572	2.0917	1.111	0.169 a	-1.0973	18.0412	1.534	0.018
1296	0.0781	1.1308	0.926	0.358 a	0.3014	0.8938	0.845	0.473 a
1297	0.0650	0.3699	1.042	0.227 a	0.2266	3.3083	1.317	0.062 a
1311	-0.3866	2.8714	1.720	0.005	0.5502	1.8850	1.611	0.011
1312	-0.5278	1.5706	1.103	0.176 a	0.2277	2.5788	1.530	0.019
1327	0.0516	0.9365	0.820	0.513 a	0.6985	3.8256	1.228	0.098 a
1332	0.3511	1.3528	0.757	0.615 a	0.3711	1.0141	1.524	0.019
1333	0.4971	4.6623	1.546	0.017	0.4230	1.2221	1.336	0.056 a
1340	0.7319	7.3804	1.178	0.125 a	0.0562	1.5210	0.985	0.287 a
1357	-0.4706	4.3404	1.482	0.025	0.7602	6.5007	1.299	0.068 a
1372	0.7299	1.9884	1.165	0.132 a	0.3514	0.6558	1.223	0.100 a
1402	0.2508	0.3352	0.658	0.779 a	-0.2929	1.5278	0.781	0.576 a
1403	0.1721	2.4553	1.243	0.091 a	-0.0186	2.9173	1.094	0.182 a
1407	1.1369	1.5932	0.573	0.898 a	-0.1260	1.3619	1.205	0.110 a
1425	0.0895	1.1733	0.854	0.460 a	0.2482	0.8346	1.357	0.050
1442	0.0784	0.8943	0.943	0.337 a	0.3099	1.3674	0.768	0.598 a
1475	0.7734	3.4840	1.245	0.090 a	0.3255	1.3636	1.299	0.068 a
1484	0.0564	0.2746	0.783	0.572 a	0.4213	1.6559	1.431	0.033
1545	0.4743	1.4393	1.030	0.239 a	-0.3288	4.2564	1.299	0.068 a
1550	0.1552	0.3129	1.211	0.106 a	-0.1558	2.4308	1.316	0.062 a
1552	-0.2718	11.2910	2.227	0.000	0.5406	4.1205	2.721	0.000
1573	0.4654	3.7171	1.150	0.142 a	0.2203	0.3686	0.861	0.449 a
1629	0.2642	1.2109	1.112	0.169 a	2.5028	19.7354	2.454	0.000
1632	-0.0490	3.0570	0.847	0.470 a	-0.1802	1.4097	1.232	0.096 a
Average 96 Securities	**0.2983**	**3.3861**	**1.195**	**0.256**	**0.4232**	**4.0092**	**1.488**	**0.100**

Notes: (a) denotes the distribution is significantly normal at 5% level or less.

Table (A5.4) Pearson's Correlation Between FTSE100 Security Return Indices and Market Return Index During the Estimation Period 16/6/1998-23/3/1999 and Test Period 1/4/1999 - 31/8/2000

Security	Estimation Period 6/98- 3/1999			Test Period (4/1999- 8/2000)		
Serial #	Rm	Sig. 2-tailed	N	Rm	Sig. 2-tailed	N
4	59.57% a	0.000	201	43.75% a	0.000	370
9	61.62% a	0.000	201	40.76% a	0.000	370
64	43.25% a	0.000	201	13.13% b	0.012	370
67	76.2% a	0.000	141	38.94% a	0.000	370
79	66.37% a	0.000	201	50.60% a	0.000	370
85	29.93% a	0.000	201	31.20% a	0.000	370
101	38.57% a	0.000	201	42.74% a	0.000	370
114	48.95% a	0.000	201	25.32% a	0.000	370
117	56.78% a	0.000	201	40.44% a	0.000	370
137	49.53% a	0.000	201	15.78% a	0.002	370
139	47.77% a	0.000	201	21.23% a	0.000	370
147	21.29% a	0.002	201	35.40% a	0.002	370
150	70.84% a	0.000	201	46.92% a	0.000	370
157	40.84% a	0.000	201	22.33% a	0.000	370
185	29.60% a	0.000	201	20.77% a	0.000	370
186	41.85% a	0.000	201	21.26% a	0.000	370
201	35.86% a	0.000	201	4.73%	0.365	370
203	46.26% a	0.000	201	19.81% a	0.000	370
211	24.15% a	0.000	201	13.91% a	0.007	370
217	56.20% a	0.000	201	29.63% a	0.000	370
236	62.12% a	0.000	201	24.81% a	0.000	370
237	21.34% a	0.000	201	17.05% a	0.000	370
246	33.86% a	0.000	201	41.23% a	0.000	370
249	64.66% a	0.000	201	52.41% a	0.000	370
280	66.39% a	0.000	201	49.45% a	0.000	370
281	42.92% a	0.000	201	22.63% a	0.000	370
309	33.69% a	0.000	201	31.56% a	0.000	370
324	44.95% a	0.000	201	38.84% a	0.000	370
331	23.70% a	0.000	201	36.44% a	0.000	370
336	8.43% a	0.000	201	22.49% a	0.000	370
338	70.38% a	0.000	201	43.98% a	0.000	370
376	47.64% a	0.000	201	38.34% a	0.000	370
386	63.59% a	0.000	201	50.72% a	0.000	370
402	37.67% a	0.000	201	16.99% a	0.000	370
423	33.12% a	0.000	201	36.85% a	0.000	370
463	22.97% a	0.000	201	42.41% a	0.000	370
523	34.37% a	0.000	201	19.95% a	0.000	370
525	36.67% a	0.000	201	42.25% a	0.000	370
526	48.36% a	0.000	201	49.49% a	0.000	370
553	25.86% a	0.000	201	6.50% a	0.000	370
657	53.64% a	0.000	201	19.81% a	0.000	370
688	40.14% a	0.000	201	26.97% a	0.000	370
710	54.65% a	0.000	201	33.80% a	0.000	370
713	34.24% a	0.000	201	28.85% a	0.000	370
731	51.82% a	0.000	201	36.93% a	0.000	370
739	23.47% a	0.000	201	29.28% a	0.000	370
753	57.95% a	0.000	201	35.13% a	0.000	370
785	39.53% a	0.000	201	31.12% a	0.000	370
799	74.02% a	0.000	201	59.72% a	0.000	370
813	35.27% a	0.000	201	20.88% a	0.000	370
831	59.83% a	0.000	201	23.06% a	0.000	370
899	36.46% a	0.000	201	25.09% a	0.000	370
911	31.35% a	0.000	201	26.00% a	0.000	370
923	68.96% a	0.000	201	42.83% a	0.000	370
944	80.10% a	0.000	201	45.13% a	0.000	370
946	44.57% a	0.000	201	40.71% a	0.000	370
983	49.30% a	0.000	201	55.29% a	0.000	370
984	33.01% a	0.000	201	25.08% a	0.000	370
1040	51.82% a	0.000	201	46.29% a	0.000	370

1082	45.03% a	0.000	201	44.85% a	0.000	370
1083	27.00% a	0.000	201	12.86% a	0.013	370
1120	38.00% a	0.000	201	26.89% a	0.000	370
1159	58.01% a	0.000	201	38.93% a	0.000	370
1161	52.56% a	0.000	201	27.63% a	0.000	370
1120	68.88% a	0.000	201	48.51% a	0.000	370
1222	17.15% a	0.000	201	34.81% a	0.000	370
1247	23.38% a	0.000	201	15.37% a	0.003	370
1254	33.08% a	0.000	201	18.65% a	0.000	370
1261	42.13% a	0.000	201	26.89% a	0.000	370
1270	48.47% a	0.000	201	13.27% b	0.011	370
1272	55.93% a	0.000	201	46.82% a	0.000	370
1279	47.00% a	0.000	201	25.01% a	0.000	370
1288	57.02% a	0.000	201	18.87% a	0.000	370
1296	69.12% a	0.000	201	34.07% a	0.000	370
1297	63.75% a	0.000	201	40.08% a	0.000	370
1311	44.39% a	0.000	201	44.52% a	0.000	370
1312	31.79% a	0.000	201	14.97% a	0.004	370
1327	56.45% a	0.000	201	36.84% a	0.000	370
1332	50.01% a	0.000	201	7.85%	0.132	370
1333	14.08% a	0.000	201	22.35% a	0.000	370
1340	32.13% a	0.000	201	27.91% a	0.000	370
1357	54.47% a	0.000	201	38.65% a	0.000	370
1372	52.28% a	0.000	201	31.09% a	0.000	370
1402	65.10% a	0.000	201	41.40% a	0.000	370
1403	42.22% a	0.000	201	20.09% a	0.000	370
1407	58.44% b	0.011	17	46.38% b	0.011	370
1425	70.23% a	0.000	201	52.73% a	0.000	370
1442	68.43% a	0.000	201	38.86% a	0.000	370
1475	39.12% a	0.000	201	47.63% a	0.000	370
1484	36.66% a	0.000	201	19.54% a	0.000	370
1545	68.21% a	0.000	201	25.64% a	0.000	370
1550	42.74% a	0.000	201	34.59% a	0.000	370
1552	7.26% a	0.000	201	7.90%	0.129	370
1573	64.83% a	0.000	201	57.76% a	0.000	370
1629	51.33% a	0.000	201	37.84% a	0.000	370
1632	51.76% a	0.000	201	48.50% a	0.000	370
Average 96 Securities	**46.22% a**	**0.000**	**198**	**31.92% a**	**0.007**	**370**

Notes: (**a**) Denotes the Correlation is significant at the 0.01 (2-tailed) level of significance or less.

(**b**) Denotes the Correlation is significant at the 0.05 (2-tailed) level of significance.

Table (A5.5) SMM Parameters and Residuals Statistics of FTSE100 Securities During the Estimation Period 16/6/1998-23/3/1999

Security No.	SMM Parameters and Tests Results					SMM Residuals				
	Beta	Alpha	F-Value	DW	R2 Adj	Mean	Std Error	Min	Max	Variance
4	0.596 a	-0.00356	109.48 a	2.360 a	35.2%	-0.00000	0.0012	-5.70%	9.67%	0.0003
9	0.616 a	0.00113	121.83 a	2.010 a	37.7%	0.00000	0.0014	-9.32%	6.47%	0.0004
64	0.432 a	-0.00096	45.78 a	1.871 a	18.3%	-0.00000	0.0015	-12.99%	9.14%	0.0005
67	0.760 a	-0.00159	190.57 a	1.852 a	57.5%	-0.00000	0.0018	-6.17%	7.97%	0.0005
79	0.664 a	-0.00000	156.68 a	1.867 a	43.8%	-0.00000	0.0021	-11.81%	14.39%	0.0009
85	0.299 a	0.00062	19.58 a	1.628 a	8.5%	-0.00000	0.0019	-7.36%	10.73%	0.0007
101	0.386 a	0.00622 a	34.78 a	2.069 a	14.5%	0.00000	0.0026	-13.85%	17.85%	0.0014
114	0.489 a	-0.00126	62.71 a	2.151 a	23.6%	0.00000	0.0019	-7.99%	7.90%	0.0007
117	0.568 a	0.00014	94.66 a	1.866 a	31.9%	0.00000	0.0012	-7.03%	6.83%	0.0003
137	0.495 a	-0.00023	64.70 a	1.874 a	24.2%	0.00000	0.0010	-3.67%	4.93%	0.0002
139	0.478 a	-0.00068	58.84 a	1.922 a	22.4%	0.00000	0.0021	-12.00%	12.81%	0.0009
147	0.213 a	0.00466	9.45 a	1.420 a	4.1%	-0.00000	0.0032	-12.47%	30.68%	0.0021
150	0.708 a	0.00027	200.40 a	1.654 a	49.9%	0.00000	0.0016	-8.00%	6.69%	0.0005
157	0.408 a	-0.00050	39.84 a	1.883 a	16.3%	-0.00000	0.0019	-12.00%	6.68%	0.0007
185	0.296 a	0.00063	19.10 a	2.120 a	8.3%	0.00000	0.0015	-8.75%	7.85%	0.0004
186	0.418 a	0.00107	42.25 a	2.008 a	17.1%	0.00000	0.0021	-6.21%	13.77%	0.0009
201	0.359 a	0.00012	29.37 a	1.948 a	12.4%	-0.00000	0.0019	-14.49%	10.19%	0.0007
203	0.463 a	-0.00006	54.30 a	2.160 a	21.0%	-0.00000	0.0013	-5.22%	6.95%	0.0004
211	0.243 a	-0.00061	12.52 a	1.733 a	5.4%	0.00000	0.0014	-5.84%	10.35%	0.0004
217	0.561 a	0.00083	91.40 a	1.851 a	31.1%	-0.00000	0.0012	-4.17%	8.53%	0.0003
236	0.619 a	-0.00242	123.93 a	1.939 a	38.1%	0.00000	0.0016	-5.97%	6.02%	0.0005
237	0.214 a	0.00319	9.54 a	1.872 a	4.1%	0.00000	0.0026	-7.03%	37.63%	0.0014
246	0.339 a	0.00107	25.88 a	1.889 a	11.1%	0.00000	0.0016	-9.61%	14.62%	0.0005
249	0.648 a	0.00209	144.07 a	1.842 a	41.7%	-0.00000	0.0014	-4.90%	8.78%	0.0004
280	0.666 a	0.00063	158.27 a	1.998 a	44.0%	-0.00000	0.0017	-7.94%	7.60%	0.0006
281	0.431 a	0.00022	45.38 a	2.036 a	18.2%	-0.00000	0.0014	-4.84%	7.10%	0.0004
309	0.338 a	0.00154	25.59 a	1.465	10.9%	0.00000	0.0018	-12.04%	8.52%	0.0006
324	0.449 a	0.00041	50.34 a	1.868 a	19.8%	-0.00000	0.0017	-5.84%	6.79%	0.0006
331	0.237 a	0.00096	11.89 a	1.523 a	5.2%	0.00000	0.0020	-9.66%	13.28%	0.0008
336	0.084	0.00063	1.40	2.066 a	0.2%	-0.00000	0.0015	-6.27%	9.66%	0.0005
338	0.702 a	-0.00065	193.30 a	1.975 a	49.0%	-0.00000	0.0016	-7.69%	6.52%	0.0005
376	0.478 a	0.00047	58.82 a	1.952 a	22.4%	-0.00000	0.0024	-24.80%	10.38%	0.0012
386	0.636 a	0.00331	135.42 a	1.646 a	40.2%	-0.00000	0.0025	-13.83%	9.14%	0.0013
402	0.374 a	0.00009	32.28 a	1.796 a	13.5%	0.00000	0.0018	-7.87%	13.04%	0.0007
423	0.328 a	0.00119	23.94 a	2.169 a	10.3%	-0.00000	0.0016	-7.63%	8.46%	0.0005
463	0.230 a	0.00490 a	11.13 a	1.672 a	4.8%	0.00000	0.0019	-7.91%	13.17%	0.0007
523	0.341 a	0.00085	26.27 a	1.683 a	11.2%	-0.00000	0.0016	-8.27%	5.57%	0.0005
525	0.364 a	-0.00045	30.43 a	1.974 a	12.8%	-0.00000	0.0020	-14.22%	15.40%	0.0008
526	0.483 a	0.00377	60.60 a	1.895 a	23.0%	-0.00000	0.0026	-11.58%	14.80%	0.0013
553	0.257 a	0.00102	14.12 a	1.569 a	6.2%	0.00000	0.0013	-5.72%	6.93%	0.0004
657	0.538 a	0.00113	80.85 a	1.992 a	28.5%	0.00000	0.0018	-8.10%	7.42%	0.0006
688	0.401 a	0.00053	38.19 a	2.597 a	15.7%	-0.00000	0.0014	-6.88%	10.26%	0.0004
710	0.546 a	0.00047	84.58 a	1.798 a	29.5%	0.00000	0.0016	-6.48%	8.91%	0.0005
713	0.341 a	-0.00036	26.24 a	1.745 a	11.2%	0.00000	0.0018	-7.93%	11.61%	0.0006
731	0.520 a	0.00020	73.87 a	2.074 a	26.7%	0.00000	0.0013	-5.64%	5.65%	0.0003
739	0.235 a	0.00195	11.59 a	1.834 a	5.0%	-0.00000	0.0016	-5.65%	12.44%	0.0005
753	0.580 a	0.00109	100.91 a	2.044 a	33.3%	-0.00000	0.0019	-7.06%	9.13%	0.0007
785	0.394 a	-0.00071	36.62 a	2.214 a	15.1%	0.00000	0.0021	-6.95%	16.79%	0.0009
799	0.739 a	0.00162	239.51 a	2.109 a	54.4%	-0.00000	0.0014	-5.33%	7.94%	0.0004
813	0.353 a	-0.00260	28.30 a	1.657 a	12.0%	-0.00000	0.0021	-13.71%	11.25%	0.0009
831	0.599 a	-0.00025	111.44 a	1.768 a	35.6%	-0.00000	0.0021	-9.57%	9.54%	0.0009
899	0.366 a	0.00213	30.73 a	2.004 a	12.9%	-0.00000	0.0018	-8.97%	10.38%	0.0007
911	0.314 a	-0.00074	21.81 a	1.658 a	9.4%	-0.00000	0.0010	-3.79%	4.67%	0.0002
923	0.689 a	0.00046	180.16 a	2.137 a	47.3%	-0.00000	0.0016	-9.99%	5.60%	0.0005
944	0.800 a	0.00026	353.56 a	1.885 a	63.8%	-0.00000	0.0013	-5.62%	6.99%	0.0003
946	0.444 a	0.00303	48.81 a	1.651 a	19.3%	-0.00000	0.0021	-11.99%	8.99%	0.0009
983	0.492 a	0.00089	63.53 a	1.695 a	23.8%	0.00000	0.0017	-5.91%	11.19%	0.0006
984	0.334 a	-0.00155	24.93 a	2.051 a	10.7%	0.00000	0.0016	-13.25%	6.39%	0.0005
1040	0.519 a	0.00017	73.35 a	1.790 a	26.6%	-0.00000	0.0027	-20.36%	17.00%	0.0014
1082	0.450 a	0.00064	50.59 a	1.872 a	19.9%	-0.00000	0.0012	-4.91%	4.68%	0.0003
1083	0.271 a	-0.00081	15.79 a	1.858 a	6.9%	0.00000	0.0013	-6.11%	5.76%	0.0004

1120	**0.380 a**	0.00117	**33.66 a**	**2.065 a**	14.0%	0.00000	0.0019	-7.92%	8.45%	0.0008
1159	**0.579 a**	0.00075	**100.59 a**	**1.881 a**	33.2%	-0.00000	0.0014	-6.25%	7.54%	0.0004
1161	**0.525 a**	0.00023	**75.92 a**	**1.801 a**	27.2%	-0.00000	0.0016	-5.10%	11.84%	0.0005
1220	**0.688 a**	0.00016	**179.18 a**	**1.661 a**	47.1%	0.00000	0.0013	-7.33%	6.88%	0.0003
1222	**0.171 a**	**0.00890 a**	**5.97 a**	1.291	2.4%	-0.00000	0.0044	-12.87%	49.23%	0.0038
1247	**0.235 a**	0.00113	**11.62 a**	**1.854 a**	5.0%	0.00000	0.0016	-6.88%	10.03%	0.0005
1254	**0.327 a**	*-0.00263 b*	**23.89 a**	**1.890 a**	10.3%	0.00000	0.0015	-14.11%	8.96%	0.0005
1261	**0.420 a**	0.00004	**42.74 a**	**1.794 a**	17.3%	0.00000	0.0017	-6.96%	10.09%	0.0006
1270	**0.486 a**	-0.00013	**61.65 a**	**2.146 a**	23.3%	-0.00000	0.0018	-10.74%	9.12%	0.0007
1272	**0.560 a**	0.00110	**90.93 a**	**1.677 a**	31.0%	0.00000	0.0019	-7.89%	9.66%	0.0007
1279	**0.470 a**	0.00129	**56.38 a**	**1.894 a**	21.7%	-0.00000	0.0013	-5.36%	5.28%	0.0004
1288	**0.572 a**	0.00008	**96.89 a**	**1.809 a**	32.4%	-0.00000	0.0015	-6.47%	7.91%	0.0004
1296	**0.689 a**	-0.00048	**180.09 a**	**2.024 a**	47.2%	0.00000	0.0016	-6.92%	6.41%	0.0005
1297	**0.637 a**	0.00087	**135.80 a**	**1.694 a**	40.3%	-0.00000	0.0016	-5.81%	6.96%	0.0005
1311	**0.442 a**	0.00204	**48.27 a**	**1.805 a**	19.1%	-0.00000	0.0020	-10.27%	10.21%	0.0008
1312	**0.320 a**	-0.00129	**22.73 a**	**1.957 a**	9.8%	0.00000	0.0014	-7.66%	6.42%	0.0004
1327	**0.567 a**	-0.00061	**94.16 a**	**2.246 a**	31.8%	0.00000	0.0021	-7.95%	12.60%	0.0009
1332	**0.501 a**	-0.00090	**66.79 a**	**1.919 a**	24.8%	-0.00000	0.0014	-6.54%	6.68%	0.0004
1333	**0.141 a**	0.00061	**4.010 a**	**1.559 a**	1.5%	-0.00000	0.0012	-7.74%	8.90%	0.0003
1340	**0.320 a**	0.00025	**22.70 a**	**1.755 a**	9.8%	0.00000	0.0014	-9.78%	11.80%	0.0004
1357	**0.542 a**	0.00056	**82.85 a**	**1.734 a**	29.0%	0.00000	0.0026	-17.29%	10.23%	0.0013
1372	**0.521 a**	-0.00010	**74.12 a**	**1.945 a**	26.8%	-0.00000	0.0015	-6.37%	8.78%	0.0004
1402	**0.652 a**	0.00064	**146.99 a**	**1.957 a**	42.2%	-0.00000	0.0013	-5.71%	5.05%	0.0003
1403	**0.423 a**	0.00046	**43.33 a**	**2.008 a**	17.5%	-0.00000	0.0018	-9.29%	10.85%	0.0006
1407	**0.598 a**	**0.01412 a**	**8.350 a**	**2.710 a**	31.5%	-0.00000	0.0060	-3.31%	4.90%	0.0006
1425	**0.703 a**	0.00187	**194.02 a**	**1.889 a**	49.1%	0.00000	0.0019	-8.03%	11.73%	0.0007
1442	**0.684 a**	0.00111	**174.96 a**	**1.750 a**	46.5%	-0.00000	0.0015	-6.75%	6.27%	0.0004
1475	**0.391 a**	0.00386	**35.86 a**	**1.871 a**	14.8%	-0.00000	0.0027	-9.85%	21.53%	0.0015
1484	**0.370 a**	-0.00042	**31.48 a**	**2.054 a**	13.2%	0.00000	0.0016	-7.35%	6.58%	0.0005
1545	**0.684 a**	-0.00101	**175.41 a**	**1.756 a**	46.6%	0.00000	0.0013	-4.18%	7.04%	0.0003
1550	**0.428 a**	-0.00163	**44.74 a**	**2.097 a**	17.9%	-0.00000	0.0016	-6.77%	7.26%	0.0005
1552	0.071	-0.00018	1.00	**2.013 a**	0.0%	-0.00000	0.0013	-10.95%	10.17%	0.0003
1573	**0.650 a**	0.00188	**145.60 a**	**2.007 a**	42.0%	-0.00000	0.0017	-8.17%	10.30%	0.0006
1629	**0.514 a**	0.00087	**71.52 a**	**1.942 a**	26.1%	-0.00000	0.0012	-5.03%	6.27%	0.0003
1632	**0.520 a**	0.00147	**73.60 a**	**1.996 a**	26.6%	-0.00000	0.0020	-12.88%	11.19%	0.0008
Average	**0.462 a**	0.00076	**72.85 a**	**1.895 a**	23.5%	-0.00000	0.0018	-8.31%	10.02%	0.0006

Notes: (**a**) denotes significant at the 5% level of significance, and
(*b*) denotes significant at 10% level of significance.

Appendix (A5.6) Pearson's Correlation of Successive Cross-Sectional FTSE100 Abnormal Returns During Different Event Windows For Each Signal Definition

(a) Single Signal

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	0.0093	0.0317	0.0182	0.0334
T0 to T+6	-0.0212	0.0564	0.0099	0.0746
T0 to T+12	**-0.0198**	**-0.0013**	**0.0021**	**0.0761**
T+6 to T+12	0.0037	-0.0598	-0.0085	0.0678
T+0 to T+60	0.0012	0.0178	0.0144	0.0366
T+6 to T+60	0.0065	0.0125	0.0143	0.0312

(b) Multiple Signal

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	-0.0055	0.1649	0.0335	0.0915
T0 to T+6	-0.0244	0.1004	-0.0082	0.2074
T0 to T+12	**-0.0604**	**0.0560**	**-0.0155**	**0.1937**
T+6 to T+12	-0.0184	0.1359	0.0279	0.0970
T+0 to T+60	-0.0736	-0.0052	-0.0197	0.1848
T+6 to T+60	-0.0155	0.1368	0.0321	0.0853

(c) Quantitative Signal
(1) First Quartile

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	-0.0403	0.0069	0.0190	-0.0138
T0 to T+6	-0.0918	-0.0073	-0.0283	0.0829
T0 to T+12	**-0.1031**	**-0.0855**	**-0.0446**	**0.1320**
T+6 to T+12	-0.0414	0.0020	0.0048	-0.0113
T+0 to T+60	-0.1036	-0.1247	-0.0698	0.2412
T+6 to T+60	-0.0347	0.0066	0.0070	-0.0130

(c) Quantitative Signal
(2) Second Quartile

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	-0.0206	0.0512	0.0133	0.0286
T0 to T+6	0.0772	0.1025	-0.0099	0.1490
T0 to T+12	**0.0027**	**0.0638**	**-0.0042**	**0.0750**
T+6 to T+12	-0.0138	0.0546	0.0187	0.0225
T+0 to T+60	-0.0280	-0.0049	-0.0284	0.0009
T+6 to T+60	-0.0195	0.0449	0.0181	0.0074

Notes: Each number in the tables represents the average correlation of subsequent abnormal returns within a specified event window.

(c) Quantitative Signal
(3) Third Quartile

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	0.0386	0.0026	0.0201	-0.0082
T0 to T+6	-0.1309	0.0498	0.0123	-0.0837
T0 to T+12	**-0.0130**	**0.0039**	**0.0257**	**-0.0692**
T+6 to T+12	0.0378	-0.0487	0.0183	-0.0242
T+0 to T+60	0.1894	-0.0393	0.0631	-0.1056
T+6 to T+60	0.0630	-0.0599	0.0223	-0.0239

(c) Quantitative Signal
(1) Fourth Quartile

AR During Selected Event Windows	BEO Corr	SSO Corr	Buy OS Corr	Sell OS Corr
T-30 to T+60	0.0020	0.0563	0.0156	0.0622
T0 to T+6	0.0292	0.0323	0.0570	0.1931
T0 to T+12	**-0.0419**	**0.0190**	**0.0382**	**0.1522**
T+6 to T+12	-0.0219	0.0487	0.0111	0.0792
T+0 to T+60	-0.1030	-0.0386	0.0294	0.0981
T+6 to T+60	-0.0275	0.0446	0.0071	0.0643

Notes: Each number in the table represents the average correlation of successive abnormal returns within a specified event window.

Appendix (A5.7)

FTSE100 Abnormal Returns and T-test Defined by the Median of the Net Volume Per Transaction and the Median of the Ratio of NV/TV

Day	The Median of the Net Volume Per Transaction							
	BUY		SELL		BEO		SSO	
	ARt	BW1985 T-Value	ARt	BW1985 T-Value	ARt	BW1985 T-Value	ARt	BW1985 T-Value
T0	-0.0008	-0.0001	-0.0264	-0.0011	-0.0056	-0.0003	-0.0433	-0.0008
T1	0.0039	0.0002	0.0241	0.0010	-0.0001	-0.0001	0.0998	0.0053
T2	-0.0078	-0.0005	-0.0650	-0.0027	0.0009	0.0002	0.0493	0.0092
T3	0.0017	0.0002	0.0468	0.0020	0.0066	0.0016	0.0391	0.0035
T4	0.0031	0.0002	0.0086	0.0004	0.0083	0.0022	0.0009	0.0002
T5	0.0038	0.0004	-0.0119	-0.0005	-0.0091	-0.0004	0.0122	0.0001
T6	-0.0093	-0.0006	-0.0204	-0.0009	-0.0207	-0.0002	0.0017	0.0007
T7	-0.0053	-0.0005	-0.0039	-0.0002	0.0026	0.0001	-0.0156	-0.0002
T8	-0.0046	-0.0003	-0.0021	-0.0001	0.0148	0.0000	-0.0111	-0.0003
T9	-0.0035	-0.0002	-0.0205	-0.0009	0.0306	0.0006	0.0356	0.0010
T10	-0.0169	-0.0012	-0.0647	-0.0027	0.0036	0.0004	-0.0077	0.0000
T11	0.0000	0.0000	0.0086	0.0004	-0.0285	-0.0005	0.0042	0.0003
T12	0.0056	0.0004	-0.0561	-0.0023	0.0119	0.0005	-0.0293	-0.0012

Source: FTSE100QSignal(VolMedian).Xls

Day	The Median of the Ratio of NV/TV							
	BUY		SELL		BEO		SSO	
	ARt	BW1985 T-Value	ARt	BW1985 T-Value	ARt	BW1985 T-Value	ARt	BW1985 T-Value
T0	-0.0044	-0.0005	0.1034	0.0040	0.0094	0.0010	0.0132	0.0007
T1	-0.0045	-0.0004	0.0288	0.0011	-0.0323	0.0000	0.0258	0.0000
T2	-0.0050	-0.0004	0.0609	0.0024	-0.0092	-0.0002	0.0036	0.0002
T3	-0.0031	-0.0002	-0.0286	-0.0011	-0.0150	-0.0002	-0.0172	-0.0002
T4	-0.0070	-0.0005	0.0160	0.0006	0.0105	0.0004	0.0098	0.0003
T5	0.0026	0.0002	0.0628	0.0024	0.0012	0.0004	0.0050	0.0000
T6	-0.0135	-0.0008	-0.0734	-0.0028	-0.0137	-0.0001	-0.0091	-0.0005
T7	-0.0130	-0.0010	-0.0484	-0.0019	-0.0127	-0.0002	0.0283	0.0002
T8	0.0178	0.0014	-0.0389	-0.0015	0.0222	0.0004	-0.0139	-0.0003
T9	-0.0005	-0.0001	-0.0001	0.0000	0.0194	0.0006	-0.0065	-0.0025
T10	0.0045	0.0002	-0.0047	-0.0002	0.0189	0.0005	0.0116	0.0011
T11	0.0069	0.0005	-0.0085	-0.0003	-0.0109	-0.0003	-0.0273	-0.0001
T12	-0.0122	-0.0008	-0.0237	-0.0009	0.0038	0.0001	0.0094	0.0009

Source: FTSE100QSignal(NVTVMedian).Xls

Appendix (A5.8)
FTSE100 Abnormal Returns and T-test (at 5% Level of Significance)
According to BW1985 and BW1980 During Different Event Windows

Day	BUY (N=295)			SELL (N=95)			BEO (N=110)			SSO (N=62)		
	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value
T-30	0.0011	0.8558	0.3945	-0.0050	-1.4240	**-1.7786**	-0.0016	-0.1207	-0.5835	0.0054	1.5808	**1.9200**
T-29	-0.0009	-0.6891	-0.3362	-0.0065	**-1.9700**	**-2.2934**	0.0057	1.4986	**2.0174**	0.0001	0.1071	0.0263
T-28	-0.0013	-0.7055	-0.4653	0.0029	1.0632	1.0384	0.0063	**1.9098**	**2.2260**	0.0001	-0.1389	0.0360
T-27	-0.0056	**-3.8227**	**-2.0020**	0.0028	0.9311	0.9828	-0.0014	-1.1200	-0.4819	0.0050	1.2397	**1.7713**
T-26	-0.0003	-0.3968	-0.1212	0.0044	1.6522	1.5584	-0.0042	-1.4990	-1.5061	0.0103	**2.6866**	**3.6502**
T-25	-0.0044	**-2.8448**	-1.5629	0.0021	0.7180	0.7503	0.0005	0.7330	0.1828	0.0035	0.9893	1.2245
T-24	0.0015	0.8645	0.5413	0.0073	**2.3989**	**2.5946**	0.0002	0.4069	0.0703	-0.0015	-0.4907	-0.5176
T-23	-0.0002	0.0885	-0.0757	0.0045	**2.3208**	1.5868	-0.0025	-1.1236	-0.8756	0.0010	0.5140	0.3375
T-22	-0.0006	-0.2125	-0.2042	-0.0029	-0.6831	-1.0422	0.0022	0.6533	0.7734	0.0023	0.4507	0.8053
T-21	-0.0011	-1.0568	-0.4029	0.0047	**1.7088**	**1.6704**	-0.0038	**-1.7079**	-1.3375	0.0074	**1.9566**	**2.6104**
T-20	0.0025	1.2309	0.8935	-0.0027	-0.3514	-0.9444	-0.0015	-0.1536	-0.5358	0.0004	0.0821	0.1401
T-19	0.0028	**1.9111**	0.9906	-0.0060	-1.3641	**-2.1217**	0.0053	**1.8919**	**1.8665**	-0.0034	-1.4673	-1.1919
T-18	0.0012	0.8655	0.4386	0.0010	-0.1026	0.3460	-0.0016	-1.1641	-0.5522	0.0005	-0.3359	0.1882
T-17	-0.0030	**-1.9605**	-1.0665	-0.0010	-0.2101	-0.3542	-0.0038	**-2.1295**	-1.3388	-0.0024	-0.8594	-0.8362
T-16	-0.0012	-0.9192	-0.4112	0.0016	0.3105	0.5696	0.0009	0.6451	0.3224	0.0052	**1.9815**	**1.8468**
T-15	-0.0013	-1.2305	-0.4434	0.0027	1.2230	0.9645	0.0007	0.1230	0.2408	-0.0032	-0.5797	-1.1388
T-14	0.0010	0.7710	0.3546	0.0096	**3.0447**	**3.4169**	0.0003	0.0529	0.0961	0.0080	**2.2593**	**2.8237**
T-13	-0.0009	-0.8645	-0.3242	0.0003	-0.4275	0.0967	0.0037	1.4163	1.3053	0.0051	0.7296	**1.7925**
T-12	-0.0017	-1.5901	-0.5935	0.0030	0.1965	1.0806	0.0028	0.9706	0.9848	-0.0016	-0.2259	-0.5760
T-11	-0.0032	**-2.2044**	-1.1311	0.0008	0.1777	0.2997	-0.0004	-0.7159	-0.1528	0.0032	1.0176	1.1227
T-10	-0.0030	**-2.3458**	-1.0694	0.0037	0.6819	1.3162	-0.0025	-0.8399	-0.8846	0.0001	-0.0552	0.0423
T-9	-0.0006	-0.1681	-0.2060	0.0040	1.2348	1.4315	-0.0001	-0.4310	-0.0451	0.0005	-0.7100	0.1636
T-8	-0.0021	-1.4443	-0.7624	0.0029	1.3839	1.0433	0.0020	1.1930	0.7240	0.0011	-0.0183	0.3946
T-7	-0.0041	**-2.2016**	-1.4587	0.0103	**3.0518**	**3.6387**	0.0024	1.3410	0.8543	0.0091	**2.9487**	**3.2178**
T-6	-0.0005	-0.4387	-0.1873	-0.0015	-0.6746	-0.5230	-0.0008	-0.2572	-0.2689	0.0069	**1.9595**	**2.4485**
T-5	-0.0002	-0.2085	-0.0707	-0.0003	-0.3760	-0.0922	-0.0051	**-1.7106**	-1.8259	-0.0003	-0.4420	-0.0944
T-4	-0.0011	-0.7354	-0.3968	0.0031	1.5015	1.1142	-0.0020	-0.4193	-0.6973	0.0076	**2.7981**	**2.6790**
T-3	-0.0070	**-4.9095**	**-2.4975**	0.0067	1.5665	**2.3856**	0.0014	0.3565	0.4858	0.0005	0.2375	0.1819
T-2	-0.0020	-0.8171	-0.6985	0.0046	1.6589	1.6402	0.0015	0.4249	0.5445	0.0041	1.1405	1.4585
T-1	-0.0050	**-3.2912**	**-1.7666**	0.0006	0.4028	0.2120	0.0013	0.5620	0.4632	0.0134	**3.7155**	**4.7466**
T0	-0.0001	0.1611	-0.0381	0.0091	**2.4141**	**3.2098**	-0.0019	-0.2506	-0.6854	-0.0025	-0.8330	-0.8848
T1	0.0016	1.4623	0.5617	-0.0006	-0.4179	-0.2027	0.0039	**1.7159**	1.3862	0.0003	0.2842	0.1007
T2	0.0005	0.1767	0.1726	-0.0084	**-3.2754**	**-2.9895**	-0.0051	**-2.3820**	**-1.8227**	-0.0020	-0.5938	-0.7132
T3	0.0007	0.3604	0.2349	-0.0015	-0.6983	-0.5233	-0.0034	**-1.5713**	-1.2224	0.0045	1.0601	1.5889
T4	-0.0011	-0.5851	-0.3869	0.0019	0.5687	0.6816	0.0022	1.1535	0.7850	-0.0044	-1.1070	-1.5694
T5	0.0033	**2.2515**	1.1581	-0.0033	-0.9590	-1.1553	-0.0028	-0.1673	-0.9987	0.0017	0.4917	0.5891
T6	0.0035	**2.1577**	1.2408	-0.0043	-1.1586	-1.5278	-0.0061	**-2.2583**	**-2.1763**	0.0006	0.3225	0.2168
T7	0.0000	-0.1569	0.0121	-0.0001	0.2095	-0.0258	-0.0027	-0.7851	-0.9494	0.0008	0.4727	0.2848
T8	0.0046	**2.9689**	1.6240	0.0007	0.1602	0.2531	0.0061	**1.7659**	**2.1551**	0.0011	0.3782	0.3809
T9	-0.0014	-1.2491	-0.5104	0.0024	0.5285	0.8658	0.0014	0.4093	0.4997	0.0024	0.8918	0.8356
T10	0.0008	0.6795	0.2892	-0.0038	-1.4554	-1.3520	0.0023	1.1220	0.8211	-0.0027	-1.0477	-0.9700
T11	-0.0019	-1.1816	-0.6734	-0.0066	**-1.6828**	**-2.3525**	0.0046	**2.3750**	1.6167	0.0037	0.9161	1.3264
T12	-0.0002	0.0348	-0.0613	-0.0072	**-1.7788**	**-2.5517**	-0.0013	-0.3219	-0.4758	-0.0030	-0.9537	-1.0541
T13	0.0040	**2.9627**	1.4361	0.0004	-0.6337	0.1294	-0.0005	-0.0246	-0.1880	0.0029	1.2051	1.0369
T14	0.0020	1.1940	0.7173	-0.0011	-0.2825	-0.3840	-0.0053	**-1.7637**	**-1.8898**	-0.0066	**-1.9042**	**-2.3370**
T15	-0.0003	-0.0311	-0.1094	-0.0007	-0.4507	-0.2365	0.0006	0.0257	0.2238	0.0038	0.7386	1.3361
T16	0.0000	0.1483	0.0011	0.0022	0.7018	0.7692	0.0014	-0.0358	0.5101	-0.0044	-1.2456	-1.5694
T17	-0.0001	-0.3474	-0.0190	0.0005	-0.2574	0.1833	-0.0003	-0.2350	-0.1161	0.0019	0.9820	0.6658
T18	0.0001	0.0054	0.0220	-0.0036	-1.3248	-1.2939	-0.0037	-1.4845	-1.3176	-0.0046	-1.4412	-1.6455
T19	0.0069	**4.3620**	**2.4443**	-0.0013	-0.6109	-0.4542	0.0020	0.6593	0.7187	0.0019	0.2435	0.6772
T20	0.0005	0.2913	0.1796	-0.0019	-0.7884	-0.6832	-0.0002	-0.0478	-0.0602	-0.0037	-0.9419	-1.3086
T21	0.0026	**1.6722**	0.9287	-0.0034	-0.3340	-1.2185	-0.0010	-0.3602	-0.3377	-0.0067	-1.6344	**-2.3856**
T22	0.0015	1.0199	0.5460	-0.0036	-1.0770	-1.2638	0.0019	0.3559	0.6721	-0.0085	**-2.2830**	**-3.0148**
T23	-0.0017	-1.2377	-0.5862	-0.0011	-0.5849	-0.4037	0.0021	0.7701	0.7483	0.0038	1.3158	1.3550
T24	-0.0029	**-2.1966**	-1.0222	0.0013	0.2743	0.4459	-0.0021	-1.1484	-0.7336	-0.0045	-1.3440	-1.5860
T25	0.0007	0.0448	0.2389	-0.0022	-0.9469	-0.7907	0.0061	**2.6848**	**2.1514**	0.0058	1.1431	**2.0447**
T26	0.0029	**2.1949**	1.0187	-0.0061	-1.6073	**-2.1477**	-0.0029	-1.3104	-1.0186	0.0104	**3.5767**	**3.6942**
T27	0.0001	-0.2030	0.0224	0.0067	1.4117	**2.3812**	-0.0026	-0.3352	-0.9086	-0.0053	-1.5156	**-1.8668**
T28	0.0022	1.1875	0.7944	-0.0012	-0.6411	-0.4123	0.0021	0.9198	0.7401	-0.0033	-0.7683	-1.1525
T29	-0.0012	-1.0837	-0.4129	-0.0065	-1.2223	**-2.3152**	-0.0037	-1.0077	-1.3234	-0.0025	-0.5775	-0.8739
T30	0.0001	0.0762	0.0444	-0.0007	0.0222	-0.2328	-0.0013	-0.4351	-0.4542	0.0032	0.9299	1.1496

Continue Appendix (A5.8)

Day	BUY (N=295)			SELL (N=95)			BEO (N=110)			SSO (N=62)		
	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value	ARt	BW1985 T-Value	BW1980 T-Value
T31	0.0018	0.8515	0.6364	-0.0043	-1.3270	-1.5305	-0.0036	-0.7631	-1.2831	-0.0074	**-1.9994**	**-2.6321**
T32	-0.0002	-0.3887	-0.0867	-0.0009	-0.0740	-0.3176	-0.0042	-1.0468	-1.5043	-0.0024	-0.2546	-0.8345
T33	0.0034	**2.6889**	1.2005	0.0041	1.0523	1.4464	0.0020	0.6661	0.7125	-0.0006	-0.4648	-0.2122
T34	0.0012	0.1968	0.4172	-0.0051	-1.4450	**-1.8096**	0.0006	-0.1716	0.2303	0.0018	0.4698	0.6400
T35	-0.0024	**-1.7135**	-0.8366	-0.0066	**-1.9663**	**-2.3329**	0.0022	0.7078	0.7863	-0.0031	-1.0624	-1.1004
T36	-0.0013	-0.7734	-0.4509	0.0003	0.1516	0.1109	0.0058	1.6440	**2.0440**	0.0006	0.0118	0.2030
T37	0.0000	0.0277	-0.0094	0.0005	-0.7047	0.1898	-0.0011	0.0704	-0.3888	0.0024	0.7955	0.8648
T38	0.0006	0.1682	0.2222	0.0048	0.7363	**1.6976**	0.0003	-0.0172	0.1126	0.0121	**3.8972**	**4.3005**
T39	-0.0019	-1.2169	-0.6695	-0.0058	**-2.1595**	**-2.0488**	0.0026	1.4306	0.9116	0.0037	1.3022	1.3166
T40	0.0033	**2.2364**	1.1759	-0.0028	-1.2710	-0.9774	0.0009	0.2627	0.3361	0.0030	1.1379	1.0621
T41	0.0011	0.9731	0.3978	0.0039	0.7668	1.3920	-0.0051	**-2.3336**	**-1.7968**	0.0065	**1.8686**	**2.2924**
T42	-0.0041	**-2.9370**	-1.4409	-0.0077	**-2.7093**	**-2.7475**	-0.0034	-1.5325	-1.2184	-0.0010	-0.0897	-0.3649
T43	-0.0006	-0.3125	-0.1981	-0.0022	-1.0602	-0.7817	-0.0039	-1.1943	-1.3703	0.0003	0.3750	0.1127
T44	-0.0001	-0.0766	-0.0264	-0.0032	-1.2143	-1.1298	-0.0005	-0.0077	-0.1854	-0.0004	0.5181	-0.1253
T45	-0.0002	0.0388	-0.0733	0.0016	-0.1597	0.5568	0.0037	1.3666	1.3182	-0.0056	-1.5220	**-2.0007**
T46	-0.0010	-0.5101	-0.3474	0.0043	0.8817	1.5131	0.0042	1.4942	1.4877	0.0067	1.6240	**2.3610**
T47	0.0014	1.1526	0.4926	0.0001	0.1916	0.0272	-0.0012	-0.7070	-0.4278	-0.0056	**-2.0572**	**-1.9732**
T48	-0.0017	**-1.6787**	-0.6067	-0.0023	-0.6212	-0.7994	-0.0027	-1.2222	-0.9718	-0.0015	-0.0550	-0.5394
T49	0.0047	3.2539	**1.6638**	-0.0040	-1.3048	-1.4094	0.0002	-0.2615	0.0566	0.0004	0.4987	0.1287
T50	0.0003	0.5439	0.1209	-0.0057	-2.1039	**-2.0333**	0.0044	1.4530	1.5577	0.0050	1.3703	**1.7730**
T51	-0.0030	**-1.7195**	-1.0608	-0.0005	-0.0604	-0.1841	-0.0036	-1.3194	-1.2916	-0.0090	**-2.7859**	**-3.1949**
T52	-0.0032	**-2.3415**	-1.1307	-0.0015	-1.2311	-0.5481	0.0027	0.9267	0.9519	-0.0021	-0.7250	-0.7481
T53	0.0012	0.4742	0.4316	-0.0049	-1.0441	**-1.7387**	0.0016	0.4734	0.5511	-0.0054	**-1.6942**	**-1.9269**
T54	-0.0008	-0.5130	-0.2908	-0.0078	-2.4480	**-2.7648**	-0.0021	-0.5982	-0.7466	-0.0023	-0.7980	-0.8087
T55	-0.0008	-0.8732	-0.2773	0.0017	1.0637	0.6093	0.0013	0.1233	0.4610	0.0017	0.5183	0.6177
T56	-0.0003	0.1265	-0.0890	-0.0020	-0.4865	-0.7005	-0.0016	-0.3945	-0.5791	0.0023	0.4659	0.8185
T57	0.0035	**2.3315**	1.2474	-0.0008	0.0488	-0.2663	-0.0041	-1.4932	-1.4458	-0.0038	-1.3338	-1.3435
T58	0.0044	3.0397	1.5758	-0.0029	-1.0003	-1.0408	-0.0025	-0.4376	-0.8921	-0.0012	-0.3111	**-0.4335**
T59	0.0023	**1.7121**	0.8225	-0.0006	0.2188	-0.1984	-0.0052	**-1.8722**	**-1.8293**	-0.0013	-0.6604	**-0.4518**
T60	-0.0002	-0.2097	-0.0846	0.0029	1.1680	1.0223	**0.0004**	-0.2781	0.1523	-0.0052	**-1.9038**	**-1.8583**

Note: **Bold** numbers are significant at 5% level of significance or less.
Source: FTSE100Ttest(1985).Xls
FTSE100Ttest(1980).Xls

Appendix (A5.9)

Summary Tables of AR of Different Signal Definition in terms of the Sign and the Significance, During the Event Window (T0 to T12) for Each Portfolio

AR-BUY	SS	MS	QS1	QS2	QS3	QS4	AR-SELL	SS	MS	QS1	QS2	QS3	QS4
t0							t0	+				+	
t1				+			t1		-	-		++	- -
t2							t2	-	- -				
t3							t3						
t4							t4						
t5	++			++			t5			- -			
t6	++	++					t6						
t7	+						t7						
t8		+			++	+	t8				- -		
t9				- -			t9						
t10							t10			- -			
t11							t11	- -		- -	- -		- -
t12				- -		++	t12	- -					

+' ('++') : Indicates that **AR** at this particular day is **Positively Significant** at 1% (5%) level

-' ('--') : Indicates that the **AR** at this particular day is **Negatively Significant** at 1% (5%) level

AR-BEO	SS	MS	QS1	QS2	QS3	QS4	AR-SSO	SS	MS	QS1	QS2	QS3	QS4
t0							t0				- -	+	
t1	++				++		t1					++	- -
t2	-		- -	-	- -		t2			-			
t3	- -	- -					t3						
t4		++	++				t4						
t5			++				t5			- -			
t6	- -					-	t6						
t7			++			++	t7						
t8	++	+					t8				- -		
t9							t9						
t10						++	t10			- -			
t11	+	+	+				t11			- -	++		++
t12							t12						

+' ('++') : Indicates that **AR** at this particular day is **Positively Significant** at 1% (5%) level

-' ('--') : Indicates that the **AR** at this particular day is **Negatively Significant** at 1% (5%) level

Ch5(A5.9).Xls

Continue Appendix (A5.9)

Summary of Abnormal Returns (AR) of Different Signal Definitions

During the Event Window (T0 to T12)

#ARofH0	SS	MS	QS1	QS2	QS3	QS4
Buy	5	5	4	5	3	5
Sell	4	4	5	6	7	2
BEO	7	5	4	7	7	6
SSO	8	5	3	7	7	8

Each **Number** Represents the No. of **AR** That are Consistent With **H0**

For Example: BuySS (1) Indicates that there is 1 Negative or Zero AR

T0	SS	MS	QS1	QS2	QS3	QS4
Buy	-	-	-	+	+	-
Sell	+	+	+	+	+	+
BEO	-	+	+	-	+	-
SSO	-	-	-	-	+	-

Each **Sign** Represents the Sign of **AR** at **T0**

T6	SS	MS	QS1	QS2	QS3	QS4
Buy	+	+	+	+	+	+
Sell	-	-	-	-	+	-
BEO	-	-	-	-	-	-
SSO	+	+	-	+	-	-

Each **Sign** Represents the Sign of the **AR** at **T6**

T12	SS	MS	QS1	QS2	QS3	QS4
Buy	-	+	+	-	-	+
Sell	-	-	-	-	-	-
BEO	-	+	-	-	-	+
SSO	-	+	-	-	+	-

Each **Sign** Represents the Sign of the **AR** at **T12** Ch5(A5.[illegible]) XIs

Appendix (A5.10)
FTSE100 Cumulative Abnormal Returns and T-test (at 5% Level of Significance) According to DW1983 During Different Event Windows
(a) BUY Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to [illegible]	T-Value	T6 to T12	T-Value
T-30	0.0011	0.0818										
T-29	0.0002	0.0121										
T-28	-0.0011	-0.0844										
T-27	-0.0068	-0.4993										
T-26	-0.0071	-0.5244										
T-25	-0.0115	-0.8483										
T-24	-0.0100	-0.7361										
T-23	-0.0102	-0.7518										
T-22	-0.0108	-0.7941										
T-21	-0.0119	-0.8776										
T-20	-0.0094	-0.6924										
T-19	-0.0066	-0.4871										
T-18	-0.0054	-0.3962										
T-17	-0.0084	-0.6173										
T-16	-0.0096	-0.7025										
T-15	-0.0108	-0.7944										
T-14	-0.0098	-0.7209										
T-13	-0.0107	-0.7881										
T-12	-0.0124	-0.9111										
T-11	-0.0156	-1.1455										
T-10	-0.0186	-1.3671										
T-9	-0.0192	-1.4098										
T-8	-0.0213	-1.5678										
T-7	-0.0254	**-1.8701**										
T-6	-0.0260	**-1.9089**	-0.0005	-0.0849								
T-5	-0.0262	**-1.9236**	-0.0007	-0.1170								
T-4	-0.0273	**-2.0058**	-0.0018	-0.2970								
T-3	-0.0343	**-2.5234**	-0.0089	-1.4297								
T-2	-0.0363	**-2.6681**	-0.0109	**-1.7465**								
T-1	-0.0413	**-3.0342**	-0.0158	**-2.5477**								
T0	-0.0414	**-3.0421**	-0.0159	**-2.5650**	-0.0001	-0.0096	-0.0001	-0.0209				
T1	-0.0398	**-2.9257**	-0.0144	**-2.3102**	0.0015	0.1325	0.0015	0.2871				
T2	-0.0393	**-2.8899**	-0.0139	**-2.2319**	0.0020	0.1762	0.0020	0.3818				
T3	-0.0387	**-2.8413**	-0.0132	**-2.1254**	0.0026	0.2357	0.0026	0.5105				
T4	-0.0398	**-2.9215**	-0.0143	**-2.3009**	0.0015	0.1377	0.0015	0.2984				
T5	-0.0365	**-2.6815**	-0.0110	**-1.7757**	0.0048	0.4309	0.0048	0.9334				
T6	-0.0330	**-2.4243**	-0.0075	-1.2129	0.0083	0.7449	0.0083	1.6137	0.0035	0.3308	0.0035	1.0014
T7	-0.0330	**-2.4218**	-0.0075	-1.2074	0.0083	0.7480	0.0083	1.6203	0.0035	0.3340	0.0035	1.0112
T8	-0.0284	**-2.0853**	-0.0029	-0.4709	0.0129	1.1591	0.0129	**2.5108**	0.0081	0.7669	0.0081	**2.3219**
T9	-0.0298	**-2.1910**	-0.0044	-0.7024	0.0115	1.0299	0.0115	**2.2309**	0.0067	0.6308	0.0067	**1.9100**
T10	-0.0290	**-2.1311**	-0.0036	-0.5712	0.0123	1.1031	0.0123	**2.3895**	0.0075	0.7079	0.0075	**2.1434**
T11	-0.0309	**-2.2706**	-0.0055	-0.8766	0.0104	0.9326	0.0104	**2.0203**	0.0056	0.5284	0.0056	**1.5999**
T12	-0.0311	**-2.2834**	-0.0056	-0.9044	0.0102	0.9171	0.0102	**1.9867**	0.0054	0.5121	0.0054	1.5504
T13	-0.0270	**-1.9857**			0.0143	1.2806			0.0095	0.8949		
T14	-0.0250	**-1.8371**			0.0163	1.4622			0.0115	1.0861		
T15	-0.0253	**-1.8598**			0.0160	1.4345			0.0112	1.0570		
T16	-0.0253	**-1.8595**			0.0160	1.4348			0.0112	1.0572		
T17	-0.0254	**-1.8635**			0.0159	1.4300			0.0111	1.0522		
T18	-0.0253	**-1.8589**			0.0160	1.4355			0.0112	1.0580		
T19	-0.0184	-1.3524			0.0229	**2.0542**			0.0181	**1.7096**		
T20	-0.0179	-1.3151			0.0234	**2.0997**			0.0186	**1.7575**		
T21	-0.0153	-1.1227			0.0260	**2.3348**			0.0212	**2.0051**		
T22	-0.0137	-1.0095			0.0276	**2.4730**			0.0228	**2.1506**		
T23	-0.0154	-1.1310			0.0259	**2.3246**			0.0211	**1.9944**		
T24	-0.0183	-1.3428			0.0230	**2.0659**			0.0182	**1.7219**		
T25	-0.0176	-1.2933			0.0237	**2.1264**			0.0189	**1.7856**		
T26	-0.0147	-1.0822			0.0266	**2.3842**			0.0218	**2.0571**		
T27	-0.0147	-1.0775			0.0266	**2.3899**			0.0218	**2.0631**		
T28	-0.0124	-0.9129			0.0289	**2.5910**			0.0241	**2.2749**		
T29	-0.0136	-0.9985			0.0277	**2.4865**			0.0229	**2.1648**		
T30	-0.0135	-0.9893			0.0278	**2.4977**			0.0230	**2.1766**		

Continue (a) BUY Portfolio												
Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T31	-0.0117	-0.8574			0.0296	**2.6588**			0.0248	**2.3463**		
T32	-0.0119	-0.8754			0.0294	**2.6368**			0.0246	**2.3232**		
T33	-0.0085	-0.6266			0.0328	**2.9407**			0.0280	**2.6432**		
T34	-0.0073	-0.5401			0.0339	**3.0463**			0.0291	**2.7544**		
T35	-0.0097	-0.7135			0.0316	**2.8345**			0.0268	**2.5314**		
T36	-0.0110	-0.8069			0.0303	**2.7204**			0.0255	**2.4112**		
T37	-0.0110	-0.8089			0.0303	**2.7180**			0.0255	**2.4087**		
T38	-0.0104	-0.7628			0.0309	**2.7743**			0.0261	**2.4679**		
T39	-0.0123	-0.9016			0.0290	**2.6048**			0.0242	**2.2894**		
T40	-0.0090	-0.6579			0.0323	**2.9024**			0.0275	**2.6029**		
T41	-0.0078	-0.5755			0.0335	**3.0031**			0.0287	**2.7089**		
T42	-0.0119	-0.8741			0.0294	**2.6384**			0.0246	**2.3248**		
T43	-0.0125	-0.9151			0.0288	**2.5883**			0.0240	**2.2720**		
T44	-0.0125	-0.9206			0.0288	**2.5816**			0.0240	**2.2650**		
T45	-0.0127	-0.9358			0.0286	**2.5630**			0.0238	**2.2454**		
T46	-0.0137	-1.0078			0.0276	**2.4751**			0.0228	**2.1528**		
T47	-0.0123	-0.9057			0.0290	**2.5998**			0.0242	**2.2842**		
T48	-0.0140	-1.0314			0.0273	**2.4462**			0.0225	**2.1224**		
T49	-0.0093	-0.6866			0.0319	**2.8674**			0.0271	**2.5659**		
T50	-0.0090	-0.6616			0.0323	**2.8979**			0.0275	**2.5982**		
T51	-0.0120	-0.8814			0.0293	**2.6294**			0.0245	**2.3154**		
T52	-0.0152	-1.1157			0.0261	**2.3432**			0.0213	**2.0140**		
T53	-0.0140	-1.0263			0.0273	**2.4525**			0.0225	**2.1290**		
T54	-0.0148	-1.0866			0.0265	**2.3789**			0.0217	**2.0515**		
T55	-0.0156	-1.1440			0.0257	**2.3087**			0.0209	**1.9776**		
T56	-0.0158	-1.1625			0.0255	**2.2862**			0.0207	**1.9539**		
T57	-0.0123	-0.9040			0.0290	**2.6019**			0.0242	**2.2864**		
T58	-0.0079	-0.5774			0.0334	**3.0008**			0.0286	**2.7064**		
T59	-0.0055	-0.4069			0.0358	**3.2090**			0.0310	**2.9257**		
T60	-0.0058	-0.4245			0.0355	**3.1876**			0.0307	**2.9032**		

Note: **Bold** numbers are significant at 5% level of significance or less.

Source: FTSE100CARbyDeay.Xls
FTSE100Ttest(DW1983).Xls

Continue (A5.10) (b) SELL Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T-30	-0.0050	-0.2092										
T-29	-0.0115	-0.4789										
T-28	-0.0086	-0.3568										
T-27	-0.0058	-0.2412										
T-26	-0.0014	-0.0579										
T-25	0.0007	0.0303										
T-24	0.0080	0.3355										
T-23	0.0125	0.5221										
T-22	0.0096	0.3995										
T-21	0.0143	0.5960										
T-20	0.0116	0.4849										
T-19	0.0056	0.2354										
T-18	0.0066	0.2761										
T-17	0.0056	0.2344										
T-16	0.0072	0.3014										
T-15	0.0099	0.4148										
T-14	0.0196	0.8167										
T-13	0.0199	0.8281										
T-12	0.0229	0.9551										
T-11	0.0237	0.9904										
T-10	0.0275	1.1452										
T-9	0.0315	1.3135										
T-8	0.0344	1.4362										
T-7	0.0447	**1.8642**										
T-6	0.0432	**1.8027**	-0.0015	-0.1346								
T-5	0.0430	**1.7918**	-0.0017	-0.1583								
T-4	0.0461	**1.9228**	0.0014	0.1284								
T-3	0.0528	**2.2034**	0.0081	0.7424								
T-2	0.0575	**2.3963**	0.0128	1.1646								
T-1	0.0581	**2.4212**	0.0134	1.2191								
T0	0.0671	**2.7987**	0.0224	**2.0453**	0.0091	0.4611	0.0091	0.9987				
T1	0.0665	**2.7749**	0.0218	**1.9931**	0.0085	0.4319	0.0085	0.9357				
T2	0.0581	**2.4233**	0.0134	1.2237	0.0000	0.0025	0.0000	0.0055				
T3	0.0566	**2.3617**	0.0119	1.0890	-0.0014	-0.0727	-0.0014	-0.1574				
T4	0.0586	**2.4419**	0.0139	1.2644	0.0005	0.0253	0.0005	0.0547				
T5	0.0553	**2.3060**	0.0106	0.9671	-0.0028	-0.1407	-0.0028	-0.3048				
T6	0.0510	**2.1264**	0.0063	0.5738	-0.0071	-0.3601	-0.0071	-0.7801	-0.0043	-0.2311	-0.0043	-0.6997
T7	0.0509	**2.1233**	0.0062	0.5672	-0.0071	-0.3638	-0.0071	-0.7882	-0.0044	-0.2350	-0.0044	-0.7115
T8	0.0516	**2.1531**	0.0069	0.6323	-0.0064	-0.3275	-0.0064	-0.7094	-0.0037	-0.1967	-0.0037	-0.5956
T9	0.0541	**2.2549**	0.0094	0.8552	-0.0040	-0.2031	-0.0040	-0.4400	-0.0012	-0.0658	-0.0012	-0.1991
T10	0.0503	**2.0959**	0.0056	0.5072	-0.0078	-0.3973	-0.0078	-0.8607	-0.0050	-0.2703	-0.0050	-0.8183
T11	0.0436	**1.8192**	-0.0011	-0.0983	-0.0144	-0.7353	-0.0144	-1.5927	-0.0117	-0.6262	-0.0117	**-1.8958**
T12	0.0364	1.5192	-0.0083	-0.7550	-0.0216	-1.1018	-0.0216	**-2.3867**	-0.0189	-1.0122	-0.0189	**-3.0645**
T13	0.0368	1.5344			-0.0213	-1.0832			-0.0185	-0.9926		
T14	0.0357	1.4892			-0.0223	-1.1384			-0.0196	-1.0507		
T15	0.0350	1.4614			-0.0230	-1.1723			-0.0203	-1.0865		
T16	0.0372	1.5519			-0.0208	-1.0619			-0.0181	-0.9701		
T17	0.0377	1.5734			-0.0203	-1.0355			-0.0176	-0.9424		
T18	0.0341	1.4212			-0.0240	-1.2214			-0.0212	-1.1381		
T19	0.0328	1.3678			-0.0253	-1.2866			-0.0225	-1.2068		
T20	0.0309	1.2875			-0.0272	-1.3848			-0.0244	-1.3102		
T21	0.0274	1.1442			-0.0306	-1.5598			-0.0279	-1.4945		
T22	0.0239	0.9956			-0.0342	**-1.7413**			-0.0314	**-1.6857**		
T23	0.0227	0.9481			-0.0353	**-1.7993**			-0.0326	**-1.7467**		
T24	0.0240	1.0005			-0.0341	**-1.7352**			-0.0313	**-1.6793**		
T25	0.0218	0.9075			-0.0363	**-1.8488**			-0.0335	**-1.7989**		
T26	0.0157	0.6550			-0.0424	**-2.1573**			-0.0396	**-2.1238**		
T27	0.0224	0.9350			-0.0356	**-1.8153**			-0.0329	**-1.7636**		
T28	0.0213	0.8865			-0.0368	**-1.8745**			-0.0340	**-1.8259**		
T29	0.0147	0.6142			-0.0433	**-2.2071**			-0.0406	**-2.1762**		
T30	0.0141	0.5869			-0.0440	**-2.2405**			-0.0412	**-2.2114**		

Continue (b) SELL Portfolio												
Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T31	0.0098	0.4069			-0.0483	**-2.4603**			-0.0455	**-2.4429**		
T32	0.0089	0.3695			-0.0492	**-2.5060**			-0.0464	**-2.4909**		
T33	0.0129	0.5396			-0.0451	**-2.2982**			-0.0424	**-2.2721**		
T34	0.0078	0.3268			-0.0502	**-2.5581**			-0.0475	**-2.5459**		
T35	0.0013	0.0524			-0.0568	**-2.8932**			-0.0540	**-2.8988**		
T36	0.0016	0.0655			-0.0565	**-2.8773**			-0.0537	**-2.8820**		
T37	0.0021	0.0878			-0.0560	**-2.8501**			-0.0532	**-2.8533**		
T38	0.0069	0.2874			-0.0512	**-2.6062**			-0.0484	**-2.5965**		
T39	0.0011	0.0465			-0.0569	**-2.9005**			-0.0542	**-2.9065**		
T40	-0.0016	-0.0685			-0.0597	**-3.0409**			-0.0569	**-3.0543**		
T41	0.0023	0.0952			-0.0558	**-2.8410**			-0.0530	**-2.8437**		
T42	-0.0055	-0.2279			-0.0635	**-3.2356**			-0.0608	**-3.2594**		
T43	-0.0077	-0.3198			-0.0657	**-3.3479**			-0.0630	**-3.3776**		
T44	-0.0109	-0.4527			-0.0689	**-3.5102**			-0.0662	**-3.5485**		
T45	-0.0093	-0.3872			-0.0673	**-3.4302**			-0.0646	**-3.4643**		
T46	-0.0050	-0.2092			-0.0631	**-3.2128**			-0.0603	**-3.2354**		
T47	-0.0049	-0.2060			-0.0630	**-3.2089**			-0.0602	**-3.2313**		
T48	-0.0072	-0.3001			-0.0653	**-3.3238**			-0.0625	**-3.3522**		
T49	-0.0112	-0.4658			-0.0692	**-3.5262**			-0.0665	**-3.5654**		
T50	-0.0169	-0.7049			-0.0750	**-3.8183**			-0.0722	**-3.8730**		
T51	-0.0174	-0.7266			-0.0755	**-3.8447**			-0.0727	**-3.9008**		
T52	-0.0190	-0.7911			-0.0770	**-3.9235**			-0.0743	**-3.9838**		
T53	-0.0239	-0.9955			-0.0819	**-4.1732**			-0.0792	**-4.2468**		
T54	-0.0317	-1.3207			-0.0897	**-4.5704**			-0.0870	**-4.6650**		
T55	-0.0300	-1.2490			-0.0880	**-4.4828**			-0.0852	**-4.5729**		
T56	-0.0319	-1.3314			-0.0900	**-4.5835**			-0.0872	**-4.6788**		
T57	-0.0327	-1.3627			-0.0907	**-4.6217**			-0.0880	**-4.7191**		
T58	-0.0356	-1.4852			-0.0937	**-4.7712**			-0.0909	**-4.8766**		
T59	-0.0362	-1.5085			-0.0942	**-4.7997**			-0.0915	**-4.9066**		
T60	-0.0333	-1.3883			-0.0913	**-4.6529**			-0.0886	**-4.7519**		

Note: **Bold** numbers are significant at 5% level of significance or less.

Source: FTSE100CARbyDeay.Xls

FTSE100Ttest(DW1983).Xls

Continue (A5.10) (c) BEO Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T-30	-0.0016	-0.0738										
T-29	0.0040	0.1815										
T-28	0.0103	0.4632										
T-27	0.0090	0.4022										
T-26	0.0047	0.2116										
T-25	0.0052	0.2347										
T-24	0.0054	0.2436										
T-23	0.0030	0.1328										
T-22	0.0051	0.2307										
T-21	0.0014	0.0614										
T-20	-0.0001	-0.0064										
T-19	0.0051	0.2298										
T-18	0.0036	0.1599										
T-17	-0.0002	-0.0095										
T-16	0.0007	0.0313										
T-15	0.0014	0.0618										
T-14	0.0016	0.0739										
T-13	0.0053	0.2391										
T-12	0.0081	0.3637										
T-11	0.0077	0.3444										
T-10	0.0052	0.2325										
T-9	0.0051	0.2267										
T-8	0.0071	0.3184										
T-7	0.0095	0.4265										
T-6	0.0087	0.3925	-0.0008	-0.0745								
T-5	0.0036	0.1614	-0.0059	-0.5802								
T-4	0.0016	0.0731	-0.0079	-0.7733								
T-3	0.0030	0.1346	-0.0065	-0.6387								
T-2	0.0045	0.2035	-0.0050	-0.4879								
T-1	0.0058	0.2622	-0.0037	-0.3596								
T0	0.0039	0.1754	-0.0056	-0.5494	-0.0019	**-0.1059**	-0.0019	-0.2295				
T1	0.0078	0.3508	-0.0017	-0.1655	0.0020	0.1083	0.0020	0.2347				
T2	0.0027	0.1202	-0.0068	-0.6703	-0.0032	-0.1734	-0.0032	-0.3756				
T3	-0.0008	-0.0345	-0.0103	-1.0089	-0.0066	-0.3623	-0.0066	-0.7849				
T4	0.0014	0.0648	-0.0081	-0.7915	-0.0044	-0.2410	-0.0044	-0.5221				
T5	-0.0014	-0.0616	-0.0109	-1.0681	-0.0072	-0.3954	-0.0072	-0.8565				
T6	-0.0075	-0.3370	-0.0170	**-1.6708**	-0.0134	-0.7318	-0.0134	-1.5851	-0.0061	**-0.3543**	**-0.0061**	-1.0726
T7	-0.0102	-0.4571	-0.0197	**-1.9337**	-0.0160	-0.8785	-0.0160	**-1.9030**	-0.0088	**-0.5088**	**-0.0088**	-1.5405
T8	-0.0041	-0.1844	-0.0136	-1.3369	-0.0100	-0.5454	-0.0100	-1.1815	-0.0027	-0.1580	-0.0027	-0.4784
T9	-0.0027	-0.1212	-0.0122	-1.1985	-0.0085	-0.4682	-0.0085	-1.0142	-0.0013	-0.0767	-0.0013	-0.2321
T10	-0.0004	-0.0173	-0.0099	-0.9711	-0.0062	-0.3413	-0.0062	-0.7393	0.0010	0.0570	0.0010	0.1725
T11	0.0042	0.1873	-0.0053	-0.5234	-0.0017	-0.0914	-0.0017	-0.1980	0.0055	0.3202	0.0055	0.9693
T12	0.0028	0.1271	-0.0067	-0.6551	-0.0030	-0.1649	-0.0030	-0.3573	0.0042	0.2427	0.0042	0.7348
T13	0.0023	0.1033			-0.0035	-0.1940			0.0037	0.2121		
T14	-0.0030	-0.1358			-0.0089	-0.4861			-0.0017	-0.0955		
T15	-0.0024	-0.1075			-0.0082	-0.4515			-0.0010	-0.0591		
T16	-0.0010	-0.0430			-0.0068	-0.3727			0.0004	0.0239		
T17	-0.0013	-0.0577			-0.0071	-0.3906			0.0001	0.0050		
T18	-0.0050	-0.2244			-0.0108	-0.5943			-0.0036	-0.2094		
T19	-0.0030	-0.1334			-0.0088	-0.4832			-0.0016	-0.0925		
T20	-0.0031	-0.1411			-0.0090	-0.4925			-0.0018	-0.1023		
T21	-0.0041	-0.1838			-0.0099	-0.5447			-0.0027	-0.1572		
T22	-0.0022	-0.0987			-0.0080	-0.4408			-0.0008	-0.0478		
T23	-0.0001	-0.0040			-0.0059	-0.3251			0.0013	0.0740		
T24	-0.0022	-0.0969			-0.0080	-0.4385			-0.0008	-0.0454		
T25	0.0039	0.1754			-0.0019	-0.1060			0.0053	0.3048		
T26	0.0010	0.0465			-0.0048	-0.2634			0.0024	0.1390		
T27	-0.0015	-0.0685			-0.0074	-0.4039			-0.0002	-0.0090		
T28	0.0006	0.0251			-0.0053	-0.2895			0.0019	0.1115		
T29	-0.0032	-0.1423			-0.0090	-0.4940			-0.0018	-0.1039		
T30	-0.0045	-0.1998			-0.0103	-0.5642			-0.0031	-0.1778		

Continue (c) BEO Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T31	-0.0081	-0.3622			-0.0139	-0.7626			-0.0067	-0.3867		
T32	-0.0123	-0.5526			-0.0182	-0.9951			-0.0109	-0.6316		
T33	-0.0103	-0.4624			-0.0161	-0.8850			-0.0089	-0.5156		
T34	-0.0097	-0.4332			-0.0155	-0.8494			-0.0083	-0.4781		
T35	-0.0074	-0.3337			-0.0133	-0.7278			-0.0061	-0.3501		
T36	-0.0017	-0.0751			-0.0075	-0.4119			-0.0003	-0.0174		
T37	-0.0028	-0.1243			-0.0086	-0.4720			-0.0014	-0.0807		
T38	-0.0025	-0.1100			-0.0083	-0.4546			-0.0011	-0.0623		
T39	0.0001	0.0053			-0.0057	-0.3137			0.0015	0.0861		
T40	0.0011	0.0479			-0.0048	-0.2617			0.0024	0.1408		
T41	-0.0040	-0.1795			-0.0098	-0.5395			-0.0026	-0.1517		
T42	-0.0074	-0.3337			-0.0133	-0.7278			-0.0061	-0.3500		
T43	-0.0113	-0.5071			-0.0171	-0.9396			-0.0099	-0.5731		
T44	-0.0118	-0.5306			-0.0177	-0.9682			-0.0105	-0.6033		
T45	-0.0081	-0.3638			-0.0139	-0.7645			-0.0067	-0.3887		
T46	-0.0039	-0.1755			-0.0098	-0.5345			-0.0025	-0.1465		
T47	-0.0051	-0.2296			-0.0110	-0.6007			-0.0037	-0.2162		
T48	-0.0079	-0.3526			-0.0137	-0.7509			-0.0065	-0.3744		
T49	-0.0077	-0.3454			-0.0135	-0.7421			-0.0063	-0.3651		
T50	-0.0033	-0.1483			-0.0091	-0.5013			-0.0019	-0.1116		
T51	-0.0069	-0.3118			-0.0128	-0.7010			-0.0056	-0.3218		
T52	-0.0043	-0.1913			-0.0101	-0.5538			-0.0029	-0.1669		
T53	-0.0027	-0.1215			-0.0086	-0.4687			-0.0013	-0.0772		
T54	-0.0048	-0.2160			-0.0107	-0.5841			-0.0034	-0.1987		
T55	-0.0035	-0.1577			-0.0094	-0.5128			-0.0021	-0.1237		
T56	-0.0051	-0.2310			-0.0110	-0.6023			-0.0038	-0.2179		
T57	-0.0092	-0.4139			-0.0151	-0.8258			-0.0079	-0.4533		
T58	-0.0117	-0.5268			-0.0176	-0.9637			-0.0104	-0.5985		
T59	-0.0169	-0.7583			-0.0227	-1.2464			-0.0155	-0.8962		
T60	-0.0165	-0.7391			-0.0223	-1.2229			-0.0151	-0.8715		

Note: **Bold** numbers are significant at 5% level of significance or less.

Source: FTSE100CARbyDeay.Xls

FTSE100Ttest(DW1983).Xls

Continue (A5.10) (d) SSO Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T-30	0.0054	0.1824										
T-29	0.0055	0.1849										
T-28	0.0056	0.1883										
T-27	0.0106	0.3566										
T-26	0.0209	0.7034										
T-25	0.0243	0.8198										
T-24	0.0229	0.7706										
T-23	0.0238	0.8027										
T-22	0.0261	0.8792										
T-21	0.0335	1.1272										
T-20	0.0339	1.1405										
T-19	0.0305	1.0272										
T-18	0.0310	1.0451										
T-17	0.0287	0.9657										
T-16	0.0339	1.1411										
T-15	0.0307	1.0329										
T-14	0.0386	1.3012										
T-13	0.0437	1.4715										
T-12	0.0421	1.4168										
T-11	0.0452	1.5235										
T-10	0.0453	1.5275										
T-9	0.0458	1.5430										
T-8	0.0469	1.5805										
T-7	0.0560	**1.8862**										
T-6	0.0629	**2.1189**	0.0069	0.5091								
T-5	0.0626	**2.1099**	0.0066	0.4895								
T-4	0.0702	**2.3644**	0.0142	1.0465								
T-3	0.0707	**2.3817**	0.0147	1.0843								
T-2	0.0748	**2.5203**	0.0188	1.3876								
T-1	0.0882	**2.9712**	0.0322	**2.3745**								
T0	0.0857	**2.8872**	0.0297	**2.1905**	-0.0025	-0.1027	-0.0025	-0.2224				
T1	0.0860	**2.8967**	0.0300	**2.2115**	-0.0022	-0.0910	-0.0022	-0.1971				
T2	0.0840	**2.8290**	0.0280	**2.0632**	-0.0042	-0.1738	-0.0042	-0.3764				
T3	0.0885	**2.9799**	0.0325	**2.3935**	0.0003	0.0106	0.0003	0.0230				
T4	0.0840	**2.8308**	0.0280	**2.0672**	-0.0042	-0.1715	-0.0042	-0.3715				
T5	0.0857	**2.8868**	0.0297	**2.1897**	-0.0025	-0.1031	-0.0025	-0.2234				
T6	0.0863	**2.9074**	0.0303	**2.2348**	-0.0019	-0.0780	-0.0019	-0.1689	0.0006	0.0265	0.0006	0.0802
T7	0.0871	**2.9345**	0.0311	**2.2940**	-0.0011	-0.0449	-0.0011	-0.0973	0.0014	0.0613	0.0014	0.1856
T8	0.0882	**2.9706**	0.0322	**2.3732**	0.0000	-0.0007	0.0000	-0.0016	0.0025	0.1079	0.0025	0.3265
T9	0.0905	**3.0500**	0.0345	**2.5469**	0.0023	0.0962	0.0023	0.2085	0.0048	0.2100	0.0048	0.6357
T10	0.0878	**2.9579**	0.0318	**2.3453**	-0.0004	-0.0163	-0.0004	-0.0354	0.0021	0.0914	0.0021	0.2768
T11	0.0915	**3.0839**	0.0355	**2.6210**	0.0033	0.1376	0.0033	0.2980	0.0059	0.2535	0.0059	0.7676
T12	0.0886	**2.9837**	0.0326	**2.4019**	0.0004	0.0153	0.0004	0.0331	0.0029	0.1247	0.0029	0.3775
T13	0.0915	**3.0823**			0.0033	0.1356			0.0058	0.2514		
T14	0.0849	**2.8602**			-0.0033	-0.1356			-0.0008	-0.0342		
T15	0.0887	**2.9872**			0.0005	0.0194			0.0030	0.1291		
T16	0.0842	**2.8381**			-0.0040	-0.1627			-0.0014	-0.0627		
T17	0.0861	**2.9013**			-0.0021	-0.0854			0.0004	0.0187		
T18	0.0815	**2.7450**			-0.0067	-0.2764			-0.0042	-0.1824		
T19	0.0834	**2.8093**			-0.0048	-0.1978			-0.0023	-0.0997		
T20	0.0797	**2.6850**			-0.0085	-0.3496			-0.0060	-0.2596		
T21	0.0730	**2.4583**			-0.0152	-0.6265			-0.0127	-0.5511		
T22	0.0645	**2.1719**			-0.0237	-0.9763			-0.0212	-0.9196		
T23	0.0683	**2.3006**			-0.0199	-0.8191			-0.0174	-0.7540		
T24	0.0638	**2.1500**			-0.0244	-1.0031			-0.0219	-0.9478		
T25	0.0696	**2.3442**			-0.0186	-0.7658			-0.0161	-0.6979		
T26	0.0800	**2.6952**			-0.0082	-0.3372			-0.0057	-0.2465		
T27	0.0747	**2.5178**			-0.0135	-0.5538			-0.0110	-0.4746		
T28	0.0715	**2.4083**			-0.0167	-0.6875			-0.0142	-0.6154		
T29	0.0690	**2.3253**			-0.0192	-0.7889			-0.0167	-0.7222		
T30	0.0723	**2.4345**			-0.0159	-0.6555			-0.0134	-0.5818		

Continue (d) SSO Portfolio												
Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T60	T-Value	T-6 to T12	T-Value	T0 to T60	T-Value	T0 to t12	T-Value	T6 to T60	T-Value	T6 to T12	T-Value
T31	0.0648	**2.1845**			-0.0234	-0.9610			-0.0208	-0.9034		
T32	0.0625	**2.1052**			-0.0257	-1.0578			-0.0232	-1.0054		
T33	0.0619	**2.0850**			-0.0263	-1.0824			-0.0238	-1.0313		
T34	0.0637	**2.1458**			-0.0245	-1.0082			-0.0220	-0.9531		
T35	0.0606	**2.0413**			-0.0276	-1.1359			-0.0251	-1.0876		
T36	0.0612	**2.0606**			-0.0270	-1.1123			-0.0245	-1.0628		
T37	0.0636	**2.1427**			-0.0246	-1.0119			-0.0221	-0.9571		
T38	0.0757	**2.5513**			-0.0125	-0.5129			-0.0100	-0.4315		
T39	0.0794	**2.6764**			-0.0088	-0.3601			-0.0062	-0.2706		
T40	0.0824	**2.7773**			-0.0058	-0.2369			-0.0033	-0.1408		
T41	0.0889	**2.9951**			0.0007	0.0291			0.0032	0.1393		
T42	0.0879	**2.9604**			-0.0003	-0.0132			0.0022	0.0947		
T43	0.0882	**2.9711**			0.0000	-0.0001			0.0025	0.1085		
T44	0.0878	**2.9592**			-0.0004	-0.0147			0.0021	0.0932		
T45	0.0822	**2.7692**			-0.0060	-0.2468			-0.0035	-0.1513		
T46	0.0889	**2.9935**			0.0007	0.0271			0.0032	0.1372		
T47	0.0833	**2.8060**			-0.0049	-0.2018			-0.0024	-0.1039		
T48	0.0818	**2.7548**			-0.0064	-0.2644			-0.0039	-0.1698		
T49	0.0821	**2.7670**			-0.0061	-0.2495			-0.0036	-0.1541		
T50	0.0871	**2.9354**			-0.0011	-0.0437			0.0014	0.0626		
T51	0.0781	**2.6319**			-0.0101	-0.4145			-0.0076	-0.3279		
T52	0.0760	**2.5608**			-0.0122	-0.5013			-0.0097	-0.4193		
T53	0.0706	**2.3777**			-0.0176	-0.7249			-0.0151	-0.6548		
T54	0.0683	**2.3009**			-0.0199	-0.8187			-0.0174	-0.7536		
T55	0.0700	**2.3596**			-0.0182	-0.7471			-0.0156	-0.6781		
T56	0.0723	**2.4374**			-0.0158	-0.6521			-0.0133	-0.5781		
T57	0.0686	**2.3097**			-0.0196	-0.8080			-0.0171	-0.7423		
T58	0.0673	**2.2685**			-0.0209	-0.8583			-0.0184	-0.7953		
T59	0.0661	**2.2256**			-0.0221	-0.9107			-0.0196	-0.8505		
T60	0.0608	**2.0490**			-0.0274	-1.1264			-0.0249	-1.0776		

Note: **Bold** numbers are significant at 5% level of significance or less.
Source: FTSE100CARbyDeay.Xls
FTSE100Ttest(DW1983).Xls

Appendix (A5.11)
Summary Tables of CAR of Different Signal Definition in terms of the Sign and the Significance, During the Event Window for Each Portfolio

CAR-BU	SS	MS	QS1	QS2	QS3	QS4	CAR-SE	SS	MS	QS1	QS2	QS3	QS4
t0							t0						
t1							t1						
t2							t2						
t3							t3						
t4							t4						
t5							t5						
t6				++			t6			--			
t7				++			t7		--				
t8	+			++	++		t8		--				
t9	++			++	++		t9		--				
t10	+				++		t10						
t11	++						t11	--	--	--			
t12	++						t12	-	--	-			--

+' ('++') : Indicates that **CAR** at this particular day is **Positively Significant** at 1% (5%) level
-' ('--') : Indicates that the **CAR** at this particular day is **Negatively Significant** at 1% (5%) level

CAR-BE	SS	MS	QS1	QS2	QS3	QS4	CAR-SS	SS	MS	QS1	QS2	QS3	QS4
t0							t0						
t1							t1						
t2							t2						
t3							t3						
t4							t4						
t5							t5						
t6							t6						
t7	--						t7						
t8							t8						
t9							t9						
t10							t10						
t11							t11						
t12							t12						

+' ('++') : Indicates that **CAR** at this particular day is **Positively Significant** at 1% (5%) level
-' ('--') : Indicates that the **CAR** at this particular day is **Negatively Significant** at 1% (5%) level

Ch5(A5.11).Xls

Continue Appendix (A5.11)

Summary of Cumulative Abnormal Returns (CAR) of Different Signal Definitions

#CARofH0	SS	MS	QS1	QS2	QS3	QS4
Buy	1	4	8	0	0	8
Sell	4	1	1	6	13	2
BEO	12	3	3	13	10	10
SSO	5	8	0	7	12	12

Each **Number** Represents the No. of **CAR** That are Consistent With **H0**

For Example: BuySS (1) Indicates that there is 1 Negative CAR

T0	SS	MS	QS1	QS2	QS3	QS4
Buy	-	+	-	+	+	-
Sell	+	+	+	+	+	+
BEO	-	+	+	-	+	-
SSO	-	+	-	-	+	-

Each **Sign** Represents the Sign of **CAR** at **T0**

T6	SS	MS	QS1	QS2	QS3	QS4
Buy	+	+	+	+	+	-
Sell	-	-	-	+	+	-
BEO	-	-	+	-	-	-
SSO	-	+	-	+	+	+

Each **Sign** Represents the Sign of the **CAR** at **T6**

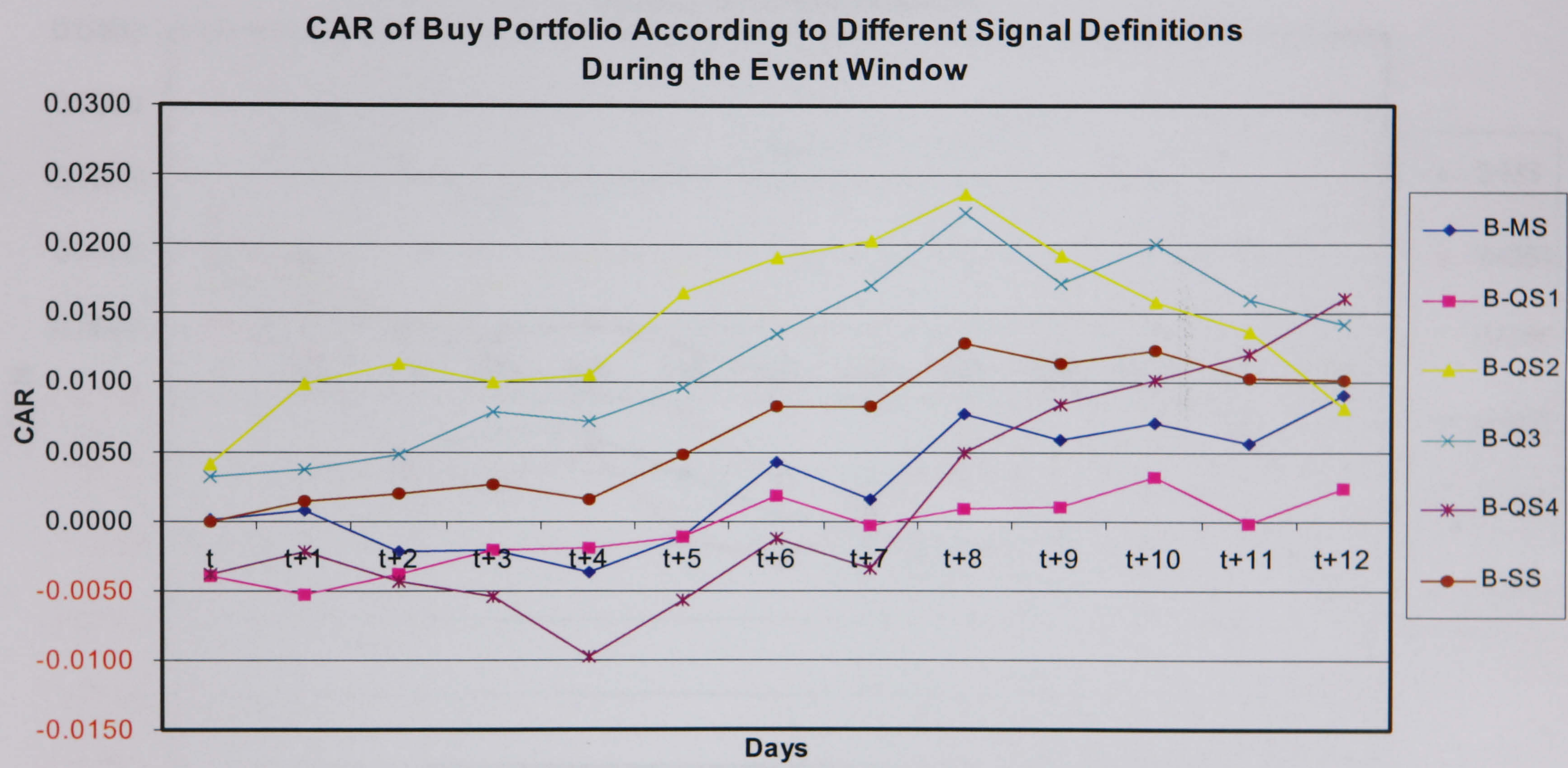
T12	SS	MS	QS1	QS2	QS3	QS4
Buy	+	+	+	+	+	+
Sell	-	-	-	-	+	-
BEO	-	+	+	-	-	+
SSO	+	-	-	+	+	+

Each **Sign** Represents the Sign of the **CAR** at **T12**

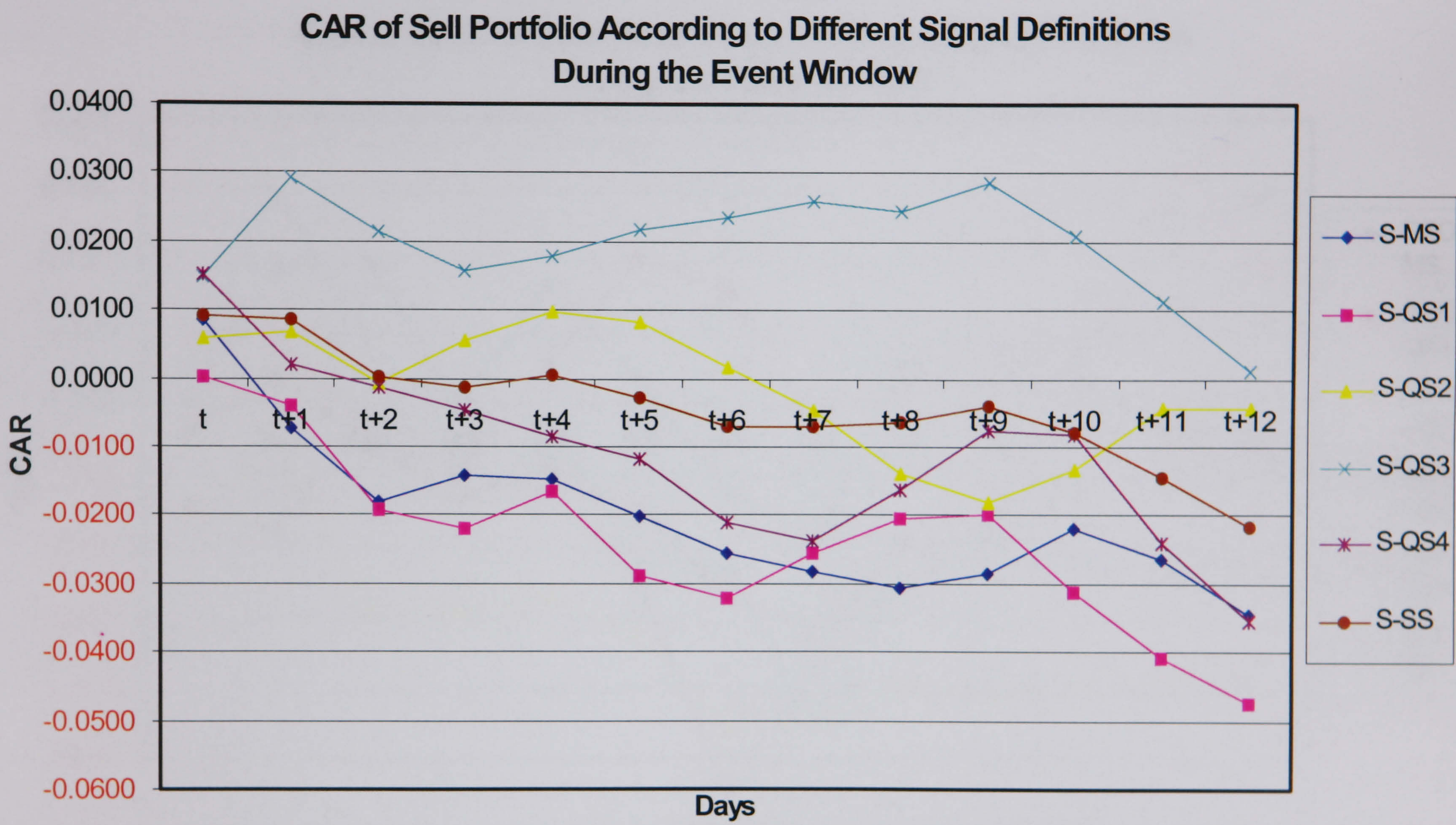
Ch5(A5.11).Xls

Appendix (A5.12) CARs of Different Signal Definitions During the Event Window (T0 to T12)

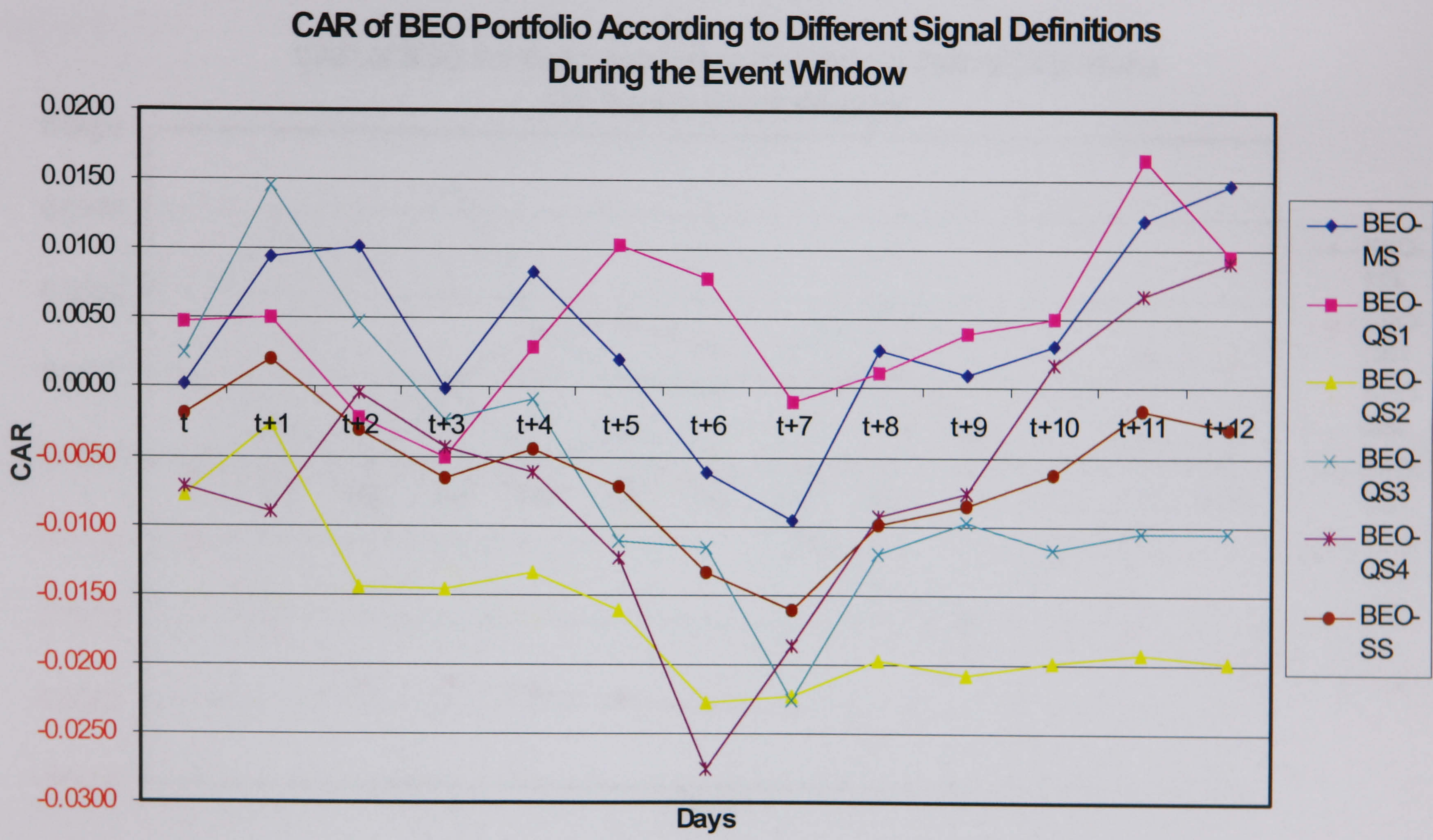
(a) Buy Portfolio



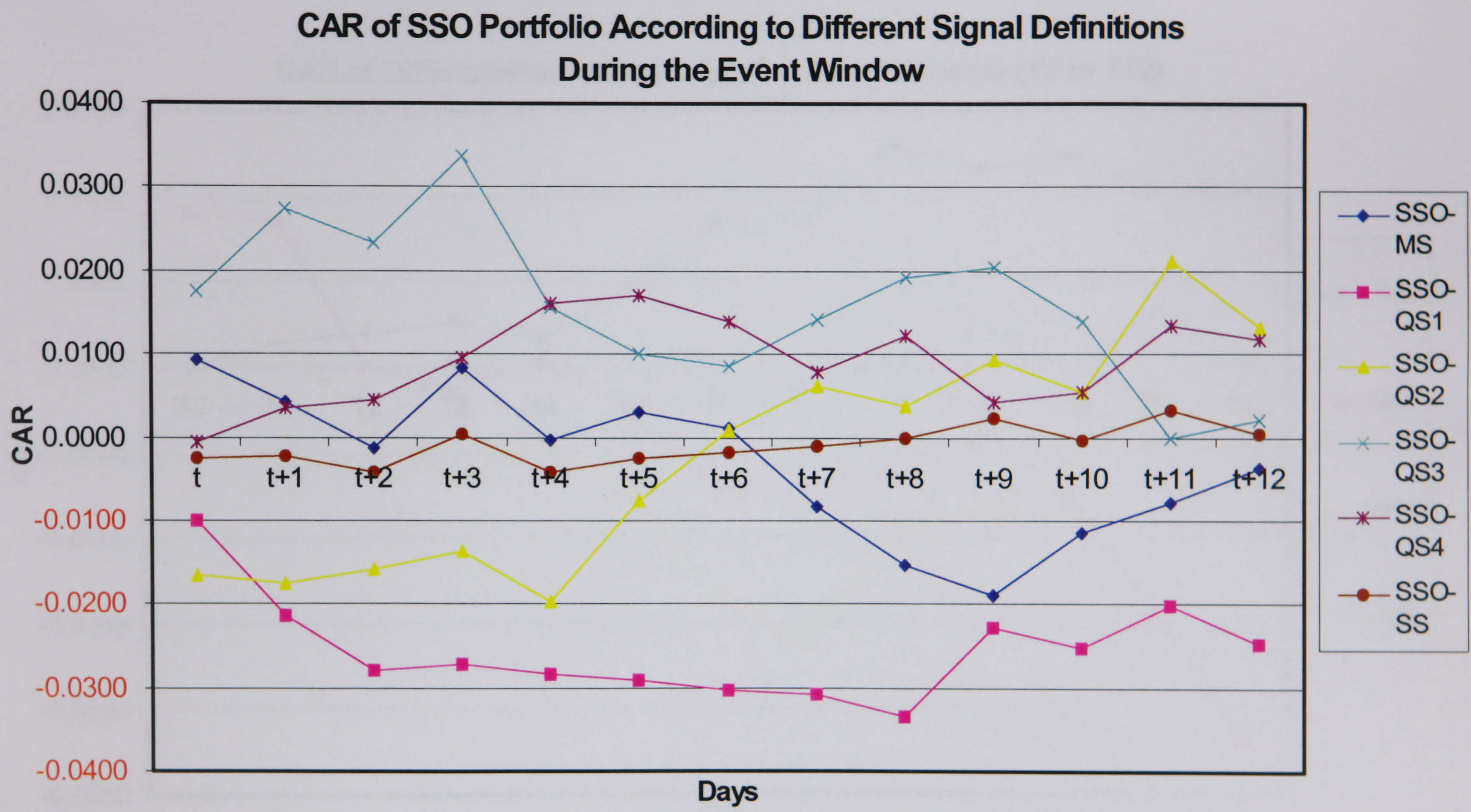
(b) Sell Portfolio



(c) BEO Portfolio

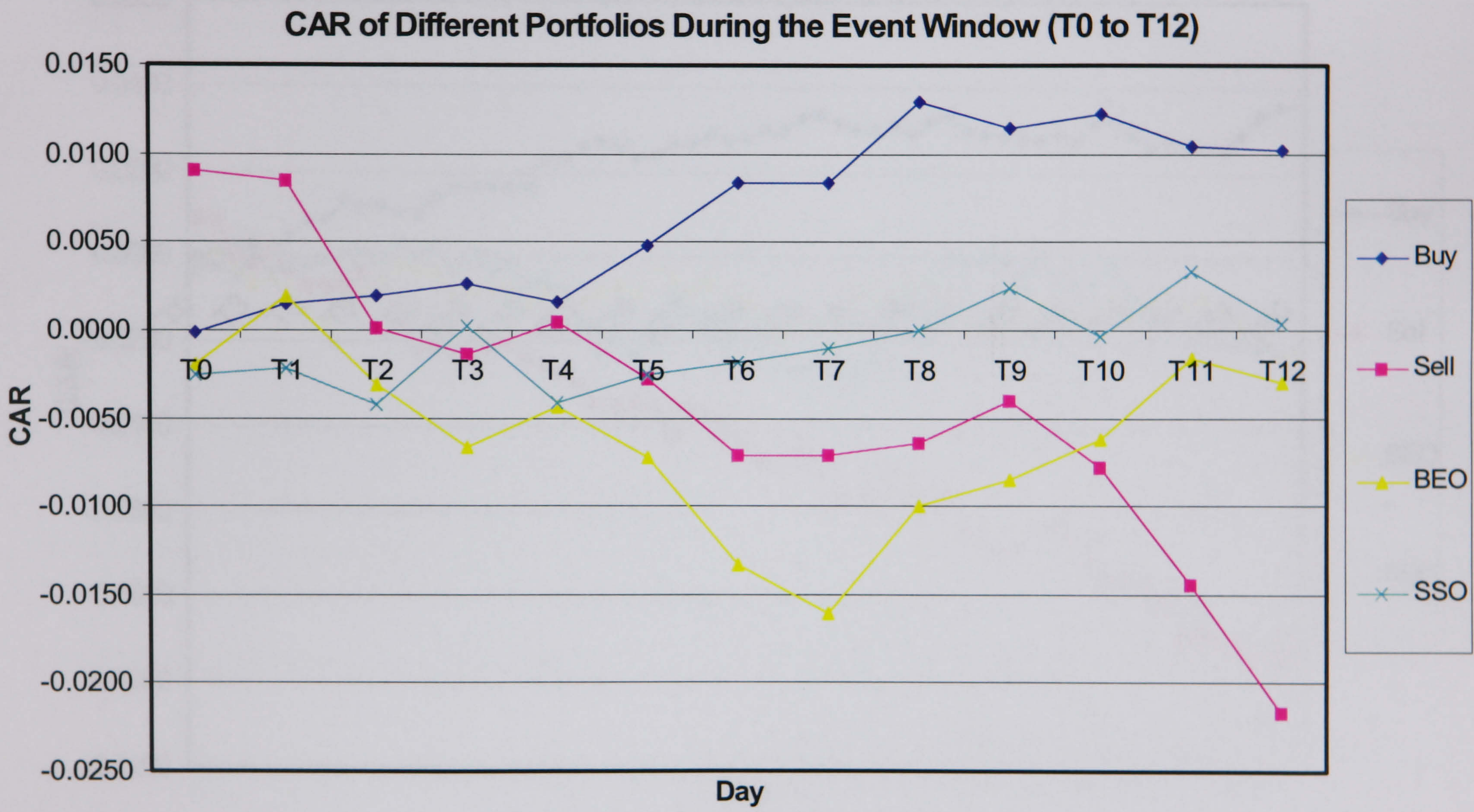


(d) SSO Portfolio

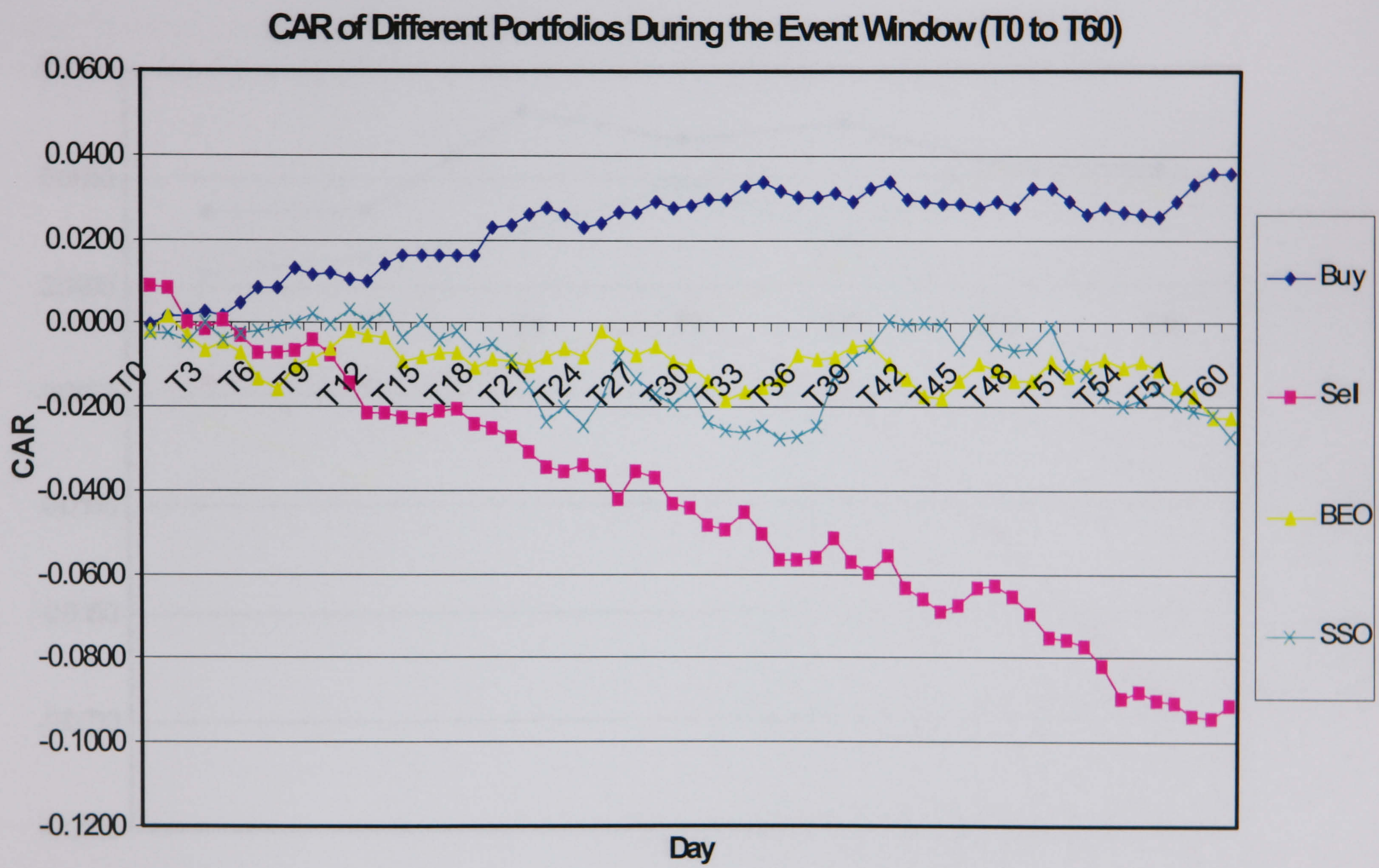


Appendix (A5.13) CARs of Different Portfolios During Different Event Windows:

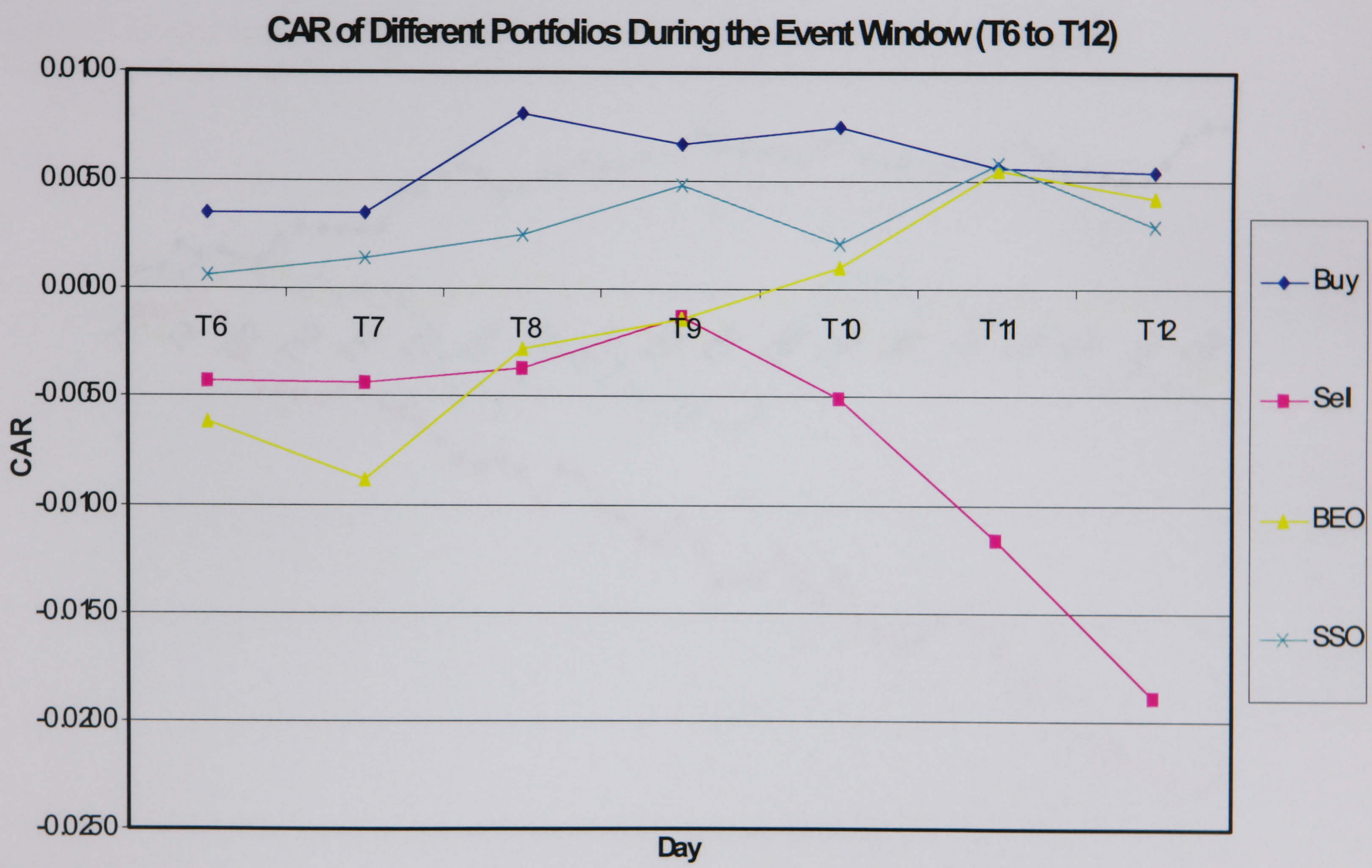
(a) Event Window (T0 to T12)



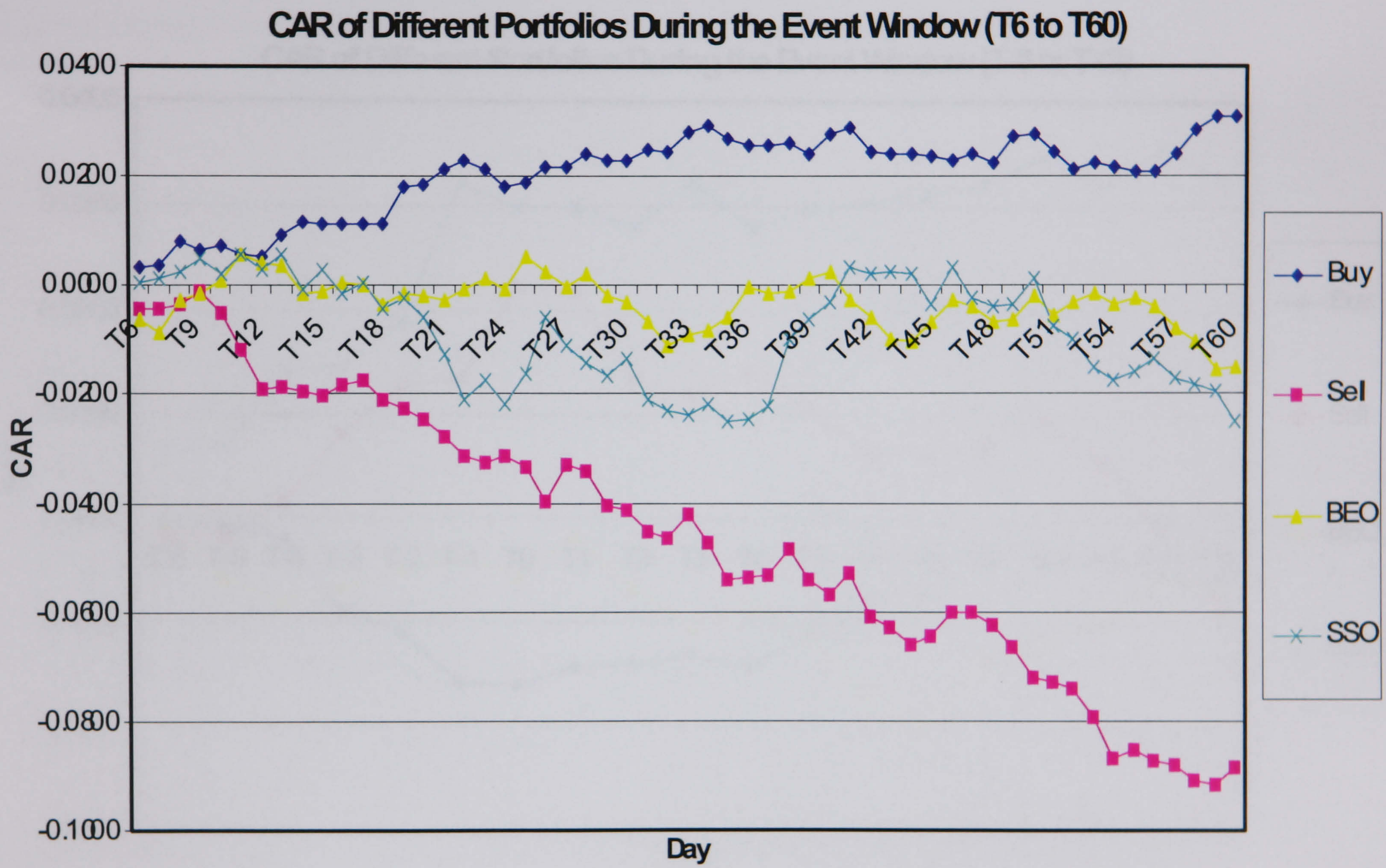
(b) Event Window (T0 to T60)



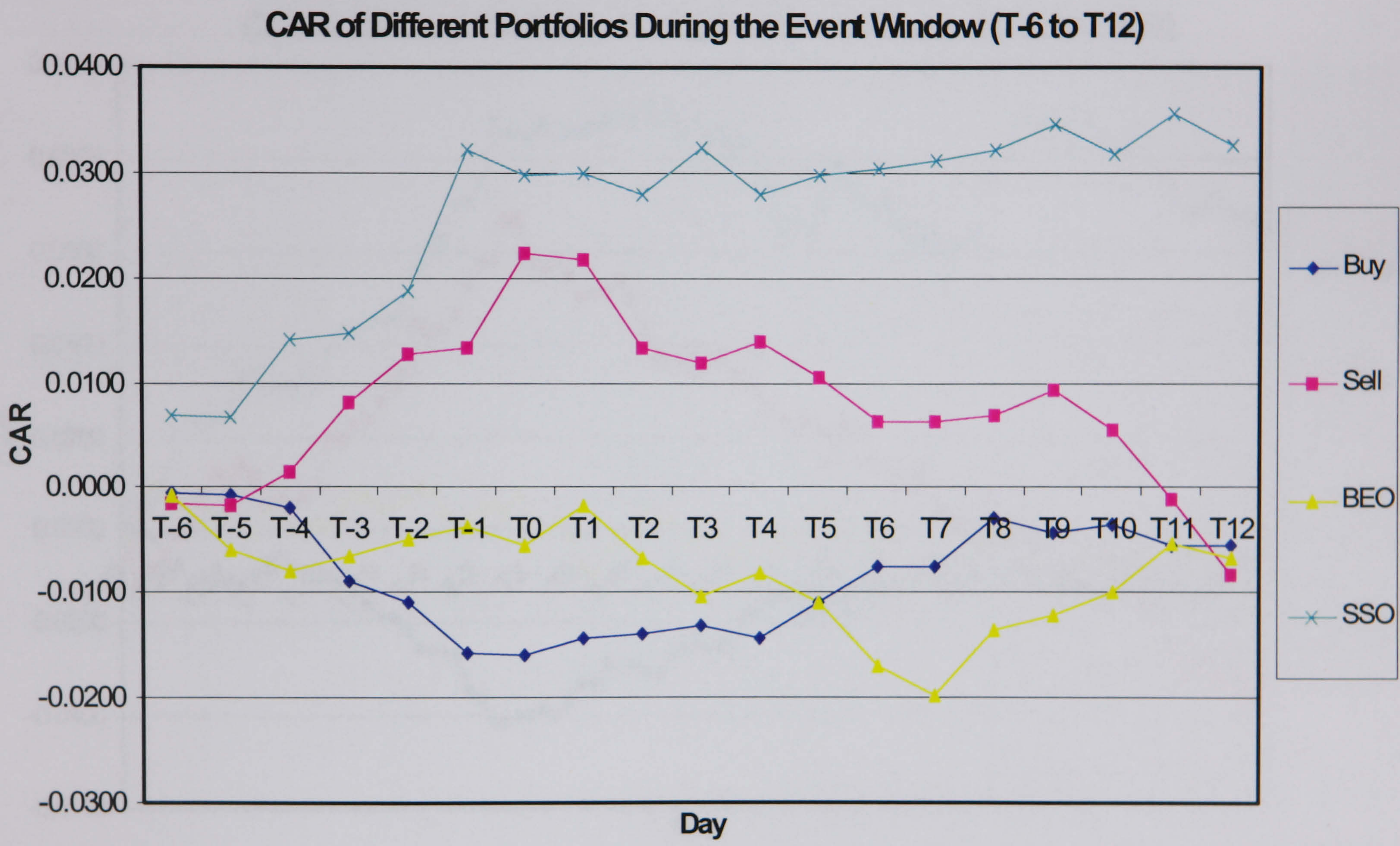
(c) Event Window (T6 to T12)



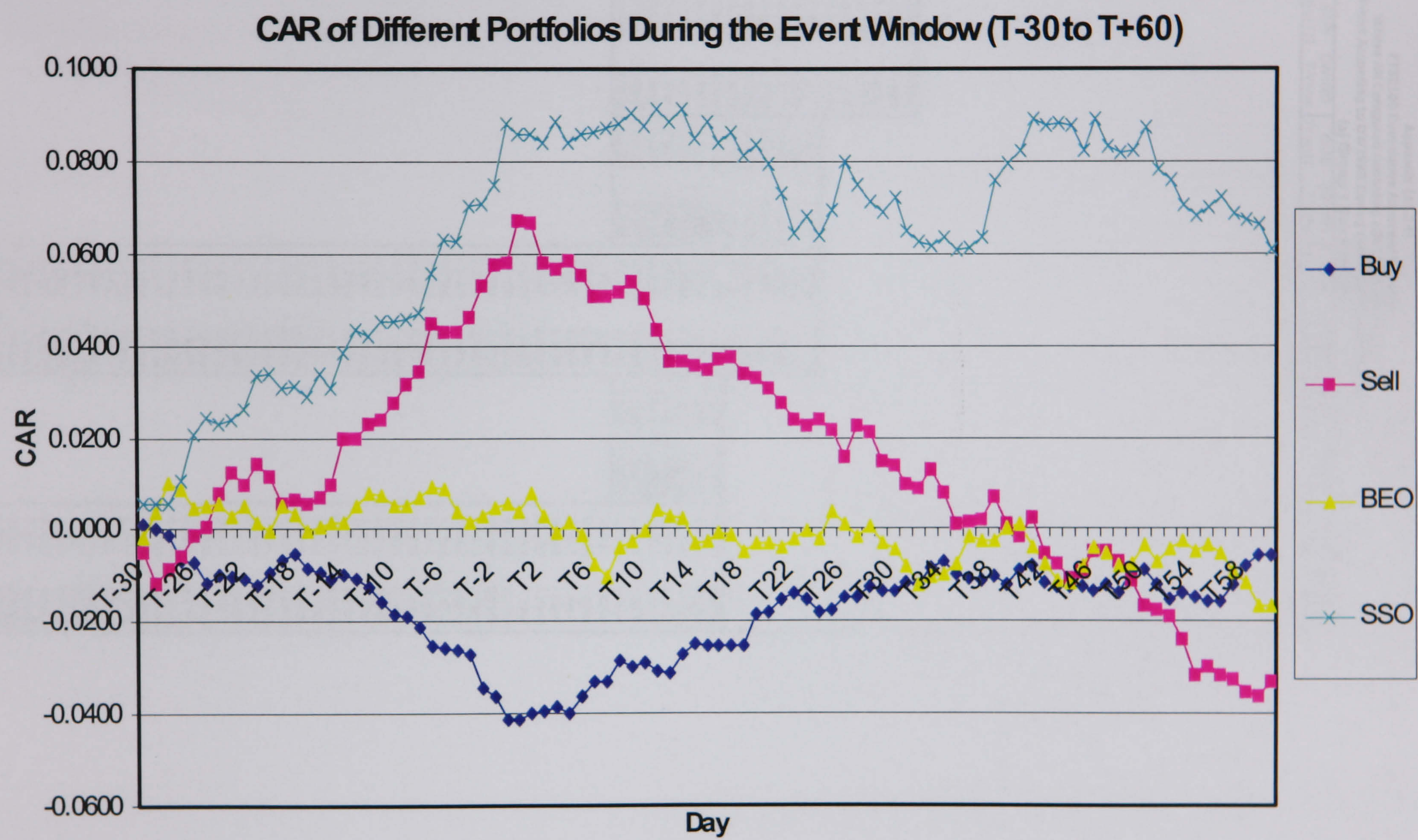
(d) Event Window (T6 to T60)



(e) Event Window (T-6 to T12)



(f) Event Window (T-30 to T60)



Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(a) Group 1 Buy Portfolio

Day	CARt T-30 to T6C	DW1983 T-Value	CARt T-6 to T12	DW1983 T-Value	CARt T0 to t12	DW1983 T-Value	CARt T0 to t60	DW1983 T-Value	CARt T6 to T12	DW1983 T-Value	CARt T6 to T60	DW1983 T-Value
T-30	0.0023	0.1095										
T-29	-0.0010	-0.0305										
T-28	-0.0092	-0.4346										
T-27	-0.0134	-0.6416										
T-26	-0.0165	-0.7981										
T-25	-0.0199	-0.9647										
T-24	-0.0179	-0.8644										
T-23	-0.0188	-0.9096										
T-22	-0.0209	-1.0130										
T-21	-0.0197	-0.9519										
T-20	-0.0161	-0.7785										
T-19	-0.0140	-0.6735										
T-18	-0.0141	-0.6779										
T-17	-0.0210	-1.0188										
T-16	-0.0255	-1.2396										
T-15	-0.0270	-1.3157										
T-14	-0.0261	-1.2686										
T-13	-0.0249	-1.2128										
T-12	-0.0255	-1.2415										
T-11	-0.0312	-1.5234										
T-10	-0.0313	-1.5252										
T-9	-0.0329	-1.6061										
T-8	-0.0357	-1.7423										
T-7	-0.0446	-2.1836										
T-6	-0.0449	-2.1964	-0.0003	-0.0281								
T-5	-0.0440	-2.1509	0.0007	0.0714								
T-4	-0.0445	-2.1753	0.0002	0.0182								
T-3	-0.0496	-2.4283	-0.0050	-0.5356								
T-2	-0.0535	-2.6231	-0.0089	-0.9619								
T-1	-0.0596	-2.9191	-0.0149	-1.6096								
T0	-0.0594	-2.9127	-0.0148	-1.5957	0.0001	0.0168	0.0001	0.0077				
T1	-0.0601	-2.9455	-0.0155	-1.6675	-0.0005	-0.0701	-0.0005	-0.0323				
T2	-0.0558	-2.7354	-0.0112	-1.2077	0.0037	0.4859	0.0037	0.2243				
T3	-0.0542	-2.6564	-0.0096	-1.0348	0.0053	0.6948	0.0053	0.3208				
T4	-0.0513	-2.5100	-0.0066	-0.7143	0.0083	1.0823	0.0083	0.4996				
T5	-0.0458	-2.2419	-0.0012	-0.1277	0.0137	1.7915	0.0137	0.8270				
T6	-0.0419	-2.0509	0.0027	0.2904	0.0176	2.2970	0.0176	1.0604	0.0039	0.7441	0.0039	0.2458
T7	-0.0379	-1.8499	0.0068	0.7303	0.0217	2.8288	0.0217	1.3059	0.0080	1.5269	0.0080	0.5043
T8	-0.0313	-1.5245	0.0134	1.4425	0.0283	3.6898	0.0283	1.7034	0.0146	2.7942	0.0146	0.9229
T9	-0.0306	-1.4910	0.0140	1.5156	0.0290	3.7782	0.0290	1.7442	0.0152	2.9244	0.0152	0.9659
T10	-0.0299	-1.4554	0.0148	1.5936	0.0297	3.8725	0.0297	1.7877	0.0160	3.0632	0.0160	1.0117
T11	-0.0253	-1.2308	0.0193	2.0852	0.0342	4.4667	0.0342	2.0620	0.0205	3.9379	0.0205	1.3006
T12	-0.0231	-1.1214	0.0215	2.3246	0.0365	4.7562	0.0365	2.1957	0.0227	4.3640	0.0227	1.4414
T13	-0.0211	-1.0236					0.0384	2.3151			0.0247	1.5672
T14	-0.0206	-0.9996					0.0389	2.3444			0.0252	1.5980
T15	-0.0214	-1.0402					0.0381	2.2948			0.0244	1.5457
T16	-0.0215	-1.0451					0.0380	2.2888			0.0243	1.5395
T17	-0.0175	-0.8470					0.0420	2.5308			0.0283	1.7943
T18	-0.0190	-0.9196					0.0406	2.4422			0.0268	1.7010
T19	-0.0099	-0.4732					0.0496	2.9873			0.0359	2.2751
T20	-0.0062	-0.2899					0.0533	3.2112			0.0396	2.5109
T21	-0.0016	-0.0573					0.0579	3.4954			0.0442	2.8101
T22	0.0004	0.0290					0.0599	3.6008			0.0462	2.9211
T23	-0.0015	-0.0556					0.0580	3.4974			0.0443	2.8123
T24	-0.0043	-0.1980					0.0553	3.3235			0.0415	2.6291
T25	-0.0043	-0.1945					0.0553	3.3277			0.0415	2.6336
T26	-0.0023	-0.0941					0.0573	3.4504			0.0436	2.7628
T27	0.0014	0.0884					0.0609	3.6733			0.0472	2.9975
T28	0.0051	0.2740					0.0647	3.9000			0.0509	3.2363
T29	0.0062	0.3382					0.0658	3.9784			0.0520	3.3188
T30	0.0102	0.5424					0.0697	4.2277			0.0560	3.5814
T31	0.0129	0.6905					0.0725	4.4087			0.0587	3.7720
T32	0.0171	0.8991					0.0767	4.6635			0.0629	4.0403
T33	0.0162	0.8557					0.0758	4.6104			0.0621	3.9844
T34	0.0202	1.0555					0.0798	4.8545			0.0661	4.2415
T35	0.0174	0.9155					0.0770	4.6835			0.0632	4.0614
T36	0.0156	0.8264					0.0751	4.5746			0.0614	3.9468
T37	0.0173	0.9103					0.0769	4.6772			0.0631	4.0547
T38	0.0231	1.2044					0.0826	5.0363			0.0689	4.4329
T39	0.0223	1.1435					0.0818	4.9620			0.0681	4.3546
T40	0.0238	1.2099					0.0833	5.0430			0.0696	4.4400
T41	0.0222	1.1437					0.0817	4.9622			0.0680	4.3550
T42	0.0194	0.9986					0.0789	4.7850			0.0652	4.1683
T43	0.0150	0.7873					0.0746	4.5269			0.0608	3.8965
T44	0.0140	0.7388					0.0735	4.4677			0.0598	3.8341
T45	0.0086	0.4629					0.0681	4.1306			0.0544	3.4792
T46	0.0081	0.4424					0.0677	4.1056			0.0539	3.4528
T47	0.0126	0.6676					0.0722	4.3807			0.0585	3.7425
T48	0.0112	0.5936					0.0707	4.2903			0.0570	3.6473
T49	0.0154	0.8073					0.0749	4.5514			0.0612	3.9222
T50	0.0165	0.8642					0.0761	4.6208			0.0624	3.9954
T51	0.0092	0.5076					0.0687	4.1852			0.0550	3.5367
T52	0.0068	0.3961					0.0664	4.0491			0.0526	3.3932
T53	0.0050	0.3095					0.0646	3.9433			0.0509	3.2819
T54	0.0058	0.3464					0.0653	3.9884			0.0516	3.3294
T55	0.0091	0.5095					0.0686	4.1876			0.0549	3.5391
T56	0.0102	0.5699					0.0698	4.2613			0.0561	3.6168
T57	0.0147	0.7850					0.0742	4.5241			0.0605	3.8936
T58	0.0210	1.0969					0.0806	4.9051			0.0668	4.2948
T59	0.0244	1.2667					0.0840	5.1125			0.0702	4.5132
T60	0.0268	1.3740					0.0863	5.2435			0.0726	4.6511

Note: (**Bold & Shaded T-stat**) Significant at 1% level of significance or less, (**Bold T-stat**) Significant at 5% and (*Italic T-stat*) Significant at 10%

Source: Decile2SizeTtest(DW83)ForBuyLSV(1994).Xls

Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(b) Group 2 Buy Portfolio

Day	CARt T-30 to T60	DW1983 T-Value	CARt T-6 to T12	DW1983 T-Value	CARt T0 to t12	DW1983 T-Value	CARt T0 to t60	DW1983 T-Value	CARt T6 to T12	DW1983 T-Value	CARt T6 to T60	DW1983 T-Value
T-30	-0.0008	-0.0358										
T-29	-0.0017	-0.0740										
T-28	0.0008	0.0347										
T-27	-0.0008	-0.0336										
T-26	-0.0036	-0.1585										
T-25	-0.0035	-0.1525										
T-24	-0.0054	-0.2368										
T-23	-0.0088	-0.3906										
T-22	-0.0095	-0.4200										
T-21	-0.0128	-0.5670										
T-20	-0.0105	-0.4645										
T-19	-0.0083	-0.3682										
T-18	-0.0072	-0.3198										
T-17	-0.0048	-0.2119										
T-16	-0.0045	-0.1985										
T-15	-0.0028	-0.1253										
T-14	-0.0015	-0.0648										
T-13	-0.0027	-0.1213										
T-12	-0.0062	-0.2721										
T-11	-0.0087	-0.3848										
T-10	-0.0103	-0.4547										
T-9	-0.0112	-0.4959										
T-8	-0.0104	-0.4599										
T-7	-0.0113	-0.5008										
T-6	-0.0165	-0.7310	-0.0052	-0.5037								
T-5	-0.0154	-0.6789	-0.0040	-0.3898								
T-4	-0.0156	-0.6901	-0.0043	-0.4143								
T-3	-0.0202	-0.8937	-0.0089	-0.8598								
T-2	-0.0172	-0.7597	-0.0059	-0.5665								
T-1	-0.0180	-0.7963	-0.0067	-0.6468								
T0	-0.0152	-0.6705	-0.0038	-0.3714	0.0028	0.3330	0.0028	0.1537				
T1	-0.0152	-0.6718	-0.0039	-0.3743	0.0028	0.3295	0.0028	0.1521				
T2	-0.0116	-0.5129	-0.0003	-0.0265	0.0064	0.7499	0.0064	0.3462				
T3	-0.0127	-0.5594	-0.0013	-0.1282	0.0054	0.6269	0.0054	0.2894				
T4	-0.0143	-0.6297	-0.0029	-0.2821	0.0038	0.4409	0.0038	0.2035				
T5	-0.0140	-0.6175	-0.0026	-0.2553	0.0040	0.4732	0.0040	0.2185				
T6	-0.0071	-0.3145	0.0042	0.4078	0.0109	1.2749	0.0109	0.5885	0.0069	1.1800	0.0069	0.3897
T7	-0.0060	-0.2660	0.0053	0.5138	0.0120	*1.4030*	0.0120	0.6477	0.0080	**2.3275**	0.0080	0.4520
T8	-0.0052	-0.2304	0.0061	0.5918	0.0128	*1.4973*	0.0128	0.6912	0.0088	**2.5635**	0.0088	0.4979
T9	-0.0052	-0.2285	0.0062	0.5959	0.0129	*1.5023*	0.0129	0.6935	0.0088	**2.5761**	0.0088	0.5003
T10	-0.0005	-0.0214	0.0108	1.0492	0.0175	**2.0503**	0.0175	0.9465	0.0135	**3.9477**	0.0135	0.7667
T11	-0.0013	-0.0580	0.0100	0.9690	0.0167	**1.9534**	0.0167	0.9018	0.0127	**3.7053**	0.0127	0.7196
T12	-0.0006	-0.0260	0.0107	1.0391	0.0174	**2.0381**	0.0174	0.9409	0.0134	**3.9173**	0.0134	0.7608
T13	0.0015	0.0659					0.0195	1.0531			0.0155	0.8790
T14	0.0026	0.1155					0.0206	1.1137			0.0166	0.9428
T15	0.0025	0.1085					0.0205	1.1051			0.0164	0.9338
T16	0.0002	0.0075					0.0182	0.9818			0.0141	0.8039
T17	-0.0038	-0.1670					0.0142	0.7686			0.0102	0.5794
T18	-0.0036	-0.1571					0.0145	0.7807			0.0104	0.5921
T19	0.0012	0.0550					0.0193	1.0398			0.0152	0.8650
T20	0.0025	0.1121					0.0206	1.1095			0.0165	0.9384
T21	0.0026	0.1160					0.0206	1.1143			0.0166	0.9434
T22	0.0051	0.2251					0.0231	1.2475			0.0191	1.0837
T23	0.0079	0.3480					0.0259	*1.3977*			0.0218	1.2419
T24	0.0069	0.3070					0.0250	*1.3476*			0.0209	1.1891
T25	0.0095	0.4199					0.0275	*1.4856*			0.0235	*1.3344*
T26	0.0136	0.5989					0.0316	**1.7041**			0.0275	*1.5646*
T27	0.0172	0.7591					0.0352	**1.8998**			0.0312	**1.7707**
T28	0.0179	0.7903					0.0359	**1.9379**			0.0319	**1.8107**
T29	0.0192	0.8490					0.0372	**2.0096**			0.0332	**1.8863**
T30	0.0187	0.8262					0.0367	**1.9817**			0.0327	**1.8569**
T31	0.0191	0.8418					0.0371	**2.0008**			0.0330	**1.8770**
T32	0.0170	0.7523					0.0350	**1.8915**			0.0310	**1.7620**
T33	0.0200	0.8849					0.0380	**2.0535**			0.0340	**1.9325**
T34	0.0180	0.7971					0.0361	**1.9462**			0.0320	**1.8195**
T35	0.0151	0.6652					0.0331	**1.7851**			0.0290	*1.6498*
T36	0.0114	0.5051					0.0295	*1.5896*			0.0254	*1.4440*
T37	0.0092	0.4059					0.0272	*1.4685*			0.0232	*1.3164*
T38	0.0076	0.3343					0.0256	*1.3810*			0.0215	1.2243
T39	0.0020	0.0869					0.0200	1.0788			0.0159	0.9060
T40	0.0029	0.1263					0.0209	1.1269			0.0168	0.9567
T41	0.0031	0.1353					0.0211	1.1378			0.0170	0.9682
T42	0.0020	0.0880					0.0200	1.0801			0.0160	0.9074
T43	0.0002	0.0101					0.0183	0.9850			0.0142	0.8072
T44	0.0014	0.0603					0.0194	1.0463			0.0153	0.8718
T45	0.0011	0.0492					0.0191	1.0327			0.0151	0.8575
T46	0.0021	0.0918					0.0201	1.0847			0.0161	0.9123
T47	0.0055	0.2414					0.0235	1.2674			0.0194	1.1047
T48	0.0047	0.2077					0.0227	1.2264			0.0187	1.0615
T49	0.0059	0.2607					0.0239	1.2911			0.0199	1.1296
T50	0.0058	0.2554					0.0238	1.2846			0.0198	1.1228
T51	0.0064	0.2825					0.0244	*1.3176*			0.0204	1.1576
T52	0.0061	0.2677					0.0241	*1.2996*			0.0200	1.1386
T53	0.0022	0.0988					0.0203	1.0933			0.0162	0.9214
T54	0.0030	0.1327					0.0210	1.1348			0.0170	0.9650
T55	-0.0030	-0.1304					0.0151	0.8133			0.0110	0.6265
T56	-0.0046	-0.2014					0.0135	0.7266			0.0094	0.5352
T57	-0.0019	-0.0861					0.0161	0.8675			0.0120	0.6835
T58	0.0029	0.1262					0.0209	1.1268			0.0168	0.9566
T59	0.0032	0.1419					0.0212	1.1459			0.0172	0.9767
T60	0.0014	0.0610					0.0194	1.0471			0.0154	0.8727

Note: (Bold Shaded T-stat) Significant at 1% level of significance or less, (Bold T-stat) Significant at 5% and (*Italic T-stat*) Significant at 10%

Source: Decile2SizeTtest(DW83)ForBuyLSV(1994).Xls

Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(c) All Groups Buy Portfolio

Day	CARt T-30 to T60	DW1983 T-Value	CARt T-6 to T12	DW1983 T-Value	CARt T0 to t12	DW1983 T-Value	CARt T0 to t60	DW1983 T-Value	CARt T6 to T12	DW1983 T-Value	CARt T6 to T60	DW1983 T-Value
T-30	0.0010	0.0697										
T-29	-0.0013	-0.0793										
T-28	-0.0050	-0.3530										
T-27	-0.0080	-0.5813										
T-26	-0.0111	-0.8060										
T-25	-0.0129	-0.9464										
T-24	-0.0126	-0.9192										
T-23	-0.0146	-1.0677										
T-22	-0.0161	-1.1784										
T-21	-0.0168	-1.2298										
T-20	-0.0138	-1.0063										
T-19	-0.0116	-0.8468										
T-18	-0.0112	-0.8162										
T-17	-0.0141	-1.0356										
T-16	-0.0166	-1.2178										
T-15	-0.0168	-1.2319										
T-14	-0.0157	-1.1480										
T-13	-0.0156	-1.1396										
T-12	-0.0173	-1.2717										
T-11	-0.0217	*-1.5966*										
T-10	-0.0224	*-1.6479*										
T-9	-0.0237	-1.7474										
T-8	-0.0250	**-1.8401**										
T-7	-0.0305	**-2.2524**										
T-6	-0.0329	**-2.4271**	-0.0024	-0.3823								
T-5	-0.0319	**-2.3506**	-0.0013	-0.2150								
T-4	-0.0323	**-2.3797**	-0.0017	-0.2786								
T-3	-0.0372	**-2.7441**	-0.0066	-1.0761								
T-2	-0.0382	**-2.8180**	-0.0076	-1.2379								
T-1	-0.0420	**-3.1011**	-0.0114	**-1.8574**								
T0	-0.0407	**-3.0062**	-0.0102	*-1.6496*	0.0013	0.2512	0.0013	0.1159				
T1	-0.0411	**-3.0356**	-0.0106	**-1.7141**	0.0009	0.1733	0.0009	0.0800				
T2	-0.0371	**-2.7402**	-0.0066	-1.0676	0.0049	0.9548	0.0049	0.4408				
T3	-0.0366	**-2.7047**	-0.0061	-0.9898	0.0053	1.0489	0.0053	0.4842				
T4	-0.0356	**-2.6274**	-0.0051	-0.8208	0.0064	1.2532	0.0064	0.5785				
T5	-0.0323	**-2.3860**	-0.0018	-0.2924	0.0096	**1.8920**	0.0096	0.8735				
T6	-0.0272	**-2.0048**	0.0033	0.5420	0.0148	**2.9007**	0.0148	*1.3391*	0.0051	*1.4847*	0.0051	0.4904
T7	-0.0244	**-1.7958**	0.0062	0.9993	0.0176	**3.4536**	0.0176	*1.5943*	0.0080	**2.2986**	0.0080	0.7592
T8	-0.0202	*-1.4876*	0.0103	*1.6732*	0.0217	**4.2683**	0.0217	**1.9704**	0.0121	**3.4977**	0.0121	1.1553
T9	-0.0198	-1.4575	0.0107	**1.7397**	0.0221	**4.3487**	0.0221	**2.0075**	0.0125	**3.6161**	0.0125	1.1943
T10	-0.0174	-1.2794	0.0131	**2.1295**	0.0245	**4.8199**	0.0245	**2.2251**	0.0149	**4.3097**	0.0149	*1.4235*
T11	-0.0152	-1.1103	0.0154	**2.4994**	0.0268	**5.2671**	0.0268	**2.4315**	0.0172	**4.9680**	0.0172	*1.6409*
T12	-0.0136	-0.9926	0.0170	**2.7571**	0.0284	**5.5787**	0.0284	**2.5754**	0.0188	**5.4266**	0.0188	**1.7924**
T13	-0.0115	-0.8423					0.0304	**2.7589**			0.0208	**1.9856**
T14	-0.0108	-0.7863					0.0312	**2.8273**			0.0216	**2.0577**
T15	-0.0113	-0.8265					0.0306	**2.7781**			0.0210	**2.0059**
T16	-0.0124	-0.9025					0.0296	**2.6854**			0.0200	**1.9082**
T17	-0.0117	-0.8545					0.0303	**2.7440**			0.0206	**1.9700**
T18	-0.0125	-0.9105					0.0295	**2.6756**			0.0199	**1.8979**
T19	-0.0052	-0.3722					0.0368	**3.3331**			0.0271	**2.5904**
T20	-0.0025	-0.1723					0.0395	**3.5772**			0.0298	**2.8474**
T21	0.0002	0.0316					0.0421	**3.8263**			0.0325	**3.1098**
T22	0.0024	0.1842					0.0444	**4.0127**			0.0347	**3.3060**
T23	0.0025	0.1989					0.0444	**4.0306**			0.0348	**3.3249**
T24	0.0005	0.0464					0.0424	**3.8443**			0.0328	**3.1287**
T25	0.0015	0.1301					0.0435	**3.9466**			0.0339	**3.2365**
T26	0.0044	0.3448					0.0464	**4.2089**			0.0368	**3.5126**
T27	0.0081	0.6172					0.0500	**4.5415**			0.0404	**3.8629**
T28	0.0105	0.8000					0.0525	**4.7648**			0.0429	**4.0981**
T29	0.0117	0.8974					0.0537	**4.8838**			0.0441	**4.2234**
T30	0.0138	1.0577					0.0558	**5.0796**			0.0461	**4.4296**
T31	0.0155	1.1970					0.0575	**5.2497**			0.0479	**4.6088**
T32	0.0171	*1.3135*					0.0591	**5.3920**			0.0494	**4.7586**
T33	0.0178	*1.3707*					0.0598	**5.4618**			0.0502	**4.8322**
T34	0.0193	*1.4807*					0.0613	**5.5963**			0.0517	**4.9737**
T35	0.0164	1.2654					0.0584	**5.3332**			0.0488	**4.6967**
T36	0.0138	1.0740					0.0558	**5.0994**			0.0462	**4.4505**
T37	0.0139	1.0757					0.0559	**5.1016**			0.0462	**4.4528**
T38	0.0165	1.2788					0.0585	**5.3497**			0.0489	**4.7140**
T39	0.0137	1.0494					0.0557	**5.0694**			0.0460	**4.4189**
T40	0.0149	1.1350					0.0569	**5.1739**			0.0473	**4.5290**
T41	0.0141	1.0842					0.0561	**5.1119**			0.0464	**4.4636**
T42	0.0120	0.9249					0.0540	**4.9173**			0.0444	**4.2587**
T43	0.0088	0.6865					0.0507	**4.6261**			0.0411	**3.9521**
T44	0.0087	0.6804					0.0506	**4.6187**			0.0410	**3.9443**
T45	0.0054	0.4338					0.0474	**4.3175**			0.0378	**3.6270**
T46	0.0056	0.4465					0.0476	**4.3330**			0.0379	**3.6434**
T47	0.0096	0.7481					0.0516	**4.7015**			0.0420	**4.0314**
T48	0.0085	0.6601					0.0504	**4.5939**			0.0408	**3.9182**
T49	0.0114	0.8828					0.0534	**4.8660**			0.0437	**4.2047**
T50	0.0120	0.9283					0.0540	**4.9215**			0.0444	**4.2631**
T51	0.0080	0.6391					0.0500	**4.5683**			0.0404	**3.8912**
T52	0.0065	0.5321					0.0485	**4.4376**			0.0389	**3.7536**
T53	0.0039	0.3366					0.0459	**4.1988**			0.0362	**3.5020**
T54	0.0047	0.3928					0.0466	**4.2674**			0.0370	**3.5743**
T55	0.0040	0.3457					0.0460	**4.2100**			0.0363	**3.5138**
T56	0.0040	0.3472					0.0460	**4.2118**			0.0363	**3.5157**
T57	0.0077	0.6158					0.0496	**4.5398**			0.0400	**3.8611**
T58	0.0133	1.0373					0.0553	**5.0546**			0.0457	**4.4033**
T59	0.0154	1.1953					0.0574	**5.2476**			0.0478	**4.6066**
T60	0.0160	1.2303					0.0580	**5.2903**			0.0484	**4.6515**

Note: (Bold & Shaded T-stat) Significant at 1% level of significance or less, (**Bold T-stat**) Significant at 5% and (*Italic T-stat*) Significant at 10%

Source: Decile2SizeTtest(DW83)ForBuyLSV(1994).xls

Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(d) Group 1 Sell Portfolio

Day	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983	CARt	DW1983
	T-30 to T6(	T-Value	T-6 to T12	T-Value	T0 to t12	T-Value	T0 to t60	T-Value	T6 to T12	T-Value	T6 to T60	T-Value
T-30	-0.0031	-0.1092										
T-29	-0.0034	-0.1188										
T-28	-0.0041	-0.1440										
T-27	0.0035	0.1231										
T-26	0.0090	0.3169										
T-25	0.0136	0.4809										
T-24	0.0269	0.9490										
T-23	0.0239	0.8440										
T-22	0.0213	0.7529										
T-21	0.0278	0.9825										
T-20	0.0251	0.8859										
T-19	0.0143	0.5034										
T-18	0.0226	0.7984										
T-17	0.0154	0.5427										
T-16	0.0229	0.8090										
T-15	0.0295	1.0413										
T-14	0.0392	*1.3848*										
T-13	0.0429	*1.5135*										
T-12	0.0515	**1.8156**										
T-11	0.0603	**2.1271**										
T-10	0.0677	**2.3900**										
T-9	0.0685	**2.4152**										
T-8	0.0682	**2.4066**										
T-7	0.0851	**3.0018**										
T-6	0.0886	**3.1255**	0.0035	0.2709								
T-5	0.0914	**3.2257**	0.0063	0.4902								
T-4	0.0930	**3.2800**	0.0079	0.6089								
T-3	0.1040	**3.6687**	0.0189	1.4596								
T-2	0.1078	**3.8023**	0.0227	*1.7520*								
T-1	0.1110	**3.9174**	0.0260	**2.0039**								
T0	0.1227	**4.3299**	0.0376	**2.9066**	0.0117	1.0913	0.0117	0.5038				
T1	0.1234	**4.3546**	0.0383	**2.9606**	0.0124	*1.1566*	0.0124	0.5339				
T2	0.1168	**4.1207**	0.0317	**2.4489**	0.0058	0.5379	0.0058	0.2483				
T3	0.1178	**4.1562**	0.0327	**2.5265**	0.0068	0.6318	0.0068	0.2917				
T4	0.1182	**4.1711**	0.0331	**2.5591**	0.0072	0.6712	0.0072	0.3099				
T5	0.1168	**4.1224**	0.0318	**2.4526**	0.0058	0.5424	0.0058	0.2504				
T6	0.1106	**3.9036**	0.0256	**1.9737**	-0.0004	-0.0366	-0.0004	-0.0169	-0.0062	-0.8522	-0.0062	-0.2815
T7	0.1115	**3.9323**	0.0264	**2.0365**	0.0004	0.0394	0.0004	0.0182	-0.0054	-0.7404	-0.0054	-0.2445
T8	0.1123	**3.9629**	0.0272	**2.1034**	0.0013	0.1202	0.0013	0.0555	-0.0045	-0.6214	-0.0045	-0.2052
T9	0.1138	**4.0166**	0.0288	**2.2211**	0.0028	0.2625	0.0028	0.1212	-0.0030	-0.4119	-0.0030	-0.1361
T10	0.1090	**3.8449**	0.0239	**1.8453**	-0.0021	-0.1917	-0.0021	-0.0885	-0.0079	-1.0806	-0.0079	-0.3569
T11	0.0926	**3.2675**	0.0075	**0.5816**	-0.0184	**-1.7195**	-0.0184	-0.7938	-0.0242	**-3.3294**	-0.0242	-1.0997
T12	0.0804	**2.8373**	-0.0047	-0.3598	-0.0306	**-2.8576**	-0.0306	*-1.3192*	-0.0364	**-5.0047**	-0.0364	*-1.6530*
T13	0.0888	**3.1334**					-0.0222	-0.9576			-0.0280	-1.2722
T14	0.0876	**3.0900**					-0.0235	-1.0107			-0.0293	*-1.3280*
T15	0.0880	**3.1039**					-0.0231	-0.9936			-0.0289	*-1.3101*
T16	0.0900	**3.1766**					-0.0210	-0.9048			-0.0268	-1.2166
T17	0.0945	**3.3329**					-0.0166	-0.7139			-0.0224	-1.0155
T18	0.0971	**3.4268**					-0.0139	-0.5993			-0.0197	-0.8948
T19	0.0924	**3.2599**					-0.0186	-0.8031			-0.0244	-1.1095
T20	0.0907	**3.1993**					-0.0204	-0.8771			-0.0262	-1.1873
T21	0.0820	**2.8939**					-0.0290	-1.2501			-0.0348	*-1.5802*
T22	0.0864	**3.0493**					-0.0246	-1.0603			-0.0304	*-1.3803*
T23	0.0867	**3.0600**					-0.0243	-1.0472			-0.0301	*-1.3665*
T24	0.0887	**3.1279**					-0.0224	-0.9643			-0.0282	-1.2792
T25	0.0835	**2.9465**					-0.0275	-1.1859			-0.0333	*-1.5126*
T26	0.0742	**2.6189**					-0.0368	*-1.5861*			-0.0426	**-1.9340**
T27	0.0860	**3.0346**					-0.0250	-1.0783			-0.0308	*-1.3993*
T28	0.0863	**3.0464**					-0.0247	-1.0638			-0.0305	*-1.3840*
T29	0.0802	**2.8297**					-0.0308	*-1.3285*			-0.0366	*-1.6628*
T30	0.0806	**2.8442**					-0.0304	*-1.3109*			-0.0362	*-1.6442*
T31	0.0763	**2.6938**					-0.0347	*-1.4945*			-0.0405	**-1.8376**
T32	0.0740	**2.6119**					-0.0370	*-1.5945*			-0.0428	**-1.9429**
T33	0.0836	**2.9498**					-0.0274	-1.1818			-0.0332	*-1.5083*
T34	0.0783	**2.7621**					-0.0327	*-1.4111*			-0.0386	**-1.7498**
T35	0.0687	**2.4244**					-0.0423	**-1.8235**			-0.0481	**-2.1841**
T36	0.0724	**2.5542**					-0.0386	*-1.6650*			-0.0444	**-2.0172**
T37	0.0788	**2.7820**					-0.0322	*-1.3868*			-0.0380	**-1.7242**
T38	0.0858	**3.0271**					-0.0252	-1.0875			-0.0310	*-1.4089*
T39	0.0834	**2.9428**					-0.0276	-1.1904			-0.0334	*-1.5173*
T40	0.0770	**2.7164**					-0.0340	*-1.4669*			-0.0399	**-1.8086**
T41	0.0848	**2.9908**					-0.0263	-1.1318			-0.0321	*-1.4556*
T42	0.0756	**2.6675**					-0.0354	*-1.5267*			-0.0412	**-1.8715**
T43	0.0710	**2.5033**					-0.0401	**-1.7271**			-0.0459	**-2.0826**
T44	0.0676	**2.3859**					-0.0434	**-1.8706**			-0.0492	**-2.2336**
T45	0.0704	**2.4829**					-0.0407	**-1.7521**			-0.0465	**-2.1088**
T46	0.0754	**2.6596**					-0.0356	*-1.5362*			-0.0415	**-1.8815**
T47	0.0723	**2.5510**					-0.0387	*-1.6690*			-0.0445	**-2.0213**
T48	0.0632	**2.2295**					-0.0478	**-2.0616**			-0.0537	**-2.4349**
T49	0.0598	**2.1101**					-0.0512	**-2.2075**			-0.0570	**-2.5885**
T50	0.0537	**1.8958**					-0.0573	**-2.4692**			-0.0631	**-2.8641**
T51	0.0488	**1.7203**					-0.0623	**-2.6836**			-0.0681	**-3.0899**
T52	0.0493	**1.7406**					-0.0617	**-2.6588**			-0.0675	**-3.0637**
T53	0.0421	*1.4837*					-0.0690	**-2.9726**			-0.0748	**-3.3942**
T54	0.0362	1.2779					-0.0748	**-3.2239**			-0.0806	**-3.6589**
T55	0.0370	*1.3051*					-0.0740	**-3.1907**			-0.0799	**-3.6239**
T56	0.0321	1.1311					-0.0790	**-3.4032**			-0.0848	**-3.8477**
T57	0.0391	*1.3813*					-0.0719	**-3.0976**			-0.0777	**-3.5259**
T58	0.0378	*1.3333*					-0.0732	**-3.1563**			-0.0791	**-3.5876**
T59	0.0333	1.1750					-0.0777	**-3.3496**			-0.0835	**-3.7912**
T60	0.0625	**2.2063**					-0.0485	**-2.0899**			-0.0543	**-2.4646**

Note: **(Bold [illegible] T-stat)** Significant at 1% level of significance or less, **(Bold T-stat)** Significant at 5% and (*Italic T-stat*) Significant at 10%

Source: Decile2SizeTtest(DW83)ForSellLSV(1994).Xls

Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(e) Group 2 Sell Portfolio

Day	CARt T-30 to T60	DW1983 T-Value	CARt T-6 to T12	DW1983 T-Value	CARt T0 to t12	DW1983 T-Value	CARt T0 to t60	DW1983 T-Value	CARt T6 to T12	DW1983 T-Value	CARt T6 to T60	DW1983 T-Value
T-30	0.0025	0.0753										
T-29	0.0011	0.0782										
T-28	0.0136	0.3416										
T-27	0.0246	0.5226										
T-26	0.0238	0.5236										
T-25	0.0351	0.7549										
T-24	0.0391	0.8784										
T-23	0.0404	0.9115										
T-22	0.0443	0.9969										
T-21	0.0464	1.0432										
T-20	0.0538	1.2045										
T-19	0.0609	1.3129										
T-18	0.0591	1.2758										
T-17	0.0463	1.0245										
T-16	0.0444	0.9603										
T-15	0.0540	1.1829										
T-14	0.0615	1.3495										
T-13	0.0595	1.3414										
T-12	0.0432	1.0202										
T-11	0.0372	0.9058										
T-10	0.0372	0.9154										
T-9	0.0444	1.0604										
T-8	0.0500	1.1826										
T-7	0.0550	1.3005										
T-6	0.0564	*1.3536*	0.0014	0.1162								
T-5	0.0598	*1.4525*	0.0048	0.3326								
T-4	0.0661	*1.6079*	0.0111	0.6727								
T-3	0.0605	*1.4818*	0.0055	0.3967								
T-2	0.0673	*1.5861*	0.0123	0.6250								
T-1	0.0654	*1.5878*	0.0104	0.6287								
T0	0.0703	*1.7204*	0.0153	0.9189	0.0049	0.3508	0.0049	0.1619				
T1	0.0645	*1.5983*	0.0095	0.6518	-0.0009	0.0279	-0.0009	0.0129				
T2	0.0543	*1.3897*	-0.0007	0.1952	-0.0111	-0.5241	-0.0111	-0.2420				
T3	0.0463	1.1943	-0.0087	-0.2324	-0.0192	-1.0411	-0.0192	-0.4806				
T4	0.0344	0.9800	-0.0206	-0.7014	-0.0310	*-1.6080*	-0.0310	-0.7423				
T5	0.0383	1.0714	-0.0167	-0.5013	-0.0271	*-1.3662*	-0.0271	-0.6307				
T6	0.0357	0.9215	-0.0193	-0.8295	-0.0298	*-1.7629*	-0.0298	-0.8138	-0.0027	-0.5839	-0.0027	-0.1929
T7	0.0324	0.8871	-0.0226	-0.9047	-0.0331	**-1.8538**	-0.0331	-0.8558	-0.0060	-0.7178	-0.0060	-0.2371
T8	0.0318	0.8601	-0.0232	-0.9639	-0.0336	**-1.9254**	-0.0336	-0.8889	-0.0065	-0.8232	-0.0065	-0.2719
T9	0.0267	0.7714	-0.0283	-1.1580	-0.0388	**-2.1600**	-0.0388	-0.9972	-0.0117	-1.1685	-0.0117	-0.3860
T10	0.0166	0.5190	-0.0384	*-1.7104*	-0.0488	**-2.8278**	-0.0488	-1.3054	-0.0217	**-2.1515**	-0.0217	-0.7106
T11	0.0170	0.5203	-0.0380	*-1.7074*	-0.0485	**-2.8242**	-0.0485	-1.3038	-0.0214	**-2.1462**	-0.0214	-0.7089
T12	0.0169	0.5234	-0.0381	-1.7007	-0.0486	**-2.8161**	-0.0486	-1.3000	-0.0215	**-2.1342**	-0.0215	-0.7049
T13	0.0163	0.5602					-0.0491	-1.2551			-0.0220	-0.6576
T14	0.0160	0.5348					-0.0495	-1.2861			-0.0224	-0.6902
T15	0.0193	0.5990					-0.0462	-1.2077			-0.0191	-0.6077
T16	0.0105	0.4056					-0.0550	*-1.4439*			-0.0279	-0.8564
T17	0.0093	0.3762					-0.0562	*-1.4798*			-0.0291	-0.8943
T18	0.0034	0.2222					-0.0620	*-1.6680*			-0.0349	-1.0924
T19	0.0051	0.2640					-0.0604	*-1.6168*			-0.0333	-1.0385
T20	0.0048	0.3090					-0.0607	*-1.5620*			-0.0336	-0.9807
T21	-0.0001	0.1873					-0.0656	*-1.7106*			-0.0385	-1.1373
T22	-0.0017	0.1563					-0.0672	*-1.7484*			-0.0401	-1.1771
T23	0.0021	0.2360					-0.0633	*-1.6511*			-0.0362	-1.0747
T24	-0.0064	0.0528					-0.0718	**-1.8748**			-0.0447	*-1.3102*
T25	-0.0057	0.0533					-0.0711	**-1.8742**			-0.0440	*-1.3096*
T26	-0.0077	-0.0292					-0.0731	**-1.9750**			-0.0460	*-1.4157*
T27	-0.0102	-0.0923					-0.0756	**-2.0521**			-0.0485	*-1.4970*
T28	-0.0145	-0.1808					-0.0799	**-2.1602**			-0.0528	*-1.6108*
T29	-0.0205	-0.3413					-0.0860	**-2.3562**			-0.0589	**-1.8172**
T30	-0.0135	-0.2474					-0.0789	**-2.2415**			-0.0518	*-1.6964*
T31	-0.0123	-0.2191					-0.0777	**-2.2070**			-0.0506	*-1.6601*
T32	-0.0145	-0.2644					-0.0800	**-2.2623**			-0.0529	*-1.7183*
T33	-0.0120	-0.2094					-0.0774	**-2.1951**			-0.0503	*-1.6476*
T34	-0.0072	-0.1189					-0.0726	**-2.0845**			-0.0455	*-1.5311*
T35	-0.0147	-0.2719					-0.0801	**-2.2714**			-0.0530	**-1.7279**
T36	-0.0204	-0.4172					-0.0859	**-2.4489**			-0.0588	**-1.9149**
T37	-0.0315	-0.6245					-0.0969	**-2.7021**			-0.0698	**-2.1815**
T38	-0.0344	-0.6410					-0.0998	**-2.7223**			-0.0727	**-2.2027**
T39	-0.0421	-0.8209					-0.1076	**-2.9420**			-0.0805	**-2.4341**
T40	-0.0330	-0.6725					-0.0984	**-2.7608**			-0.0713	**-2.2432**
T41	-0.0362	-0.7544					-0.1016	**-2.8607**			-0.0745	**-2.3485**
T42	-0.0334	-0.7285					-0.0988	**-2.8291**			-0.0717	**-2.3153**
T43	-0.0287	-0.6239					-0.0942	**-2.7013**			-0.0671	**-2.1806**
T44	-0.0238	-0.4503					-0.0892	**-2.4893**			-0.0621	**-1.9573**
T45	-0.0272	-0.4896					-0.0927	**-2.5373**			-0.0656	**-2.0079**
T46	-0.0264	-0.4787					-0.0919	**-2.5240**			-0.0648	**-1.9939**
T47	-0.0177	-0.3007					-0.0832	**-2.3066**			-0.0561	**-1.7649**
T48	-0.0173	-0.3136					-0.0827	**-2.3223**			-0.0556	**-1.7815**
T49	-0.0148	-0.2324					-0.0803	**-2.2232**			-0.0532	*-1.6771*
T50	-0.0191	-0.2855					-0.0845	**-2.2881**			-0.0574	*-1.7454*
T51	-0.0123	-0.1109					-0.0778	**-2.0748**			-0.0507	*-1.5208*
T52	-0.0282	-0.4300					-0.0936	**-2.4645**			-0.0665	**-1.9313**
T53	-0.0303	-0.4989					-0.0958	**-2.5487**			-0.0687	**-2.0200**
T54	-0.0320	-0.4749					-0.0975	**-2.5194**			-0.0704	**-1.9891**
T55	-0.0365	-0.5374					-0.1020	**-2.5957**			-0.0749	**-2.0694**
T56	-0.0437	-0.6923					-0.1091	**-2.7849**			-0.0820	**-2.2686**
T57	-0.0515	-0.8536					-0.1169	**-2.9819**			-0.0898	**-2.4762**
T58	-0.0577	-0.9117					-0.1232	**-3.0528**			-0.0961	**-2.5508**
T59	-0.0486	-0.7420					-0.1140	**-2.8456**			-0.0869	**-2.3326**
T60	-0.0401	-0.5874					-0.1056	**-2.6568**			-0.0785	**-2.1338**

Note: (Bold & Shaded T-stat) Significant at 1% level of significance or less, (Bold T-stat) Significant at 5% and (*Italic T-stat*) Significant at *10%*

Source: Decile2SizeTtest(DW83)ForSellLSV(1994).Xls

Appendix (A5.14)
FTSE100 Cumulative Abnormal Returns
Where AR Computed According LSV (1994) Re-Test
and T-test According to DW1983 During Different Event Windows
(f) All Groups Sell Portfolio

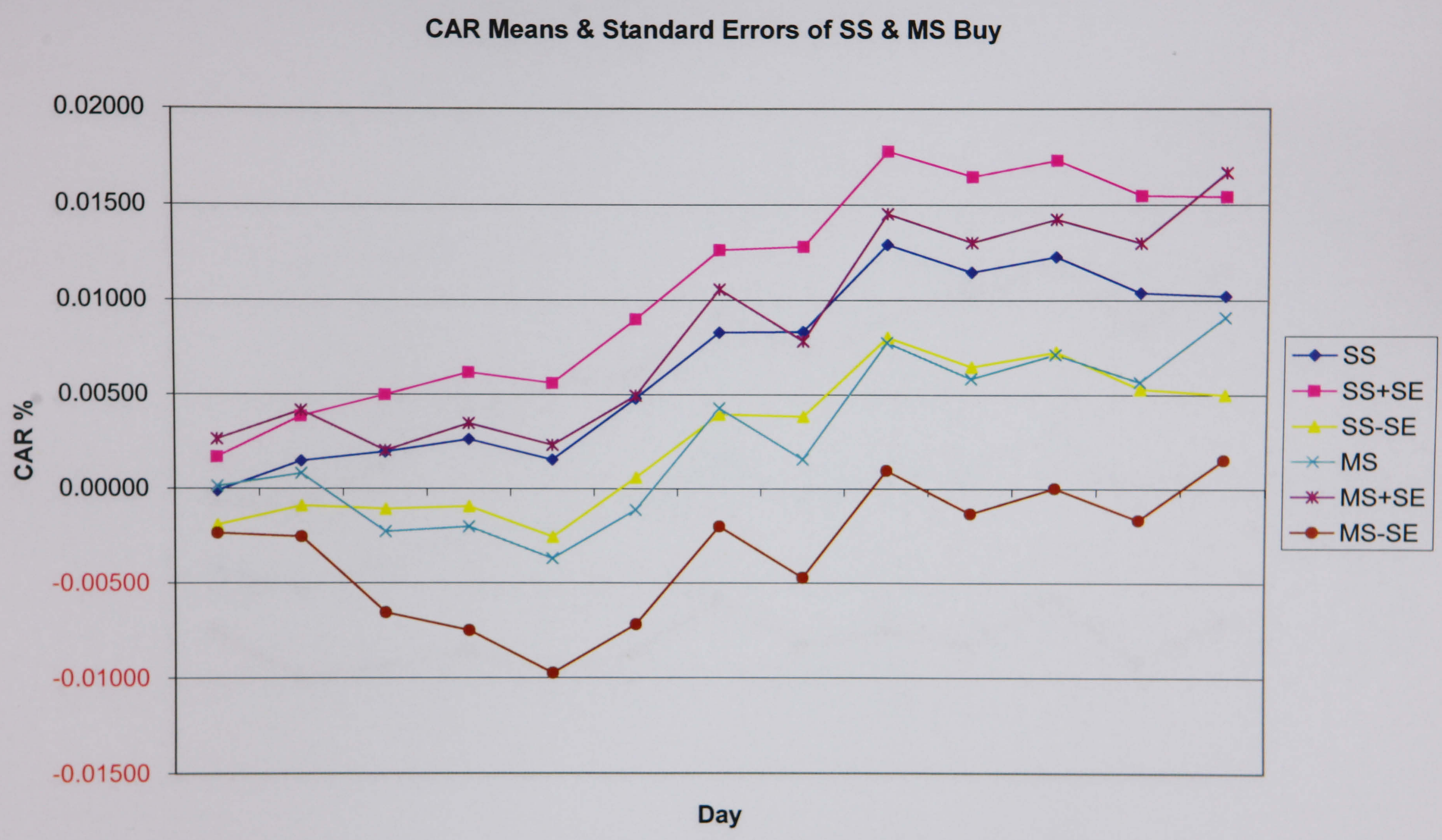
Day	CARt T-30 to T6C	DW1983 T-Value	CARt T-6 to T12	DW1983 T-Value	CARt T0 to t12	DW1983 T-Value	CARt T0 to t60	DW1983 T-Value	CARt T6 to T12	DW1983 T-Value	CARt T6 to T60	DW1983 T-Value
T-30	-0.0019	-0.0667										
T-29	-0.0025	-0.0738										
T-28	-0.0004	-0.0016										
T-27	0.0078	0.2908										
T-26	0.0120	0.4566										
T-25	0.0181	0.6786										
T-24	0.0294	1.1227										
T-23	0.0273	1.0447										
T-22	0.0261	0.9970										
T-21	0.0317	1.2100										
T-20	0.0310	1.1844										
T-19	0.0239	0.8956										
T-18	0.0302	1.1346										
T-17	0.0218	0.8268										
T-16	0.0274	1.0317										
T-15	0.0346	*1.3092*										
T-14	0.0438	*1.6620*										
T-13	0.0463	**1.7694**										
T-12	0.0498	**1.9136**										
T-11	0.0555	**2.1395**										
T-10	0.0614	**2.3673**										
T-9	0.0635	**2.4401**										
T-8	0.0645	**2.4762**										
T-7	0.0789	**3.0270**										
T-6	0.0819	**3.1516**	0.0031	0.2728								
T-5	0.0849	**3.2725**	0.0060	0.5374								
T-4	0.0874	**3.3741**	0.0086	0.7597								
T-3	0.0950	**3.6619**	0.0161	*1.3895*								
T-2	0.0994	**3.8132**	0.0206	**1.7207**								
T-1	0.1016	**3.9124**	0.0228	**1.9378**								
T0	0.1119	**4.3121**	0.0330	**2.8126**	0.0103	1.0575	0.0103	0.4882				
T1	0.1113	**4.2900**	0.0324	**2.7642**	0.0096	0.9990	0.0096	0.4612				
T2	0.1039	**4.0163**	0.0250	**2.1652**	0.0023	0.2749	0.0023	0.1269				
T3	0.1030	**3.9777**	0.0242	**2.0807**	0.0014	0.1728	0.0014	0.0798				
T4	0.1009	**3.9144**	0.0221	**1.9422**	-0.0007	0.0053	-0.0007	0.0024				
T5	0.1006	**3.9054**	0.0218	**1.9225**	-0.0010	-0.0185	-0.0010	-0.0086				
T6	0.0952	**3.6648**	0.0163	*1.3959*	-0.0065	-0.6552	-0.0065	-0.3025	-0.0055	-0.9371	-0.0055	-0.3095
T7	0.0951	**3.6772**	0.0163	*1.4231*	-0.0065	-0.6222	-0.0065	-0.2873	-0.0055	-0.8886	-0.0055	-0.2935
T8	0.0957	**3.6938**	0.0168	*1.4593*	-0.0059	-0.5785	-0.0059	-0.2671	-0.0049	-0.8242	-0.0049	-0.2722
T9	0.0959	**3.7081**	0.0170	*1.4908*	-0.0058	-0.5405	-0.0058	-0.2495	-0.0048	-0.7683	-0.0048	-0.2538
T10	0.0899	**3.4720**	0.0110	0.9740	-0.0117	-1.1652	-0.0117	-0.5379	-0.0107	**-1.6878**	-0.0107	-0.5575
T11	0.0770	**2.9786**	-0.0019	-0.1059	-0.0246	**-2.4707**	-0.0246	-1.1406	-0.0236	**-3.6095**	-0.0236	-1.1922
T12	0.0673	**2.6117**	-0.0116	-0.9088	-0.0343	**-3.4414**	-0.0343	*-1.5887*	-0.0333	**-5.0384**	-0.0333	*-1.6641*
T13	0.0738	**2.8778**					-0.0278	-1.2637			-0.0268	*-1.3218*
T14	0.0728	**2.8315**					-0.0288	*-1.3202*			-0.0278	*-1.3814*
T15	0.0738	**2.8662**					-0.0278	-1.2778			-0.0268	*-1.3367*
T16	0.0736	**2.8599**					-0.0280	-1.2856			-0.0270	*-1.3449*
T17	0.0769	**2.9832**					-0.0247	-1.1350			-0.0238	-1.1862
T18	0.0778	**3.0090**					-0.0238	-1.1034			-0.0229	-1.1530
T19	0.0744	**2.8813**					-0.0272	-1.2594			-0.0263	*-1.3173*
T20	0.0730	**2.8458**					-0.0287	*-1.3028*			-0.0277	*-1.3630*
T21	0.0651	**2.5417**					-0.0366	**-1.6743**			-0.0356	*-1.7542*
T22	0.0682	**2.6632**					-0.0334	*-1.5258*			-0.0324	*-1.5979*
T23	0.0693	**2.7005**					-0.0323	*-1.4802*			-0.0314	*-1.5498*
T24	0.0690	**2.6940**					-0.0326	*-1.4882*			-0.0316	*-1.5582*
T25	0.0651	**2.5388**					-0.0365	**-1.6777**			-0.0355	**-1.7579**
T26	0.0573	**2.2294**					-0.0443	**-2.0557**			-0.0433	**-2.1559**
T27	0.0662	**2.5623**					-0.0355	*-1.6491*			-0.0345	**-1.7277**
T28	0.0655	**2.5411**					-0.0361	**-1.6749**			-0.0351	**-1.7549**
T29	0.0594	**2.2987**					-0.0422	**-1.9710**			-0.0412	**-2.0667**
T30	0.0612	**2.3441**					-0.0404	**-1.9155**			-0.0394	**-2.0083**
T31	0.0581	**2.2254**					-0.0436	**-2.0605**			-0.0426	**-2.1610**
T32	0.0558	**2.1392**					-0.0459	**-2.1658**			-0.0449	**-2.2718**
T33	0.0639	**2.4475**					-0.0377	**-1.7893**			-0.0368	**-1.8753**
T34	0.0606	**2.3189**					-0.0410	**-1.9463**			-0.0400	**-2.0407**
T35	0.0515	**1.9760**					-0.0501	**-2.3652**			-0.0491	**-2.4818**
T36	0.0532	**2.0355**					-0.0484	**-2.2925**			-0.0474	**-2.4053**
T37	0.0561	**2.1567**					-0.0455	**-2.1445**			-0.0446	**-2.2494**
T38	0.0610	**2.3603**					-0.0406	**-1.8958**			-0.0396	**-1.9875**
T39	0.0575	**2.2242**					-0.0441	-2.0620			-0.0431	**-2.1626**
T40	0.0543	**2.0832**					-0.0473	**-2.2343**			-0.0463	**-2.3440**
T41	0.0598	**2.2887**					-0.0418	**-1.9832**			-0.0408	**-2.0796**
T42	0.0531	**2.0213**					-0.0485	**-2.3098**			-0.0475	**-2.4236**
T43	0.0504	**1.9179**					-0.0512	**-2.4361**			-0.0503	**-2.5565**
T44	0.0488	**1.8791**					-0.0529	**-2.4835**			-0.0519	**-2.6065**
T45	0.0502	**1.9482**					-0.0514	-2.3991			-0.0504	**-2.5175**
T46	0.0544	**2.1032**					-0.0472	**-2.2098**			-0.0463	**-2.3182**
T47	0.0537	**2.0731**					-0.0479	**-2.2465**			-0.0469	**-2.3569**
T48	0.0466	**1.7936**					-0.0550	**-2.5880**			-0.0541	**-2.7165**
T49	0.0444	**1.7202**					-0.0572	**-2.6776**			-0.0562	**-2.8109**
T50	0.0387	*1.5180*					-0.0629	**-2.9246**			-0.0619	**-3.0710**
T51	0.0361	*1.4297*					-0.0655	**-3.0324**			-0.0645	**-3.1845**
T52	0.0333	*1.3339*					-0.0683	**-3.1493**			-0.0673	**-3.3077**
T53	0.0271	1.0898					-0.0745	**-3.4475**			-0.0735	**-3.6217**
T54	0.0221	0.9222					-0.0795	**-3.6522**			-0.0785	**-3.8373**
T55	0.0218	0.9230					-0.0798	**-3.6513**			-0.0788	**-3.8363**
T56	0.0164	0.7195					-0.0852	**-3.8999**			-0.0842	**-4.0981**
T57	0.0204	0.8762					-0.0812	**-3.7085**			-0.0802	**-3.8965**
T58	0.0181	0.8146					-0.0835	**-3.7837**			-0.0826	**-3.9758**
T59	0.0164	0.7393					-0.0852	**-3.8757**			-0.0842	**-4.0726**
T60	0.0170	0.7501					-0.0846	**-3.8624**			-0.0836	**-4.0586**

Note: (Bold & Shaded T-stat) Significant at 1% level of significance or less, (Bold T-stat) Significant at 5% and (*Italic T-stat*) Significant at *10%*

Source: Decile2SizeTtest(DW83)ForSellLSV(1994).Xls

Appendix (A5.15) (a) Buy Portfolios
Means and Standard Errors of CARs of Different Signal Definitions During the Event Window

BUY	N	Mean	Mean	Mean +	Mean -
Single Signal	Stat	Statistic	Std Error	StdError	StdError
T0BSS	295	-0.00011	0.00179	0.00169	-0.00190
T1BSS	295	0.00148	0.00237	0.00385	-0.00089
T2BSS	295	0.00196	0.00303	0.00499	-0.00106
T3BSS	295	0.00263	0.00356	0.00618	-0.00093
T4BSS	295	0.00153	0.00408	0.00561	-0.00254
T5BSS	295	0.00480	0.00419	0.00899	0.00061
T6BSS	295	0.00830	0.00434	0.01264	0.00396
T7BSS	295	0.00833	0.00448	0.01281	0.00385
T8BSS	295	0.01291	0.00487	0.01778	0.00804
T9BSS	295	0.01147	0.00499	0.01647	0.00648
T10BSS	295	0.01229	0.00502	0.01731	0.00727
T11BSS	295	0.01039	0.00508	0.01547	0.00531
T12BSS	295	0.01022	0.00520	0.01542	0.00501
Multiple Signal					
T0BMS	103	0.00014	0.00249	0.00263	-0.00235
T1BMS	103	0.00081	0.00335	0.00416	-0.00254
T2BMS	103	-0.00227	0.00429	0.00203	-0.00656
T3BMS	103	-0.00202	0.00549	0.00348	-0.00751
T4BMS	103	-0.00371	0.00604	0.00233	-0.00975
T5BMS	103	-0.00112	0.00606	0.00494	-0.00719
T6BMS	103	0.00428	0.00628	0.01057	-0.00200
T7BMS	103	0.00157	0.00628	0.00784	-0.00471
T8BMS	103	0.00775	0.00678	0.01453	0.00098
T9BMS	103	0.00585	0.00718	0.01302	-0.00133
T10BMS	103	0.00713	0.00711	0.01424	0.00003
T11BMS	103	0.00567	0.00733	0.01300	-0.00166
T12BMS	103	0.00910	0.00756	0.01666	0.00154
Q1 Signal					
T0BQ1	74	-0.00395	0.00342	-0.00053	-0.00737
T1BQ1	74	-0.00529	0.00450	-0.00079	-0.00978
T2BQ1	74	-0.00385	0.00539	0.00154	-0.00923
T3BQ1	74	-0.00206	0.00634	0.00428	-0.00840
T4BQ1	74	-0.00190	0.00759	0.00569	-0.00949
T5BQ1	74	-0.00110	0.00742	0.00632	-0.00852
T6BQ1	74	0.00182	0.00756	0.00938	-0.00574
T7BQ1	74	-0.00036	0.00780	0.00744	-0.00817
T8BQ1	74	0.00088	0.00825	0.00912	-0.00737
T9BQ1	74	0.00109	0.00928	0.01037	-0.00819
T10BQ1	74	0.00322	0.00881	0.01204	-0.00559
T11BQ1	74	-0.00024	0.00885	0.00861	-0.00909
T12BQ1	74	0.00236	0.00929	0.01165	-0.00694
Q2 Signal					
T0BQ2	73	0.00415	0.00346	0.00760	0.00069
T1BQ2	73	0.00989	0.00531	0.01520	0.00457
T2BQ2	73	0.01146	0.00720	0.01866	0.00426
T3BQ2	73	0.01010	0.00864	0.01874	0.00146
T4BQ2	73	0.01065	0.00986	0.02051	0.00078
T5BQ2	73	0.01650	0.00984	0.02634	0.00666
T6BQ2	73	0.01913	0.00987	0.02899	0.00926
T7BQ2	73	0.02025	0.01004	0.03029	0.01021
T8BQ2	73	0.02365	0.01095	0.03460	0.01270
T9BQ2	73	0.01918	0.01044	0.02963	0.00874
T10BQ2	73	0.01586	0.01089	0.02676	0.00497
T11BQ2	73	0.01376	0.01128	0.02505	0.00248
T12BQ2	73	0.00819	0.01127	0.01946	-0.00307
Q3 Signal					
T0BQ3	74	0.00324	0.00387	0.00710	-0.00063
T1BQ3	74	0.00368	0.00469	0.00837	-0.00102
T2BQ3	74	0.00477	0.00583	0.01060	-0.00106
T3BQ3	74	0.00797	0.00691	0.01488	0.00106
T4BQ3	74	0.00722	0.00713	0.01435	0.00009
T5BQ3	74	0.00968	0.00798	0.01766	0.00170
T6BQ3	74	0.01360	0.00865	0.02225	0.00495
T7BQ3	74	0.01700	0.00957	0.02658	0.00743
T8BQ3	74	0.02236	0.01056	0.03291	0.01180
T9BQ3	74	0.01724	0.01090	0.02814	0.00635
T10BQ3	74	0.01998	0.01084	0.03082	0.00914
T11BQ3	74	0.01601	0.01073	0.02673	0.00528
T12BQ3	74	0.01417	0.01155	0.02573	0.00262
Q4 Signal					
T0BQ4	74	-0.00380	0.00354	-0.00026	-0.00734
T1BQ4	74	-0.00226	0.00433	0.00207	-0.00659
T2BQ4	74	-0.00440	0.00560	0.00121	-0.01000
T3BQ4	74	-0.00541	0.00633	0.00093	-0.01174
T4BQ4	74	-0.00971	0.00777	-0.00194	-0.01747
T5BQ4	74	-0.00573	0.00805	0.00232	-0.01377
T6BQ4	74	-0.00120	0.00849	0.00729	-0.00969
T7BQ4	74	-0.00340	0.00812	0.00473	-0.01152
T8BQ4	74	0.00491	0.00889	0.01380	-0.00397
T9BQ4	74	0.00849	0.00929	0.01778	-0.00080
T10BQ4	74	0.01014	0.00958	0.01971	0.00056
T11BQ4	74	0.01208	0.00978	0.02186	0.00230
T12BQ4	74	0.01612	0.00949	0.02561	0.00663


CAR Means & Standard Errors of SS & MS Buy
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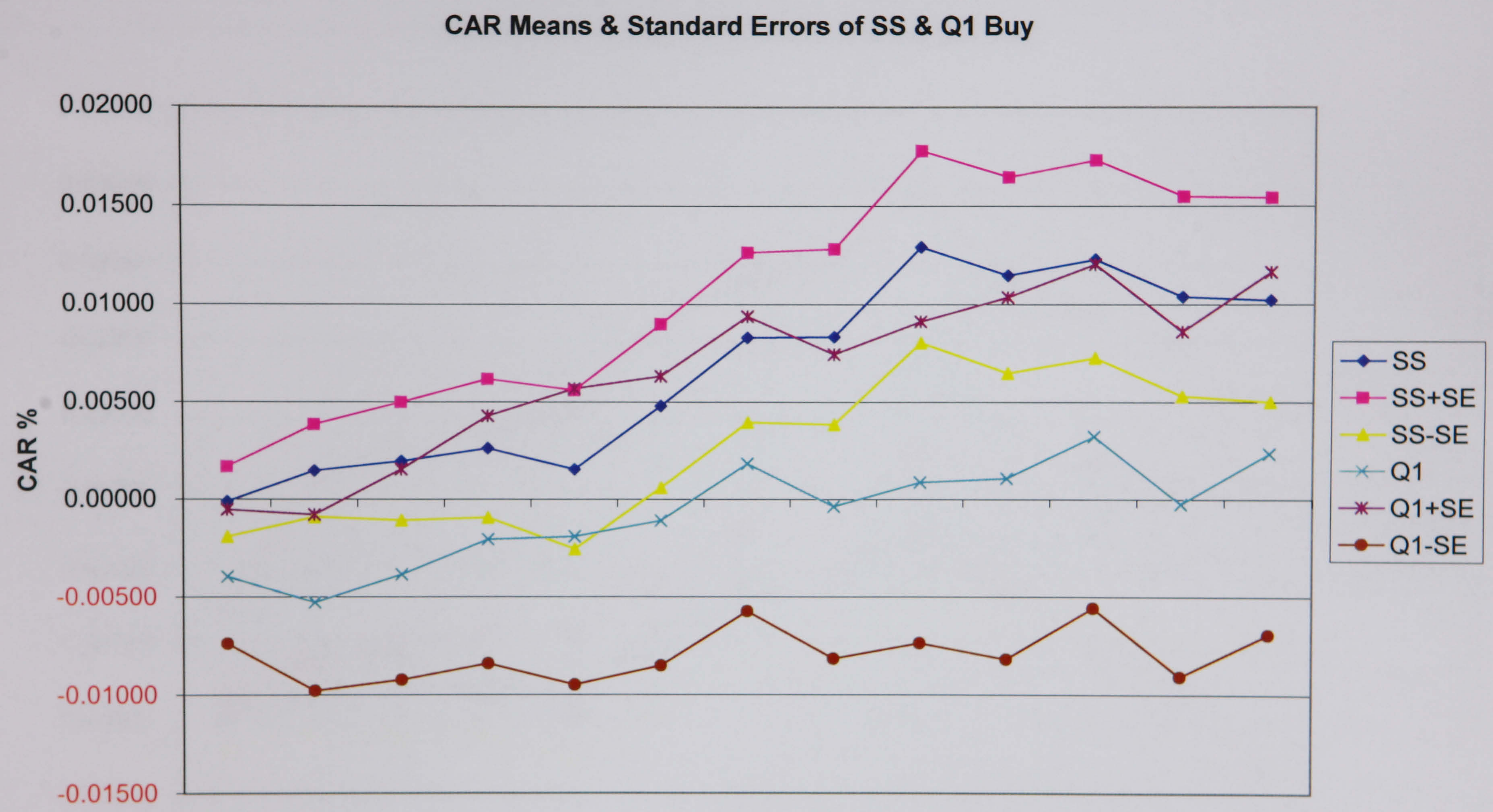
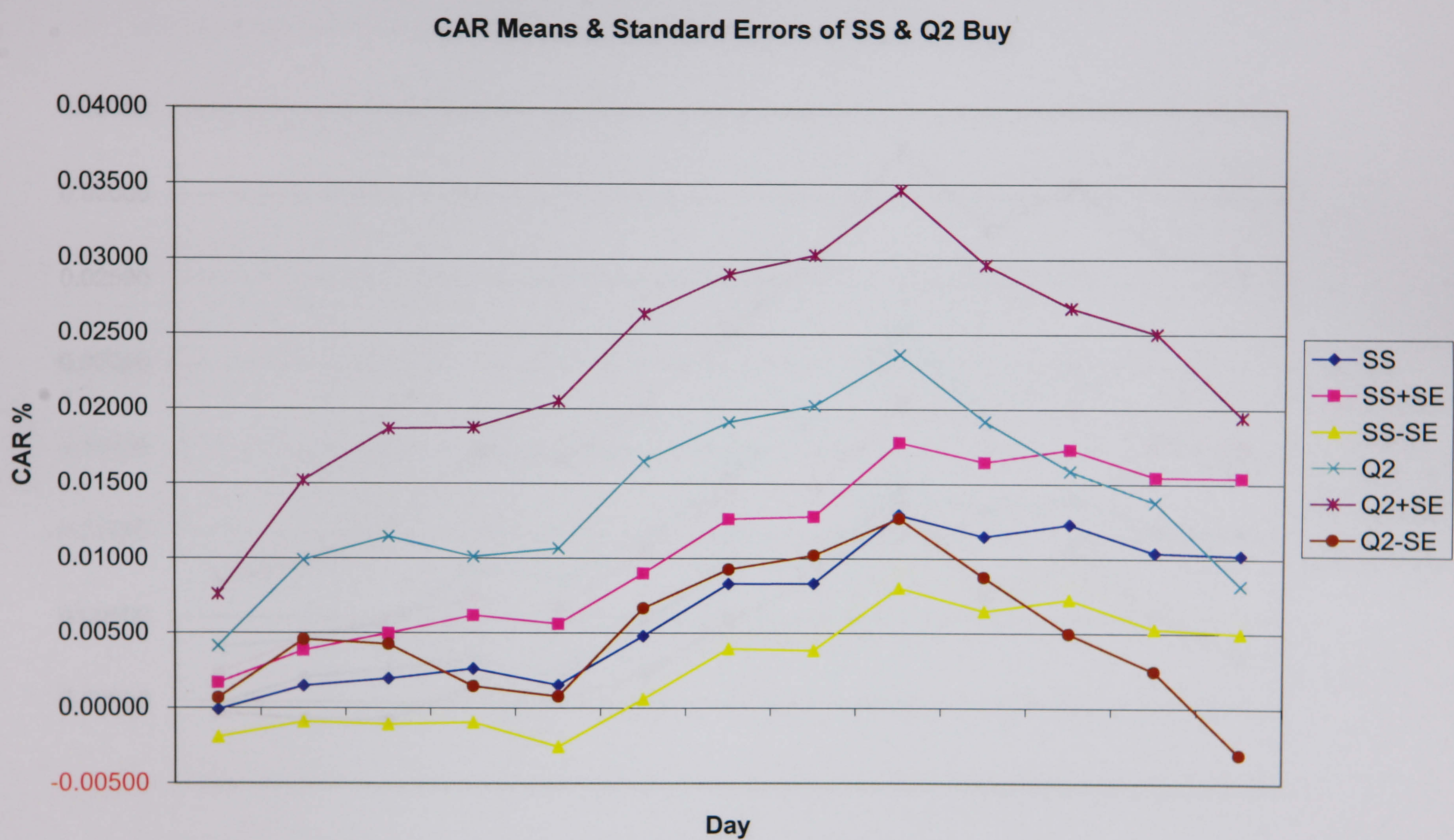
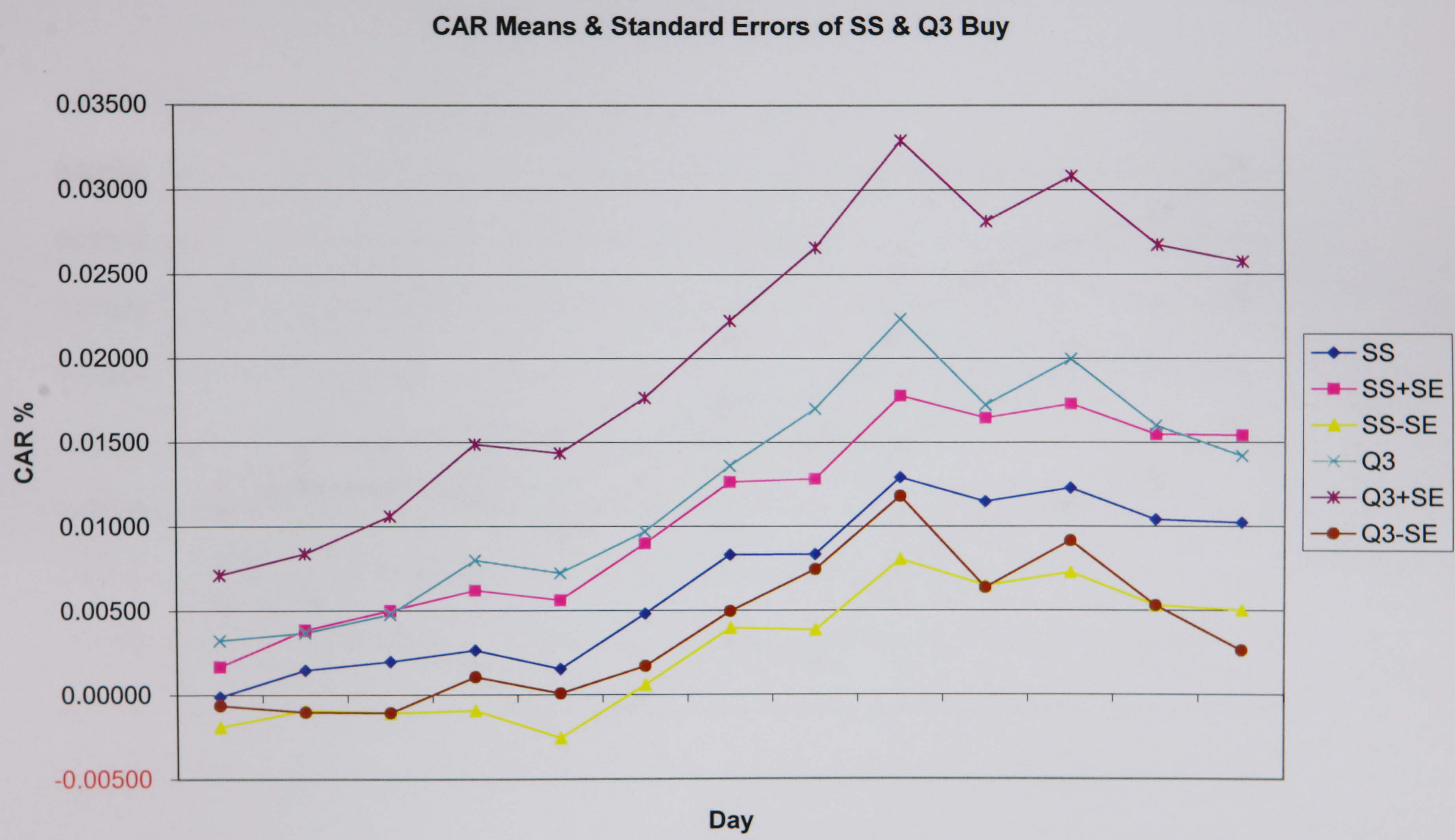
0.01500
0.01000
0.00500
0.00000
-0.00500
-0.01000
-0.01500
CAR %
Day
SS
SS+SE
SS-SE
MS
MS+SE
MS-SE



CAR Means & Standard Errors of SS & Q1 Buy
0.02000
0.01500
0.01000
0.00500
0.00000
-0.00500
-0.01000
-0.01500
CAR %
Day
SS
SS+SE
SS-SE
Q1
Q1+SE
Q1-SE



CAR Means & Standard Errors of SS & Q2 Buy
CAR %
0.04000
0.03500
0.03000
0.02500
0.02000
0.01500
0.01000
0.00500
0.00000
-0.00500
Day
SS
SS+SE
SS-SE
Q2
Q2+SE
Q2-SE



CAR Means & Standard Errors of SS & Q3 Buy
CAR %
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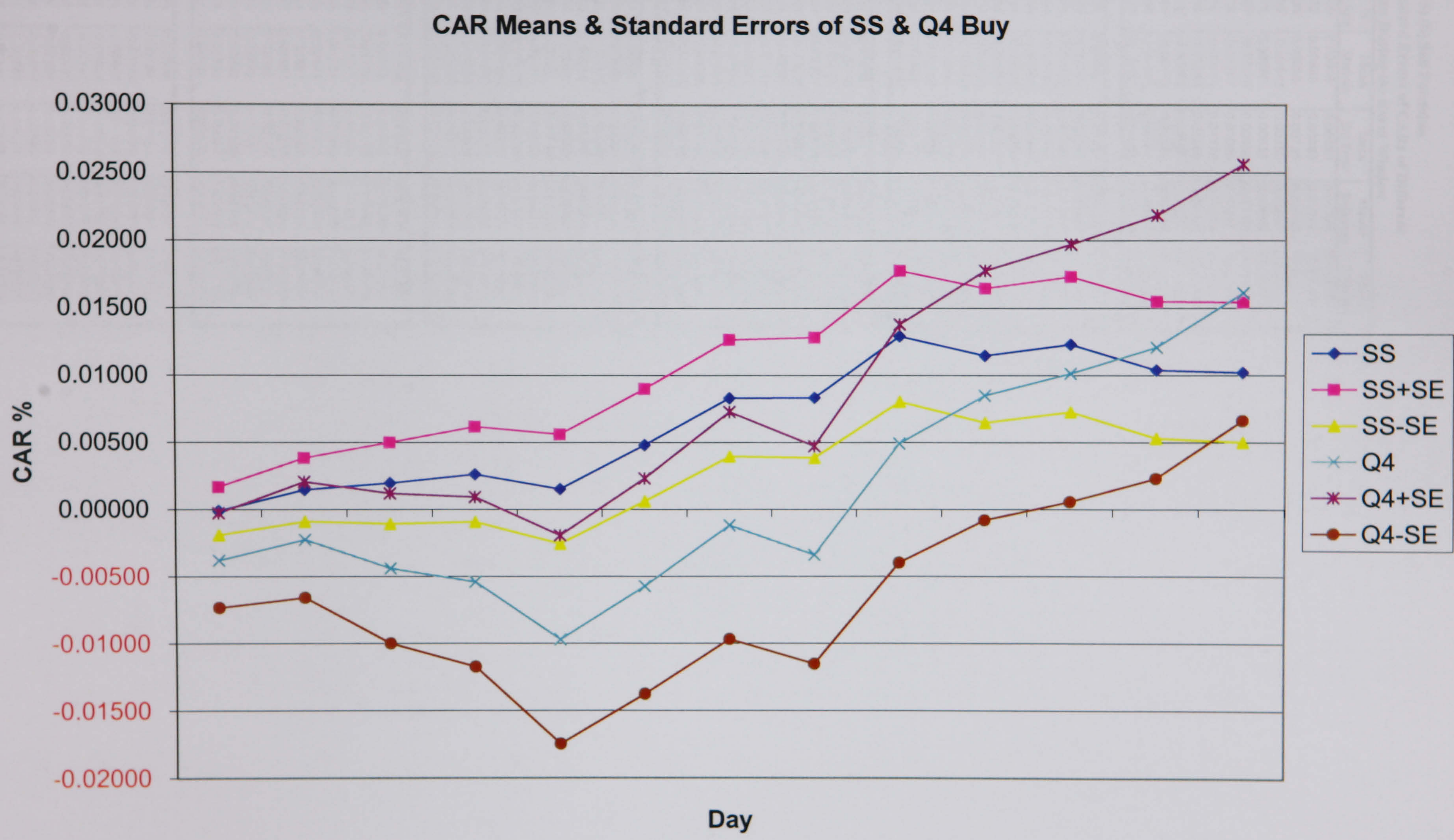
0.03000
0.02500
0.02000
0.01500
0.01000
0.00500
0.00000
-0.00500
Day
SS
SS+SE
SS-SE
Q3
Q3+SE
Q3-SE


CAR Means & Standard Errors of SS & Q4 Buy
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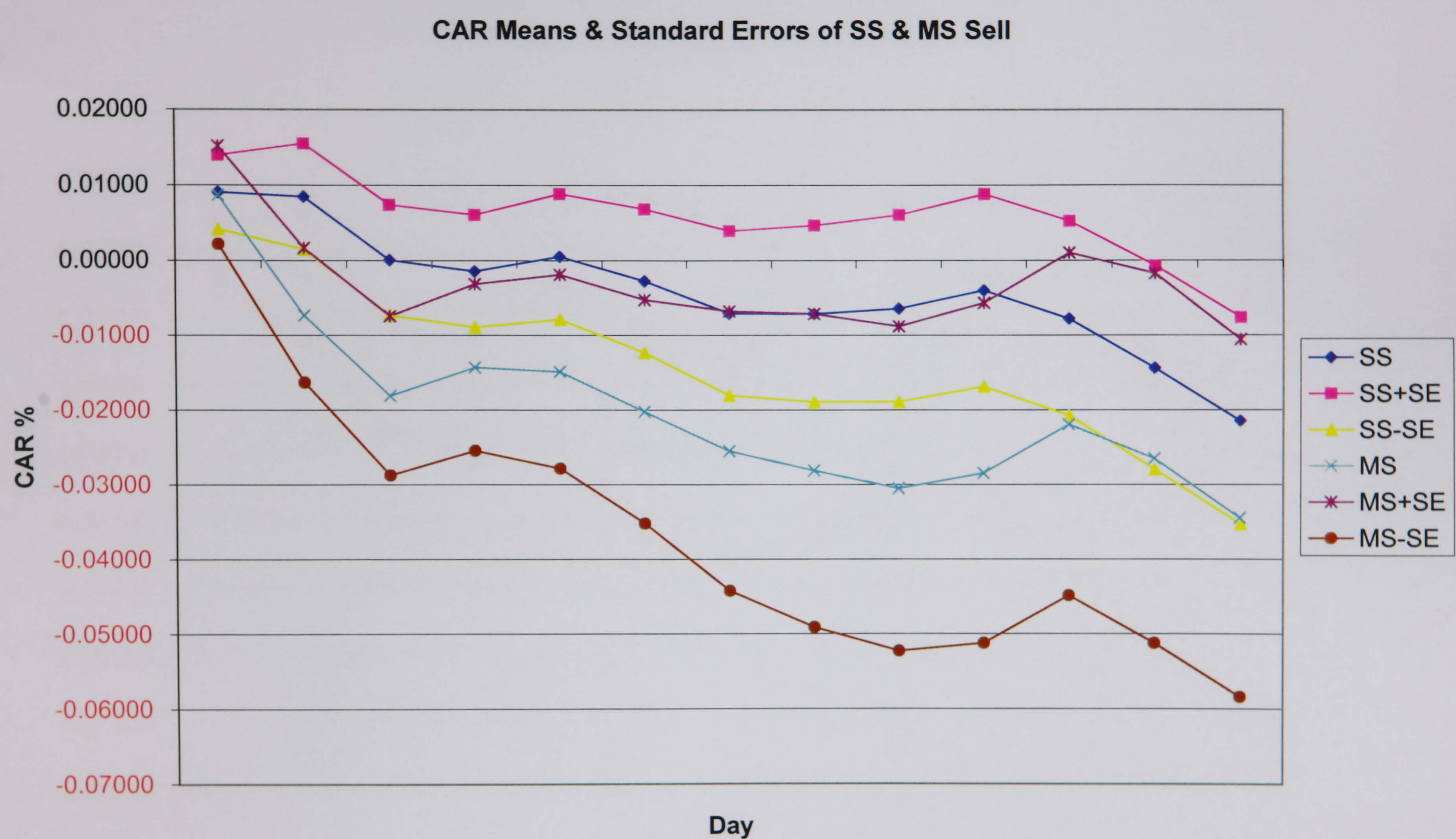
0.02500
0.02000
0.01500
0.01000
0.00500
0.00000
-0.00500
-0.01000
-0.01500
-0.02000
CAR %
Day
SS
SS+SE
SS-SE
Q4
Q4+SE
Q4-SE

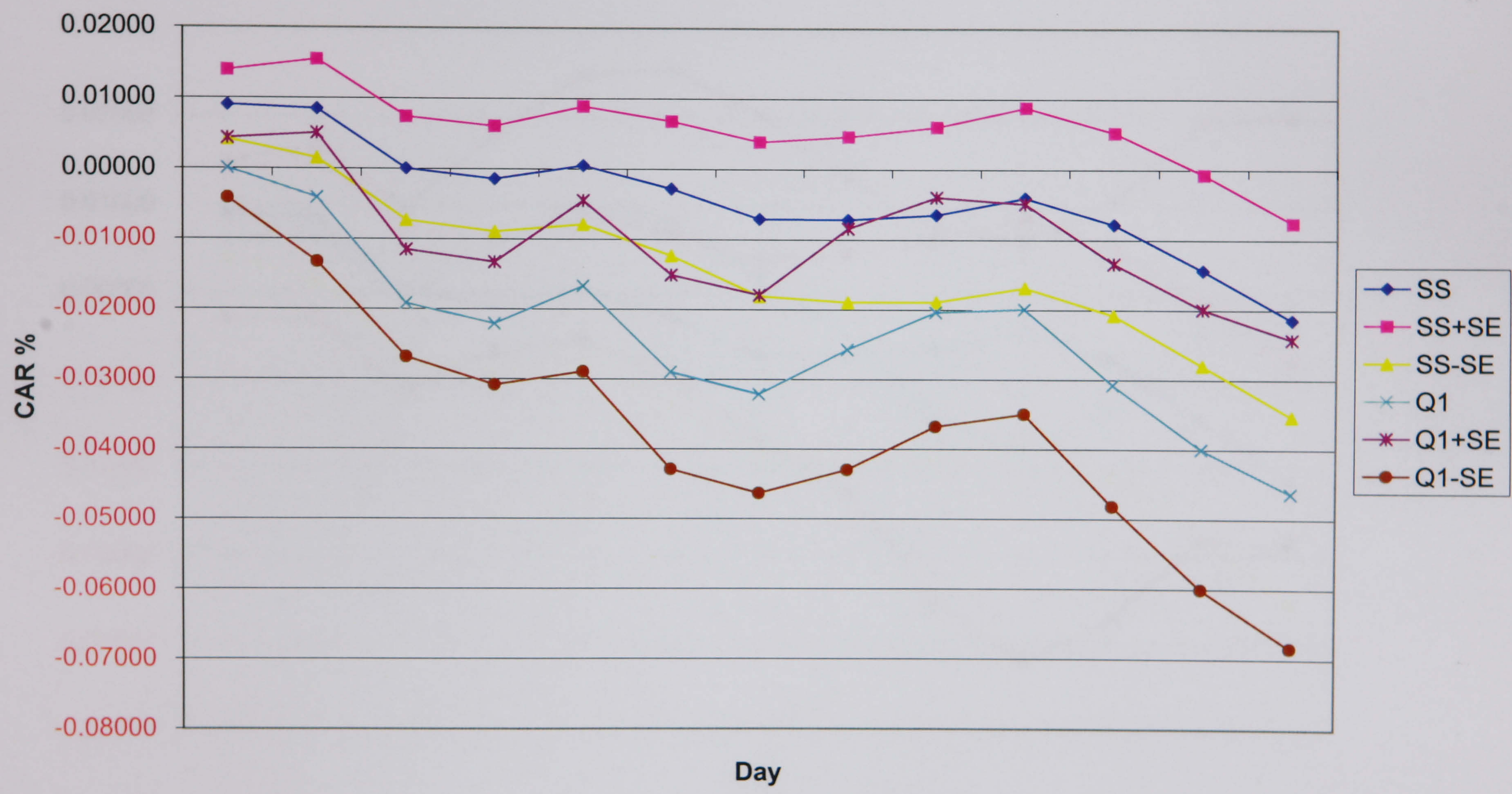
Appendix (A5.15) (b) Sell Portfolios
Means and Standard Errors of CARs of Different Signal Definitions During the Event Window

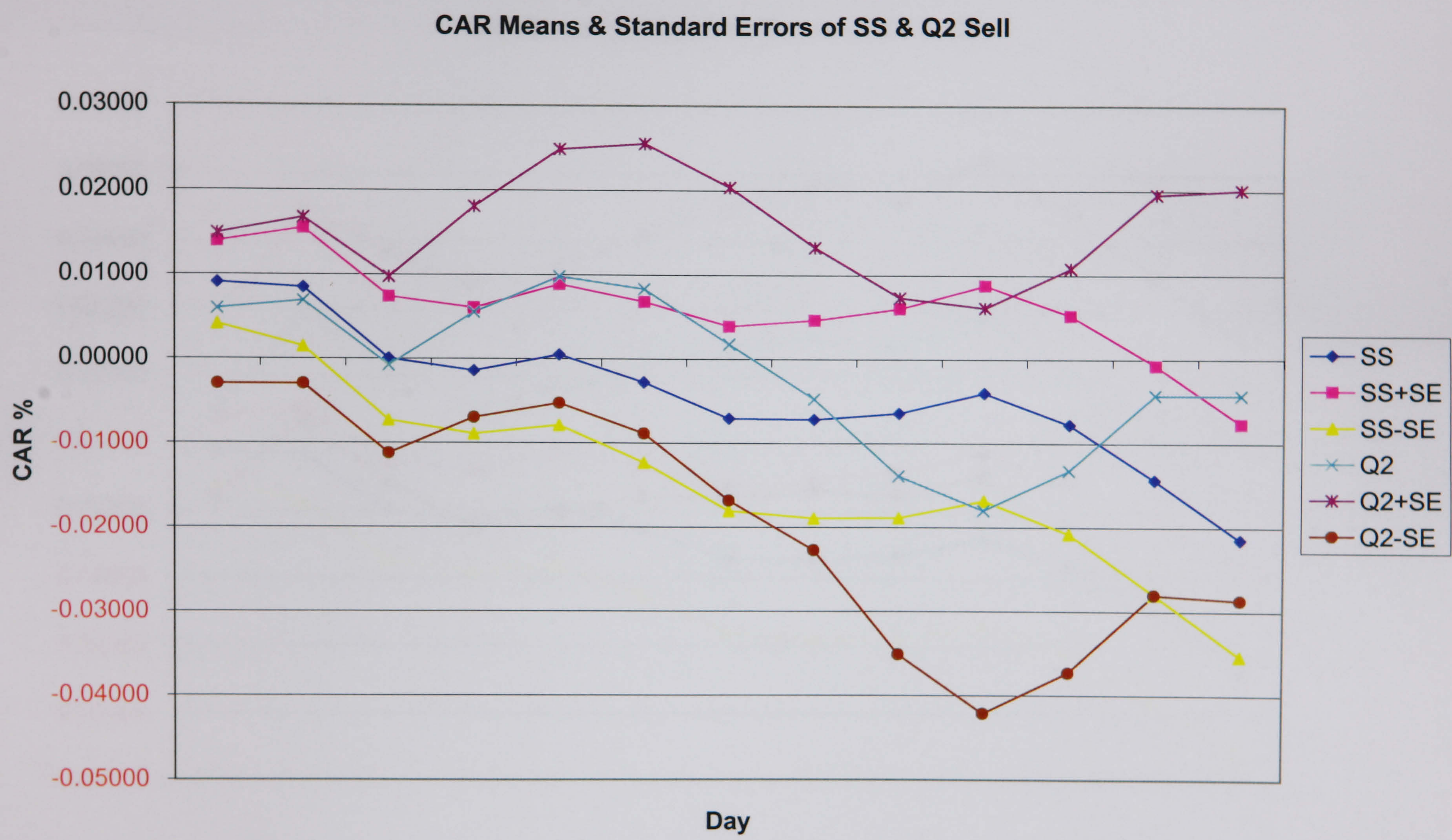
SELL	N	Mean	Mean	Mean+	Mean-
Single Signal	Stat	Statistic	Std Error	StdError	StdError
T0SSS	95	0.00905	0.00490	0.01395	0.00416
T1SSS	95	0.00848	0.00699	0.01547	0.00149
T2SSS	95	0.00005	0.00735	0.00740	-0.00730
T3SSS	95	-0.00143	0.00750	0.00607	-0.00893
T4SSS	95	0.00050	0.00837	0.00886	-0.00787
T5SSS	95	-0.00276	0.00956	0.00680	-0.01233
T6SSS	95	-0.00707	0.01099	0.00391	-0.01806
T7SSS	95	-0.00714	0.01179	0.00464	-0.01893
T8SSS	95	-0.00643	0.01245	0.00602	-0.01888
T9SSS	95	-0.00401	0.01280	0.00879	-0.01682
T10SSS	95	-0.00779	0.01299	0.00520	-0.02077
T11SSS	95	-0.01435	0.01361	-0.00074	-0.02796
T12SSS	95	-0.02147	0.01383	-0.00764	-0.03530
Multiple Signal					
T0SMS	34	0.00867	0.00650	0.01517	0.00217
T1SMS	34	-0.00734	0.00898	0.00164	-0.01633
T2SMS	34	-0.01809	0.01068	-0.00741	-0.02876
T3SMS	34	-0.01430	0.01115	-0.00316	-0.02545
T4SMS	34	-0.01488	0.01298	-0.00190	-0.02786
T5SMS	34	-0.02024	0.01498	-0.00527	-0.03522
T6SMS	34	-0.02553	0.01872	-0.00681	-0.04425
T7SMS	34	-0.02814	0.02098	-0.00715	-0.04912
T8SMS	34	-0.03053	0.02174	-0.00879	-0.05227
T9SMS	34	-0.02846	0.02278	-0.00569	-0.05124
T10SMS	34	-0.02194	0.02294	0.00100	-0.04487
T11SMS	34	-0.02650	0.02473	-0.00177	-0.05123
T12SMS	34	-0.03449	0.02390	-0.01059	-0.05838
Q1 Signal					
T0SQ1	24	0.00008	0.00425	0.00433	-0.00417
T1SQ1	24	-0.00410	0.00915	0.00505	-0.01324
T2SQ1	24	-0.01917	0.00766	-0.01152	-0.02683
T3SQ1	24	-0.02207	0.00878	-0.01328	-0.03085
T4SQ1	24	-0.01670	0.01223	-0.00447	-0.02893
T5SQ1	24	-0.02898	0.01390	-0.01507	-0.04288
T6SQ1	24	-0.03211	0.01420	-0.01791	-0.04631
T7SQ1	24	-0.02570	0.01728	-0.00842	-0.04298
T8SQ1	24	-0.02035	0.01641	-0.00394	-0.03676
T9SQ1	24	-0.01989	0.01504	-0.00485	-0.03493
T10SQ1	24	-0.03078	0.01740	-0.01338	-0.04817
T11SQ1	24	-0.03999	0.02005	-0.01994	-0.06005
T12SQ1	24	-0.04633	0.02207	-0.02426	-0.06839
Q2 Signal					
T0SQ2	23	0.00597	0.00894	0.01490	-0.00297
T1SQ2	23	0.00689	0.00985	0.01674	-0.00296
T2SQ2	23	-0.00075	0.01048	0.00973	-0.01123
T3SQ2	23	0.00554	0.01252	0.01806	-0.00698
T4SQ2	23	0.00980	0.01503	0.02483	-0.00524
T5SQ2	23	0.00831	0.01718	0.02549	-0.00886
T6SQ2	23	0.00177	0.01860	0.02037	-0.01684
T7SQ2	23	-0.00473	0.01799	0.01326	-0.02271
T8SQ2	23	-0.01390	0.02122	0.00733	-0.03512
T9SQ2	23	-0.01800	0.02412	0.00612	-0.04212
T10SQ2	23	-0.01325	0.02405	0.01080	-0.03730
T11SQ2	23	-0.00425	0.02379	0.01953	-0.02804
T12SQ2	23	-0.00428	0.02439	0.02011	-0.02867
Q3 Signal					
T0SQ3	24	0.01496	0.01253	0.02749	0.00243
T1SQ3	24	0.02918	0.01567	0.04485	0.01351
T2SQ3	24	0.02139	0.01723	0.03862	0.00416
T3SQ3	24	0.01575	0.01826	0.03401	-0.00251
T4SQ3	24	0.01791	0.01848	0.03639	-0.00057
T5SQ3	24	0.02175	0.01921	0.04095	0.00254
T6SQ3	24	0.02363	0.02156	0.04519	0.00207
T7SQ3	24	0.02587	0.02278	0.04864	0.00309
T8SQ3	24	0.02449	0.02188	0.04637	0.00261
T9SQ3	24	0.02872	0.02347	0.05219	0.00526
T10SQ3	24	0.02082	0.02326	0.04408	-0.00244
T11SQ3	24	0.01122	0.02347	0.03469	-0.01225
T12SQ3	24	0.00094	0.02476	0.02570	-0.02381
Q4 Signal					
T0SQ4	24	0.01508	0.01150	0.02658	0.00357
T1SQ4	24	0.00188	0.01856	0.02044	-0.01667
T2SQ4	24	-0.00130	0.01952	0.01822	-0.02082
T3SQ4	24	-0.00464	0.01794	0.01330	-0.02257
T4SQ4	24	-0.00864	0.02002	0.01138	-0.02865
T5SQ4	24	-0.01167	0.02414	0.01247	-0.03581
T6SQ4	24	-0.02120	0.02980	0.00860	-0.05100
T7SQ4	24	-0.02391	0.03254	0.00862	-0.05645
T8SQ4	24	-0.01627	0.03590	0.01963	-0.05217
T9SQ4	24	-0.00747	0.03573	0.02826	-0.04320
T10SQ4	24	-0.00817	0.03598	0.02781	-0.04414
T11SQ4	24	-0.02395	0.03821	0.01426	-0.06217
T12SQ4	24	-0.03550	0.03713	0.00164	-0.07263



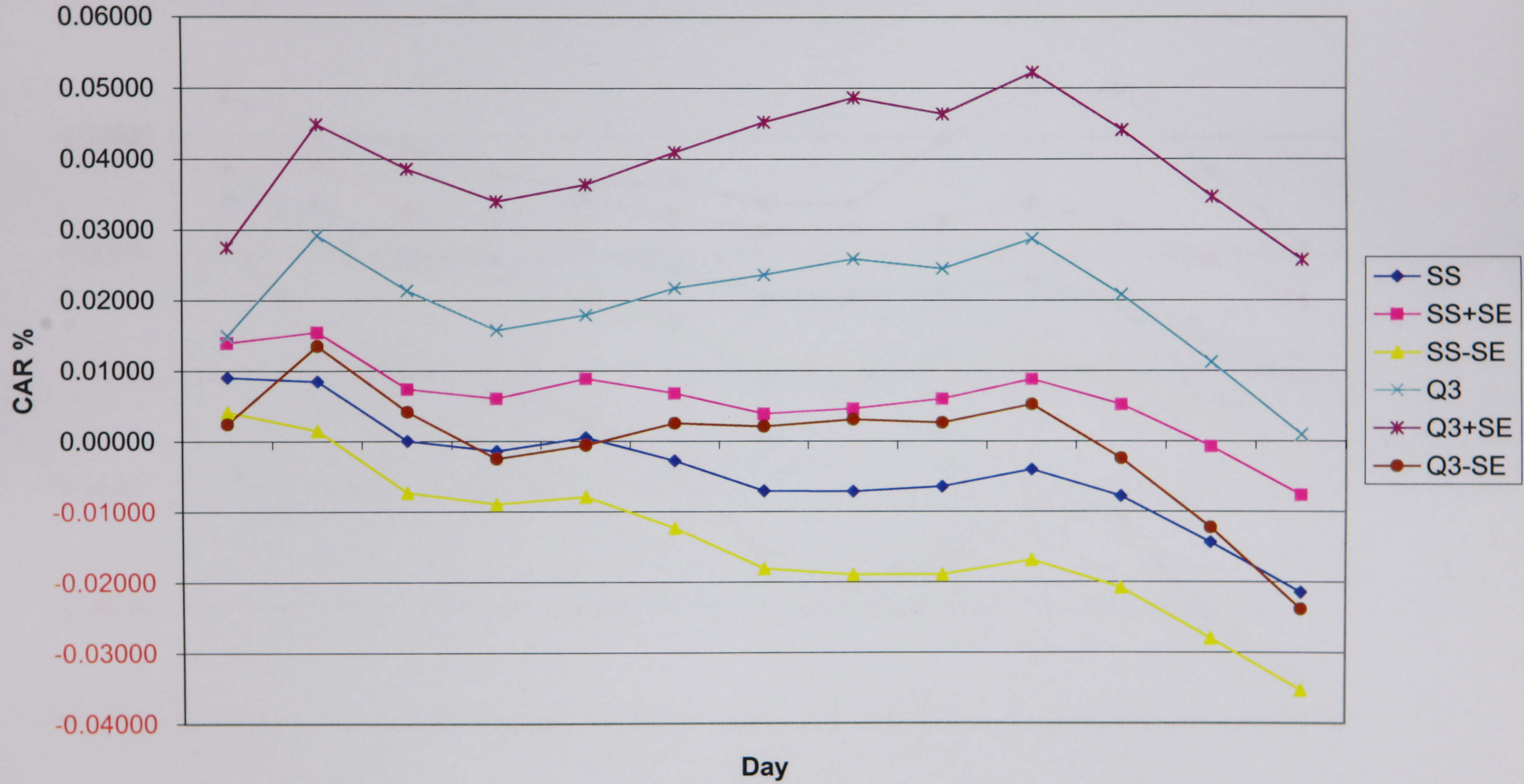
CAR Means & Standard Errors of SS & MS Sell
0.02000
0.01000
0.00000
-0.01000
-0.02000
-0.03000
-0.04000
-0.05000
-0.06000
-0.07000
CAR %
Day
SS
SS+SE
SS-SE
MS
MS+SE
MS-SE

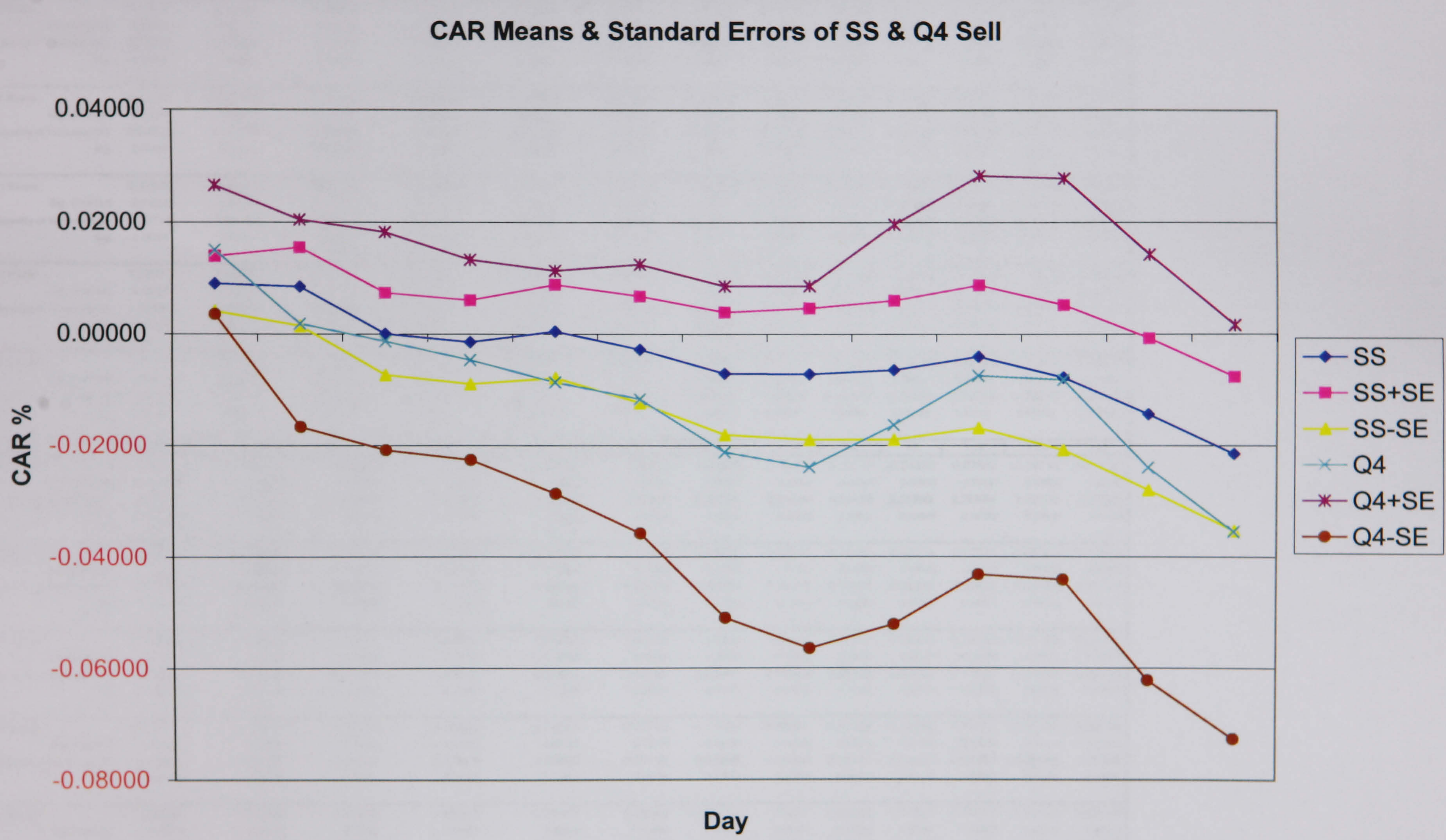
CAR Means & Standard Errors of SS & Q1 Sell




CAR Means & Standard Errors of SS & Q2 Sell
0.03000
0.02000
0.01000
0.00000
-0.01000
-0.02000
-0.03000
-0.04000
-0.05000
CAR %
Day
SS
SS+SE
SS-SE
Q2
Q2+SE
Q2-SE

CAR Means & Standard Errors of SS & Q3




CAR Means & Standard Errors of SS & Q4 Sell
0.04000
0.02000
0.00000
-0.02000
-0.04000
-0.06000
-0.08000
CAR %
Day
SS
SS+SE
SS-SE
Q4
Q4+SE
Q4-SE

Appendix (A5.16) Test of Equality of Means of LnCAR Produced by SS and each of MS, QS1, QS2, QS3 and QS4 For Buy and Sell Portfolios
Independent Samples Test of LnCARbuy of SS With Each of MS, Q1, Q2, Q3 and Q4 at Each Day of the Event Window

SS	Buy	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
MS	t-test for Equality of Means	0.11817	0.17961	0.14919	-1.57846	-0.71036	-0.80012	-0.11444	0.64090	0.07050	-0.54747	0.07498	0.09931	1.20785
	Sig. (2-tailed)	0.90617	0.85782	0.88170	0.11759	0.47912	0.42552	0.90912	0.52304	0.94393	0.58526	0.94038	0.92109	0.22992
	Levene's Test for Equality of Variances (F)	2.77923	2.95264	0.10093	0.64434	1.76974	0.00244	0.01042	0.02897	0.81791	1.29994	0.17147	0.08886	0.54834
	Sig.	0.09859	0.08880	0.75137	0.42403	0.18641	0.96068	0.91890	0.86520	0.36794	0.25692	0.67969	0.76625	0.46071
Q1	t-test for Equality of Means	-0.44248	-0.76412	-1.58400	-2.26648	-1.82552	-2.47653	-0.05409	-0.45341	-0.26425	0.44583	0.09398	0.59348	0.52511
	Sig. (2-tailed)	0.65947	0.44729	0.11758	0.02643	0.07207	0.01562	0.95702	0.65162	0.79234	0.65705	0.92538	0.55472	0.60112
	Levene's Test for Equality of Variances (F)	0.09079	0.00160	5.31695	1.25113	2.71132	1.63573	0.29358	0.70446	0.00079	0.48728	0.02588	0.07497	0.80676
	Sig.	0.76404	0.96823	0.02400	0.26706	0.10400	0.20502	0.58961	0.40407	0.97759	0.48739	0.87265	0.78502	0.37207
Q2	t-test for Equality of Means	0.46879	-0.36445	0.37580	-0.59286	-0.28173	-0.26566	-0.20542	0.33255	-0.18520	-1.08663	-0.12975	-0.13282	1.06454
	Sig. (2-tailed)	0.64065	0.71661	0.70818	0.55516	0.77897	0.79127	0.83783	0.74046	0.85360	0.28088	0.89713	0.89471	0.29069
	Levene's Test for Equality of Variances (F)	0.33778	1.49583	2.83845	0.84486	0.05073	0.26648	2.12656	3.13519	0.57325	0.86215	0.12319	0.02700	0.35021
	Sig.	0.56296	0.22536	0.09642	0.36112	0.82245	0.60731	0.14917	0.08091	0.45148	0.35628	0.72664	0.86994	0.55587
Q3	t-test for Equality of Means	1.28971	0.95038	-0.11205	0.27440	-0.64949	-0.95432	-0.73753	-0.51232	-0.91664	-1.70631	-1.19038	-1.28227	-1.99342
	Sig. (2-tailed)	0.20128	0.34510	0.91110	0.78456	0.51809	0.34311	0.46320	0.61000	0.36239	0.09226	0.23781	0.20386	0.05000
	Levene's Test for Equality of Variances (F)	1.74430	0.90364	0.00548	1.07191	1.03280	0.66550	2.83709	1.61415	2.66119	1.57586	1.66779	0.65160	0.08853
	Sig.	0.19078	0.34499	0.94122	0.30398	0.31290	0.41732	0.09644	0.20800	0.10719	0.21342	0.20069	0.42220	0.76691
Q4	t-test for Equality of Means	-1.07578	-0.58604	-0.88893	-0.64303	-0.18330	0.30542	0.81834	-0.13696	0.04478	-0.42836	-0.09598	0.52709	0.30337
	Sig. (2-tailed)	0.28562	0.55968	0.37700	0.52225	0.85508	0.76093	0.41586	0.89144	0.96441	0.66967	0.92380	0.59975	0.76248
	Levene's Test for Equality of Variances (F)	1.55104	0.02744	0.04335	0.20677	0.51214	1.64228	0.85558	0.03330	0.18376	0.70699	0.71306	1.18575	0.02083
	Sig.	0.21702	0.86890	0.83565	0.65068	0.47653	0.20413	0.35807	0.85571	0.66944	0.40323	0.40123	0.27982	0.88566
SS	**Sell**	**T0**	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
MS	t-test for Equality of Means	1.04718	2.43542	1.80973	1.39378	1.40544	1.16531	0.00603	-0.14576	-0.39147	-0.24388	0.07662	-0.00714	-0.05620
	Sig. (2-tailed)	0.30286	0.02063	0.07974	0.17299	0.16952	0.25251	0.99523	0.88502	0.69804	0.80888	0.93941	0.99435	0.95553
	Levene's Test for Equality of Variances (F)	0.91550	0.06745	1.44665	0.44854	1.57580	0.86788	2.72752	3.81090	4.14478	2.96993	2.76984	1.22330	1.20260
	Sig.	0.34583	0.79676	0.23789	0.50783	0.21846	0.35852	0.10841	0.05972	0.05011	0.09448	0.10582	0.27696	0.28099
Q1	t-test for Equality of Means	-0.63390	-1.79445	-1.10019	-0.23783	-1.55795	-1.37268	0.72202	0.32640	-0.47350	0.03031	0.17113	-0.08563	0.17029
	Sig. (2-tailed)	0.53268	0.08700	0.28314	0.81421	0.13352	0.18368	0.47789	0.74721	0.64052	0.97609	0.86569	0.93254	0.86633
	Levene's Test for Equality of Variances (F)	0.07424	6.46982	5.48881	0.01891	0.83935	0.28222	0.67929	1.25755	0.21090	0.33385	0.35436	0.00001	0.60144
	Sig.	0.78780	0.01851	0.02859	0.89188	0.36952	0.60057	0.41868	0.27421	0.65057	0.56927	0.55773	0.99733	0.44629
Q2	t-test for Equality of Means	1.12228	-0.08440	-1.25771	-1.68065	-1.71075	-1.45315	-1.31386	-1.23511	-1.42506	-0.89306	-0.24353	-1.15200	-0.24452
	Sig. (2-tailed)	0.27441	0.93353	0.22230	0.10778	0.10186	0.16096	0.20307	0.23043	0.16884	0.38194	0.80996	0.26227	0.80920
	Levene's Test for Equality of Variances (F)	0.02666	1.29562	2.14533	1.76772	2.21091	0.02489	0.21961	0.03868	0.86436	0.02064	0.11535	0.34229	0.32193
	Sig.	0.87186	0.26784	0.15782	0.19793	0.15190	0.87615	0.64417	0.84598	0.36309	0.88714	0.73750	0.56474	0.57647
Q3	t-test for Equality of Means	-0.76356	-0.93750	-0.83350	-1.49084	-1.72861	-0.37742	-1.33396	-1.87277	0.01986	-1.12266	-1.04602	0.30185	0.38789
	Sig. (2-tailed)	0.45324	0.35868	0.41352	0.15020	0.09789	0.70948	0.19586	0.07445	0.98433	0.27368	0.30691	0.76560	0.70183
	Levene's Test for Equality of Variances (F)	0.91726	0.49785	0.00013	0.17963	0.28845	0.01178	0.41700	0.54660	0.50100	0.02668	0.33866	0.48855	1.08564
	Sig.	0.34860	0.48785	0.99097	0.67581	0.59661	0.91455	0.52512	0.46752	0.48649	0.87174	0.56652	0.49190	0.30876
Q4	t-test for Equality of Means	0.85800	0.25808	0.36238	0.50940	0.43467	1.68518	-1.21452	-1.06417	0.33281	-1.04221	-0.76079	-1.36658	0.80149
	Sig. (2-tailed)	0.40014	0.79675	0.72053	0.61554	0.66804	0.10609	0.23742	0.29879	0.74243	0.30863	0.45486	0.18556	0.43142
	Levene's Test for Equality of Variances (F)	1.66483	2.49234	2.81236	3.23619	1.84249	0.34973	1.45818	2.73159	1.37004	2.21060	0.79638	1.11196	0.95862
	Sig.	0.21035	0.12887	0.10769	0.08576	0.18842	0.56030	0.24004	0.11258	0.25433	0.15126	0.38184	0.30310	0.33818

Appendix (A5.17) Non-Parametric Test of Equality of Means of CAR Buy (Sell) of SS With Each of MS and QSs at Each Day of the Event Window

Wilcoxon Signed Ranks Test

SS	Buy	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
MS	Negative Ranks (MS<SS)	48	49	63	56	53	52	50	53	51	51	46	48	47
	Positive Ranks (MS>SS)	55	54	40	47	50	51	53	50	52	52	57	55	56
	Ties (MS=SS)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*	*103*
	Z (Wilcoxon Signed RanksTest)	-0.847a	-0.850a	-0.387a	-0.424a	-0.063a	-0.046b	-0.538b	-0.428a	-1.127a	-0.497a	-0.717a	-0.582a	-0.956a
	Asymp. Sig (2-tailed)	0.3970	0.3950	0.6991	0.6713	0.9502	0.9633	0.5906	0.6689	0.2598	0.6193	0.4732	0.5604	0.3392
Q1	Negative Ranks (Q1<SS)	34	33	32	33	35	32	31	34	32	34	32	29	35
	Positive Ranks (Q1>SS)	40	41	42	41	39	42	42	40	42	40	42	45	39
	Ties (Q1=SS)	0	0	0	0	0	0	1	0	0	0	0	0	0
	Total	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*
	Z (Wilcoxon Signed RanksTest)	-0.353a	-0.307a	-0.840b	-0.633b	-0.851b	-0.757b	-0.871b	-0.980a	-1.099a	-0.873a	-1.317a	-1.323a	-1.490a
	Asymp. Sig (2-tailed)	0.7240	0.7590	0.4007	0.5267	0.3947	0.4491	0.3836	0.3268	0.2718	0.3828	0.1878	0.1860	0.1363
Q2	Negative Ranks (Q2<SS)	33	25	29	31	31	34	31	29	27	29	29	29	32
	Positive Ranks (Q2>SS)	40	48	44	42	42	38	42	44	46	44	44	44	41
	Ties (Q2=SS)	0	0	0	0	0	1	0	0	0	0	0	0	0
	Total	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*	*73*
	Z (Wilcoxon Signed RanksTest)	***-1.685a***	**-2.702a**	**-2.232b**	-1.586b	***-1.600b***	***-1.681b***	**-1.902b**	**-2.268a**	**-2.675a**	**-2.345a**	**-2.125a**	**-2.265a**	***-1.864a***
	Asymp. Sig (2-tailed)	***0.0920***	**0.0070**	**0.0256**	0.1127	***0.1096***	***0.0928***	**0.0572**	**0.0233**	**0.0075**	**0.0190**	**0.0336**	**0.0235**	***0.0624***
Q3	Negative Ranks (Q3<SS)	32	31	30	32	37	37	32	31	28	30	31	26	30
	Positive Ranks (Q3>SS)	42	43	44	42	37	36	42	43	46	44	43	48	44
	Ties (Q3=SS)	0	0	0	0	0	1	0	0	0	0	0	0	0
	Total	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*
	Z (Wilcoxon Signed RanksTest)	-1.393a	-1.867a	-1.341b	-1.263b	-1.290b	-1.256b	-1.460b	**-1.910a**	**-2.397a**	**-1.956a**	**-2.260a**	**-2.222a**	**-1.915a**
	Asymp. Sig (2-tailed)	0.1640	0.0620	0.1798	0.2065	0.1970	0.2090	0.1443	**0.0562**	**0.0165**	**0.0505**	**0.0238**	**0.0263**	**0.0555**
Q4	Negative Ranks (Q4<SS)	42	37	36	39	35	40	32	37	36	35	29	25	24
	Positive Ranks (Q4>SS)	32	37	38	35	39	34	42	37	38	39	45	49	50
	Ties (Q4=SS)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*	*74*
	Z (Wilcoxon Signed RanksTest)	-0.108b	-0.399a	-0.305b	-0.035a	-0.251a	-0.205a	-0.692b	-0.504a	-1.285a	***-1.619a***	**-2.012a**	**-2.211a**	**-2.632a**
	Asymp. Sig (2-tailed)	0.9140	0.6900	0.7608	0.9721	0.8022	0.8378	0.4888	0.6145	0.1988	***0.1055***	**0.0442**	**0.0270**	**0.0085**

SS	Sell	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
MS	Negative Ranks (MS<SS)	19	19	17	17	16	17	15	13	14	13	12	13	15
	Positive Ranks (MS>SS)	13	13	15	15	16	15	17	19	18	19	20	19	17
	Ties (MS=SS)	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*	*34*
	Z (Wilcoxon Signed RanksTest)	-0.168a	-0.860b	-0.673b	-0.056a	-0.131a	-0.178a	-0.299a	-0.411a	-0.898a	-0.879a	-1.309a	-1.028a	-0.748a
	Asymp. Sig (2-tailed)	0.8663	0.3897	0.5008	0.9553	0.8959	0.8590	0.7648	0.6808	0.3694	0.3795	0.1906	0.3037	0.4545
Q1	Negative Ranks (Q1<SS)	13	14	11	12	12	12	9	10	9	8	7	7	8
	Positive Ranks (Q1>SS)	10	9	12	11	11	11	14	13	14	15	16	16	15
	Ties (Q1=SS)	0	1	1	1	1	1	1	1	1	1	1	1	1
	Total	*23*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*
	Z (Wilcoxon Signed RanksTest)	-0.061b	-0.456b	-0.274b	-0.274b	-0.122a	-0.061b	-0.487a	-0.943a	-1.095a	-1.277a	-1.125a	-1.095a	-1.034a
	Asymp. Sig (2-tailed)	0.9515	48209750652	0.7843	0.7843	0.9032	0.9515	0.6265	0.3458	0.2735	0.2015	0.2604	0.2735	0.3011
Q2	Negative Ranks (Q2<SS)	13	10	10	11	11	8	9	9	9	9	9	8	8
	Positive Ranks (Q2>SS)	11	13	13	12	12	15	14	14	14	14	14	15	15
	Ties (Q2=SS)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	*24*	*23*	*23*	*23*	*23*	*23*	*23*	*23*	*23*	*23*	*23*	*23*	*23*
	Z (Wilcoxon Signed RanksTest)	-0.229b	-0.243a	-0.608a	-0.821a	-0.943a	-1.460a	-1.338a	-1.171a	-0.912a	-0.669a	-0.867a	-1.430a	-1.521a
	Asymp. Sig (2-tailed)	0.8192	0.8078	0.5430	0.4115	0.3458	0.1443	0.1808	0.2416	0.3615	0.5034	0.3860	0.1529	0.1283
Q3	Negative Ranks (Q3<SS)	10	11	12	10	11	10	9	7	8	7	6	7	9
	Positive Ranks (Q3>SS)	14	13	12	14	13	14	15	17	16	17	18	17	15
	Ties (Q3=SS)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*
	Z (Wilcoxon Signed RanksTest)	-0.729a	-0.886a	-1.343a	-0.914a	-1.229a	-1.514a	***-1.600a***	**-2.057a**	**-2.314a**	**-2.257a**	**-2.371a**	**-2.286a**	**-1.943a**
	Asymp. Sig (2-tailed)	0.4662	0.3758	0.1793	0.3606	0.2192	0.1300	***0.1096***	**0.0397**	**0.0207**	**0.0240**	**0.0177**	**0.0223**	**0.0520**
Q4	Negative Ranks (Q4<SS)	10	13	11	9	11	11	11	10	11	9	11	11	11
	Positive Ranks (Q4>SS)	13	11	13	15	13	13	13	14	13	15	13	13	13
	Ties (Q4=SS)	1	0	0	0	0	0	0	0	0	0	0	0	0
	Total	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*	*24*
	Z (Wilcoxon Signed RanksTest)	-0.548a	-0.029b	-0.371a	-0.400a	-0.286a	-0.400a	-0.771a	-0.829a	-1.100a	-1.200a	-1.229a	-1.029a	-0.914a
	Asymp. Sig (2-tailed)	0.5841	0.9772	0.7103	0.6892	0.7751	0.6892	0.4405	0.4073	0.2713	0.2301	0.2192	0.3037	0.3606

a. Based on Negative Ranks

b. Based on Positive Ranks

Appendix (A6.1) Total Number of Executive Directors and Total Compenation Paid to Chief Executive Officer (HPD) in FTSE100 during 1999 and 2001

(In £ Sterling Pound)

1999			2001		
Serial #	No.of Executives	Highly Paid Director	Serial #	No.of Executives	Highly Paid Director
CoNo.	#Exec99	HPD99	CoNo.	#Exec01	HPD01
4	5	432,012	4	6	625,410
9	9	1,336,610	9	10	544,886
64	8	594,000	64	5	780,000
67	0	25,027	67	1	17,200
79	9	2,485,000	79	7	3,805,000
85	7	1,631,000	85	4	1,631,000
101	3	195,114	101	5	233,898
114	5	2,200,000	114	4	390,000
117	7	645,000	117	5	1,075,687
137	6	592,000	137	6	397,000
139	5	674,000	139	7	705,000
147	4	116,000	147	1	454,000
148	3	437,000	148	4	595,000
150	4	1,196,000	150	5	1,742,000
157	5	826,000	157	4	1,008,000
185	6	427,245	185	3	474,150
186	5	816,124	186	3	899,957
201	4	558,767	203	5	854,000
203	2	714,000	211	5	632,000
211	6	871,000	217	6	1,853,691
217	7	938,000	236	3	511,000
236	2	458,000	237	4	1,355,701
237	4	771,763	246	2	3,358,637
246	2	6,807,640	249	3	1,278,000
249	4	938,000	280	5	1,769,151
280	2	567,834	281	6	1,749,000
281	6	919,000	309	4	214,468
309	4	302,550	324	4	310,000
324	4	558,060	331	5	484,500
331	6	386,000	336	5	674,000
336	4	493,000	338	6	703,000
338	5	534,692	376	7	340,000
376	4	320,000	386	3	529,500
386	1	372,500	391	5	1,042,000
391	5	711,000	402	5	224,140
402	7	518,510	423	5	841,664
423	4	896,000	463	6	809,000

1999			2001		
Serial #	No.of Executives	Highly Paid Director	Serial #	No.of Executives	Highly Paid Director
CoNo.	#Exec99	HPD99	CoNo.	#Exec01	HPD01
463	6	893,000	523	3	422,000
523	3	268,000	525	4	3,280,000
525	4	2,513,900	526	5	573,659
526	2	431,032	553	7	490,000
553	3	458,000	657	6	816,000
647	3	55,032	688	2	279,000
657	6	635,000	710	4	596,000
688	6	1,723,000	713	5	925,000
710	5	857,000	731	5	440,000
713	10	405,000	739	5	580,000
731	6	515,000	753	6	398,000
739	5	610,000	785	4	554,000
753	8	439,000	799	8	1,114,000
785	3	745,000	813	6	794,000
799	6	958,000	831	3	1,244,444
813	6	516,000	899	7	1,308,000
831	4	697,409	900	3	347,000
899	6	1,372,000	911	5	395,000
900	2	115,000	923	6	867,000
911	4	282,000	944	9	807,000
923	5	674,000	946	3	75,000
944	9	700,000	983	5	1,228,000
946	4	296,000	984	6	593,000
984	9	969,000	1040	5	831,930
1040	6	435,183	1082	4	489,000
1082	4	355,000	1083	4	482,085
1083	5	546,285	1120	4	487,946
1120	3	371,255	1126	5	1,052,000
1126	3	474,000	1159	4	2,517,000
1159	5	707,000	1161	10	1,005,000
1161	11	858,000	1220	6	876,000
1220	4	655,000	1222	6	297,000
1222	7	178,000	1247	6	398,000
1247	6	329,000	1254	2	1,390,000
1254	4	503,000	1261	5	718,495
1261	2	549,357	1270	3	1,044,000
1270	4	1,455,000	1272	5	905,000
1272	6	513,000	1279	6	983,000
1279	8	872,000	1288	8	604,000
1288	8	550,000	1296	4	976,000
1296	5	546,000	1297	7	2,903,000
1297	6	2,162,000	1311	5	515,000
1311	5	272,000	1312	5	546,000
1312	7	832,000	1327	5	1,917,000
1327	8	1,464,000	1332	6	623,000

1999			2001		
Serial #	No.of Executives	Highly Paid Director	Serial #	No.of Executives	Highly Paid Director
CoNo.	#Exec99	HPD99	CoNo.	#Exec01	HPD01
1332	7	566,000	1333	5	556,000
1333	7	297.148	1340	5	688,611
1340	5	487,345	1372	2	969,872
1357	4	384,503	1402	2	1,183,000
1372	3	624,468	1403	7	734,000
1402	5	2,410,000	1407	7	543.611
1403	6	719,000	1425	7	1.115,000
1407	8	260,404	1475	5	662,000
1425	10	1,156,000	1484	8	1,173,000
1442	6	527,992	1498	4	215,392
1475	3	398,000	1545	8	1,153,075
1484	9	798,000	1550	4	944,850
1545	9	961,323	1552	4	392,600
1550	7	667,626	1573	5	1,758,000
1552	4	443,600	1632	5	1,324,000
1573	4	613,000			
1629	4	431,000			
1632	5	1,349,000			
N	**100**	**100**		**97**	**97**
Mean	**44**	**765,823**		**45**	**907,332**
Minim	0	317		1	17,200
Maxim	1999	6,807,640		2001	3,805,000
StdDe	277.81	787,380		282.25	678,582
Skewn	7.03	4.95		6.93	2.17
Kurtois	48.41	34.38		46.91	5.74

Source:Corporate Registrar (PriceWaterHouseCoopers) Sept.1999 & 2001, Published by HS Financial Publishing, London.

Appendix (A6.2/A) FTSE100 CEOs Personal and Job Characteristics, Shareholdings, Industry Sector and Cumulative Abnormal Returns in 1999.

Company Serial #	CEO 1999 Years in Post	Education Level	No. of Shares Held Ordinary	Incentives	Total No. of Employees	Total Market Capitalization	Earnings Per Share	Price / Earnings Ratio	Industry Sector Service/Not	1999 Annual CAR For Each Company						
CoNo.	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	OrdinaryS	BEO	SSO	Incentives	AllPortfolios
4	7	0	704,869	440,607	774	4,651	0.19	8	1	1.1070	.	1.1070	1.7460	2.3760	2.0610	1.5840
9	2	0	58,782	85,662	27,963	15,126	1.07	11	1	-0.3545	.	-0.3545	.	-2.6388	-2.6388	-1.4967
64	1	0	20,000		49,709	4,515	0.44	4	0	-1.2024	.	-1.2024	1.4276	0.8766	1.1521	-0.0252
67	1	0	84,826	22,927	29,617	11,819	0.26	8	1	0.0069	.	0.0069	.	.	.	0.0035
79	4	1	68,388	717,003	4,500	3,829	0.24	6	1	1.1556	0.3660	0.7608	.	-0.3492	-0.3492	0.2058
85	1	0	36,423	150,833	249,000	13,130	6.31	32	0	1.4340	.	1.4340	.	-1.8528	-1.8528	-0.2094
101	7	1	5,003,800	205,000	314	1,801	0.22	38	0	.	1.0356	1.0356	.	.	.	0.5178
114	1	1	20,000	100,000	32,712	3,264	0.43	4	0	-1.7724	.	-1.7724	.	.	.	-0.8862
117	2	1	63,804	0	34,000	40,852	1.10	43	0	.	.	.	-1.8796	.	-1.8796	-0.9398
137	9	1	427,891	231,726	12,724	6,690	0.49	6	1	-0.3636	.	-0.3636	.	.	.	-0.1818
139	1	0	74,604	1,200,728	46,500	7,210	0.55	4	0	0.3258	.	0.3258	.	.	.	0.1629
147	1	0	0	64,948	220	292	-0.28	16	1	3.2672	.	3.2672	.	.	.	1.6336
148	4	1	301,240	455,000	22,704	9,736	0.82	8	1	.	.	.	.	.		
150	7	1	34,464	21,692	80,200	27,407	1.27	18	1	-0.8025	.	-0.8025	-0.3804	.	-0.3804	-0.5915
157	11	1	191,568	317,335	82,616	7,141	1.05	9	1	-0.8772	.	-0.8772	.	.	.	-0.4386
185	3	1	7,406	12,683	18,894	14,557	0.31	4	1	-0.2824	.	-0.2824	.	.	.	-0.1412
186	3	1	994	213,636	36,743	5,532	0.23	3	0	.	2.6208	2.6208	-0.7392	.	-0.7392	0.9408
201	1	1	0	2,068	19,598	3,429	0.35	4	0	-1.5978	.	-1.5978	.	.	.	-0.7989
203	4	1	76,022	752,455	40,454	6,263	0.51	13	0	-0.3324	.	-0.3324	.	.	.	-0.1662
211	12	1	79,123	23,195	87,381	6,915	0.19	8	1	-0.4329	.	-0.4329	-1.5168	.	-1.5168	-0.9749
217	7	1	426,737	2,984	98,900	117,187	0.30	12	0	-0.7468	-1.6026	-1.1747	0.9648	.	0.9648	-0.1050
236	8	1	40,971	214,477	63,779	4,399	0.21	4	1	.	.	.	.	.	.	.
237	1	0	26,902	236,058	57,884	11,315	0.47	7	0	-1.5332	.	-1.5332	.	.	.	-0.7666
246	1	1	0	0	4,629	1,020	0.16	1	1	.	.	.	.	.	.	.
249	3	1	9,465	6,460	124,900	69,546	0.66	11	1	-0.4824	-2.6832	-1.5828	.	.	.	-0.7914
280	1	1	0	255,827	11,528	10,475	0.09	7	1	-1.2084	0.8052	-0.2016	-0.0744	.	-0.0744	-0.1380
281	6	0	207,741	316,190	38,643	8,028	0.57	8	0	0.0216	.	0.0216	-1.0416	-1.3896	-1.2156	-0.5970
309	11	0	1,575,000	325,000	5,302	1,437	0.14	7	1	.	-0.1320	-0.1320	.	0.2100	0.2100	0.0390
324	1	1	10,000	0	11,624	3,103	0.51	5	1	.	.		.	.	.	
331	8	1	151,492	819,976	204	381	-0.04	5	0	-1.7436	.	-1.7436	.	.	.	-0.8718
336	2	1	156,105	1,373,622	16,427	5,613	0.04	1	0	.	.	.	.	.		
338	1	0	80,837	375,728	51,965	11,252	0.59	9	1	.	-0.1128	-0.1128	-0.0336	.	-0.0336	-0.0732
376	2	0	150,000	4,594	6,005	2,203	0.45	17	1	.	3.1968	3.1968	.	.	.	1.5984
386	2	0	2,408,000	6,800,000	1,072	8,877	-0.09	15	1	0.9392	1.1804	1.0598	0.7536	0.3444	0.5490	0.8044
391	3	0	0	328,294	154,758	4,369	0.23	6	1	.	.	.	.	.	.	.
402	3	1	87,144	745,365	46,487	3,280	-0.07	2	0	.	.	.	.	.	.	.
423	10	1	58,614	80,600	14,094	3,501	39.64	704	1	0.9804	.	0.9804	-0.5484	.	-0.5484	0.2160
463	10	1	205,033	844,378	21,519	5,537	0.51	13	1	.	.	.	.	.	.	.
523	1	0	89,028	135,029	6,484	2,973	0.46	12	1	-2.2104	-1.3932	-1.8018	-3.0384	.	-3.0384	-2.4201
525	1	1	5,000	0	10,280	4,117	0.26	5	1	.	.	.	.	.		
526	3	0	6,896	859,906	1,028	4,847	-0.11	16	1	.	.	.	0.9648	.	0.9648	0.4824
553	8	1	25,200	273,549	14,900	1,460	0.57	10	1	.	.	.	.	.	.	.
647	1	0	7,143	1,428,572	94	2,392	0.00	2	1	.	.	.	.	.	.	.
657	2	1	10,066	4,366	35,503	7,599	0.99	11	0	-0.5040	-2.7596	-1.6318	-1.0188	.	-1.0188	-1.3253
688	3	0	79,736	283,378	54,336	57,815	0.74	16	0	-0.0132	-0.9516	-0.4824	-0.2712	.	-0.2712	-0.3768
710	6	0	61,522	1,045,548	72,293	11,279	0.85	12	1	.	.	.	-1.398	.	-1.398	-0.699
713	3	0	7,200	0	67,354	6,372	0.45	6	1	1.5162	0.3708	0.9435	.	.	.	0.4718
731	2	1	4,111	34,825	36,378	15,351	0.70	6	1	-2.1456	-1.4472	-1.7964	.	.	.	-0.8982
739	3	1	25,227	230,402	16,000	3,599	0.30	6	0	-2.5248	.	-2.5248	-2.5248	.	-2.5248	-2.5248
753	2	0	0	479,136	17,499	5,678	0.23	7	1	.	.	.	-1.2222	-1.9656	-1.5939	-0.797
785	18	0	152,628	1,081,855	46,702	3,732	0.23	3	1	0.0211	.	0.0211	-1.9818	.	-1.9818	-0.9804
799	4	0	87,895	167,388	144,521	62,089	4.49	70	1	0.4902	.	0.4902	.	.	.	0.2451
813	1	1	21,000	353,695	60,600	5,224	0.40	7	0	-1.1025	.	-1.1025	.	.	.	-0.5513
831	7	1	308,576	1,947,940	130,626	12,733	0.08	3	0	.	.	.	.	.	.	.
899	8	1	357,619	1,784,672	110,216	9,435	0.46	7	1	-1.8036	.	-1.8036	.	.	.	-0.9018
900	2	0	0	0	1,414	1,069	1.31	39	1	.	.	.	.	.	.	.
911	12	1	78,490	35,476	494	4,625	0.53	8	1	-0.7116	.	-0.7116	-0.1098	.	-0.1098	-0.4107
923	7	1	1,125,976	31,203	7,899	7,601	0.32	6	1	0.6894	1.0614	0.8754	-0.6636	-1.3140	-0.9888	-0.0567
944	3	0	175,284	490,486	86,486	44,000	0.55	8	1	-0.0286	1.0272	0.4993	-0.7164	-0.2568	-0.4866	0.0063
946	5	0	352,174	1,052,867	5,670	2,656	0.57	36	1	4.0260	-0.4560	1.7850	.	1.0072	1.0072	1.3961
984	1	1	65,465	645,508	75,492	10,912	0.19	4	1	-0.4404	.	-0.4404	.	.	.	-0.2202
1040	10	0	95,717	1,044,798	4,925	3,082	0.46	28	1	.	.	.	3.954	.	3.954	1.977
1082	5	0	112,622	412,587	3,628	6,147	0.87	4	0	-1.3704	.	-1.3704	.	.	.	-0.6852
1083	1	0	21,263	146,277	4,432	5,400	0.46	4	0	.	.	.	.	.	.	.

Company Serial #	CEO 1999 Years in Post	Education Level	No. of Shares Held: Ordinary	No. of Shares Held: Incentives	Total No. of Employees	Total Market Capitalization	Earnings Per Share	Price / Earnings Ratio	Industry Sector Service/Not	1999 Annual CAR For Each Company						
CoNo.	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	OrdinaryS	BEO	SSO	Incentives	AllPortfolios
1120	9	0	173,059	542,379	10,839	2,576	0.35	4	1	-1.8798	.	-1.8798	-1.9254	.	-1.9254	-1.9026
1126	39	1	184,000	5,128,488	41,349	4,357	-0.12	1	1	.	.	.	.	.	.	.
1159	2	1	28,112	538,633	18,400	7,663	1.03	13	1	.	-0.7956	-0.7956	.	0.7092	0.7092	-0.0432
1161	15	1	409,230	105,687	68,333	6,673	0.57	10	1	-0.5712	.	-0.5712	-0.6144	0.2532	-0.1806	-0.3759
1220	4	1	65,353	5,014	22,834	17,921	0.59	9	1	-1.0308	.	-1.0308	.	.	.	-0.5154
1222	1	1	0	0	1,093	738	0.30	10	0	.	5.259	5.259	.	5.3184	5.3184	5.2887
1247	2	1	1,373	936	10,821	5,752	0.84	11	1	-0.9882	.	-0.9882	.	.	.	-0.4941
1254	2	1	24,600	276,282	15,900	3,569	0.56	9	0	1.6104	.	1.6104	.	.	.	0.8052
1261	1	1	0	0	13,807	5,387	0.47	5	1	0.8464	.	0.8464	-1.8144	.	-1.8144	-0.4840
1270	15	1	5,634,020	4,423,974	129,347	6,879	0.17	2	1	.	.	.	.	.	.	.
1272	10	1	158,428	5,508	16,690	12,485	0.41	9	1	1.5048	.	1.5048	.	.	.	0.7524
1279	3	1	6,100	285,963	28,628	12,417	0.86	12	0	-1.7436	.	-1.7436	-3.1800	.	-3.1800	-2.4618
1288	6	1	21,100	124,188	42,000	3,883	0.22	3	0	0.5820	.	0.5820	.	.	.	0.2910
1296	1	1	23,474	785,811	44,489	7,216	0.56	5	1	0.6040	.	0.6040	-0.6720	.	-0.6720	-0.0340
1297	11	1	70,650	62,094	29,645	11,430	1.14	13	1	.	.	.	-1.1292	.	-1.1292	-0.5646
1311	14	1	850,465	704,315	2,122	3,127	0.41	27	1	.	.	.	.	.	.	.
1312	9	0	44,966	527,825	178,958	7,243	0.46	4	1	0.2421	-0.9612	-0.3596	0.6852	.	0.6852	0.1628
1327	14	1	34,109	0	6,156	3,911	1.03	17	1	-0.8532	0.4704	-0.1914	.	1.2168	1.2168	0.5127
1332	11	1	162,728	169,918	47,121	3,959	0.52	6	1	-1.0320	.	-1.0320	.	.	.	-0.5160
1333	1	1	88,515	2,955	9,336	5,178	0.34	6	0	.	.	.	.	.	.	.
1340	11	1	57,412	153,876	16,170	6,142	0.54	5	0	-2.5302	.	-2.5302	0.4344	.	0.4344	-1.0479
1357	10	0	680,116	427,904	17,426	2,850	0.21	6	1	3.4002	1.0445	2.2224	.	.	.	1.1112
1372	7	0	365,000	1,841,000	40,800	50,066	0.06	5	0	-1.1760	-0.9852	-1.0806	0.5694	.	0.5694	-0.2556
1402	8	1	1,445,537	6,771,764	58,300	42,589	0.16	8	0	-0.1572	.	-0.1572	.	.	.	-0.0786
1403	3	0	23,888	300,322	13,873	2,722	0.02	0	0	.	.	.	.	.	.	.
1407	11	1	183,111	0	49,089	3,984	0.48	5	0	.	-5.3166	-5.3166	-6.2148	-6.834	-6.5244	-5.9205
1425	2	1	76,484	378,599	26,500	9,910	0.70	10	1	.	.	.	-1.644	.	-1.644	-0.822
1442	2	1	1,000	47,000	7,110	4,635	0.40	6	1	.	.	.	.	.	.	.
1475	1	0	55,495	2,007,096	4,975	5,710	-0.15	3	1	.	.	.	.	1.7856	1.7856	0.8928
1484	7	0	1,319,539	2,444,971	198,342	10,996	0.12	2	1	0.3012	.	0.3012	.	.	.	0.1506
1545	10	0	23,104	122,904	267,000	37,880	0.95	12	0	.	0.3084	0.3084	.	.	.	0.1542
1550	3	0	524,123	725,161	15,080	3,376	0.80	7	1	.	.	.	.	.	.	.
1552	6	0	12,177	9,184	10,128	4,399	0.83	8	0	0.3294	.	0.3294	.	.	.	0.1647
1573	3	0	122,551	520,086	12,630	80,403	0.30	26	1	-1.728	.	-1.728	1.186	0.9354	1.0607	-0.3337
1629	5	0	1,639	271,750	7,598	5,258	0.32	3	1	.	.	.	.	.	.	.
1632	13	1	4,498,921	6,445,912	25,577	4,239	0.28	6	1	2.5875	.	2.5875	2.474	.	2.474	2.5308
N	100	100	100	99	100	100	100	101	100	61	26	70	38	19	46	78
Mean	6	1	334,945	685,596	41301	11754	0.93	20	1	-0.20	-0.03	-0.16	52.05	-0.08	-0.36	-0.18
Min	1	0	0	0	94	292	-0.28	0	0	-2.53	-5.32	-5.32	-6.21	-6.83	-6.52	-5.92
Max	39	1	5,634,020	6,800,000	267,000	117,187	39.64	704	1	4.03	5.26	5.26	1999.00	5.32	5.32	5.29
StdDev	5	0	914,570	1,329,627	51,321	18,293	3.99	76	0	1.42	2.05	1.59	324.38	2.43	1.94	1.29
Skew	3	-0	5	3	2	3	9.46	8	-1	0.85	0.05	0.40	6.16	-0.67	0.03	-0.11
Kurtois	14	-2	21	12	6	14	92.29	69	-2	0.89	1.94	2.20	38.00	3.18	2.48	8.21

Source:Corporate Registrar (PriceWaterHouseCoopers) **Sept. 1999**, Published By: HS Financial Publishing, London.

Appendix (A6.2/B) FTSE100 CEOs Personal and Job Characteristics, Shareholdings, Industry Sector and Cumulative Abnormal Returns in 2001.

Company	CEO 2001				Total	Total	Earnings	Price /	Industry	2001						
Serial	Years	Educatio	No. of Shares Held		No. of	Market	Per	Earnings	Sector	Annual CAR For Each Company						
#	in Post	Level	Ordinary	Incentives	Employees	Capitalization	Share	Ratio	Service/Not							
CoNo.	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	Ordinary$	BEO	SSO	Incentive$	AllPortfolios
4	9	0	716,129	380,237	971	5,645	0.19	9	1	4.8336		4.8336	2.9460	2.5416	2.7438	3.7887
9	4	0	76,081	66,616	31,268	16,016	1.38	11	1	2.5560	-1.4568	0.5496	1.3680		1.3680	0.9588
64	3	0	105,000	1,053,060	10,932	4,345	0.39	4	0	-0.3264		-0.3264				-0.1632
67	1	0	32,959	5,670	29,617	19,084	16.42	227	1							
79	12	1	4,648,507	1,674,027	6,544	8,717	0.58	11	1	2.5176	2.2140	2.3658		2.1576	2.1576	2.2617
85	2	1	18,896	583,926	249,000	13,647	6.31	33	0	-0.1200		-0.1200				-0.0600
101	9	1	26,132,860	765,000	520	2,841	0.04	3	0		0.3432	0.3432	-4.0512	-6.6024	-5.3268	-2.4918
114	8	1	17,600	300,000	34,372	3,766	0.31	5	0							
117	5	1	73,935	259,634	38,191	61,311	1.45	35	0	1.4868		1.4868	0.0396		0.0396	0.7632
137	9	1	94,145	385,861	13,559	7,214	0.50	7	1	0.0636		0.0636	-1.8924		-1.8924	-0.9144
139	7	1	870,450	738,776	84,900	11,372	0.06	4	0	2.4672		2.4672	0.9376	0.8622	0.8999	1.6836
147	1	1	7,496	0	774	129	-0.18	0	1		-2.5464	-2.5464				-1.2732
148	5	1	482,588	440,000	20,933	10,608	0.75	8	1							
150	1	1	25,776	476,337	72,300	34,628	2.10	21	1	1.0176		1.0176				0.5088
157	4	0	55,255	374,919	85,624	6,090	2.26	7	1	2.1276		2.1276				1.0638
185	1	1	220,055	513,603	19,745	9,879	0.27	3	1							
186	1	1	0	0	29,800	7,607	0.26	4	0							
203	3	0	700	902,357	42,386	4,818	0.93	10	0							
211	6	1	60,589	31,804	80,529	5,991	0.55	7	1	0.2976		0.2976				0.1488
217	9	1	1,051	942,090	98,000	131,164	0.50	6	0				1.1604		1.1604	0.5802
236	1	1	0	163,551	62,175	3,713	0.14	3	1	3.3336		3.3336				1.6668
237	3	0	33,633	613,300	64,274	12,269	0.70	6	0	2.5299		2.5299	-0.1044		-0.1044	1.21275
246	3	1	0	2,138,000	10,730	14,889	-0.14	8	1							
249	5	1	1,358,320	7,194	133,400	41,777	-0.16	6	1	-0.9606		-0.9606	-0.3396		-0.3396	-0.6501
280	4	1	38,151	2,216,481	47,904	9,735	1.21	3	1				2.7096	-3.2880	-0.2892	-0.1446
281	8	0	1,086,952	976,729	36,446	9,829	0.37	5	0	1.7472	1.2051	1.4762		0.4626	0.4626	0.9694
309	14	0	3,000,000	1,240,116	7,339	3,130	0.06	5	1					-0.1836	-0.1836	-0.0918
324	1	1	346,274	488,247	14,067	2,329	-0.36	3	1		-1.7508	-1.7508		-1.7508	-1.7508	-1.7508
331	10	1	313,588	192,300	1,785	2,911	-1.55	11	0		-1.0356	-1.0356	-1.0356		-1.0356	-1.0356
336	4	1	141,569	1,881,849	28,294	8,930	0.11	2	0							
338	1	0	38,157	97,720	72,749	22,286	-0.62	10	1	2.2020	0.3880	1.295				0.6475
376	4	0	327,512	7,545	11,059	1,599	0.14	3	1		-4.2462	-4.2462				-2.1231
386	1	0	0	2,316,492	3,280	2,588	-0.17	4	1							
391	14	1	451,150	3,207,753	154,758	11,615	0.07	5	1							
402	32	1	250,764	792,508	64,700	1,810	-0.41	1	0							
423	12	1	264,691	275,000	18,665	3,148	8.84	158	1		0.0500	0.05				0.025
463	12	1	1,000,683	3,007,955	29,298	4,392	0.25	2	1					-1.3830	-1.3830	-0.6915
523	16	0	581,431	0	6,290	1,888	-2.07	7	1		-0.8320	-0.832	-1.0300		-1.03	-0.931
525	3	1	3,918	534,829	9,987	3,472	0.21	4	1	-0.3696		-0.3696	-1.1412		-1.1412	-0.7554
526	1	0	5,000	349,800	2,733	2,109	-0.06	1	1							
553	10	1	31,660	241,994	56,700	2,225	0.29	7	1							
657	12	1	63,108	1,220	42,962	7,599	0.67	11	0	1.3202	-0.3096	0.5053	0.2484	-0.9696	-0.3606	0.07235
688	13	1	212,547	4,408,646	6,029	127,529	0.97	20	0	0.6231	1.6944	1.15875	0.7866	0.5532	0.6699	0.91433
710	1	0	156,769	1,016,560	72,293	4,362	0.35	2	1					0.6216	0.6216	0.3108
713	4	0	30,000	150,787	69,708	6,280	0.31	6	1	1.5888		1.5888				0.7944
731	3	1	41,195	101,380	39,488	18,295	0.76	8	1	-1.3062		-1.3062				-0.6531
739	6	1	99,221	340,135	24,700	3,722	0.42	5	0				-1.1160		-1.1160	-0.5580
753	2	1	28,306	0	25,475	3,046	0.12	2	1	0.4938		0.4938				0.2469
785	2	0	259,964	2,108,653	53,631	3,887	0.13	3	1							
799	7	0	299,841	198,544	169,858	75,809	0.71	8	1	-0.0559		-0.0559				-0.028
813	3	1	104,193	581,262	45,130	3,159	-0.12	4	0	1.5536		1.5536				0.7768
831	11	1	355,576	2,933,168	93,509	2,975	0.04	1	0							
899	11	1	468,130	2,074,737	134,061	5,602	0.49	4	1	0.1260		0.1260				0.0630
900	3	0	6,010	318,956	1,906	397	-0.03	1	1							
911	3	1	87,739	205,872	1,096	4,602	0.60	9	1							
923	9	1	1,207,830	1,970,664	8,363	8,818	0.10	2	1	-0.3180	0.2358	-0.0411	0.8448		0.8448	0.40185
944	5	0	178,751	763,065	85,847	40,034	0.70	7	1	-0.6774		-0.6774	-0.5772		-0.5772	-0.6273
946	7	1	83,285	1,204,116	8,336	3,079	0.24	8	1				0.4992	-2.0160	-0.7584	-0.3792
983	5	1	300,000	2,950,567	56,000	2,785	-0.02	1	0	0.0444		0.0444				0.0222
984	1	0	808,080	4,365,532	52,213	7,090	0.05	2	1	0.8040		0.8040	-0.6384		-0.6384	0.0828
1040	11	1	148,868	1,044,353	5,745	2,156	0.20	4	1		-0.7968	-0.7968	-2.0532	-0.7968	-1.4250	-1.1109
1082	6	1	118,898	619,212	7,523	7,054	0.42	5	0	1.2348		1.2348				0.6174
1083	1	0	40,000	67,550	4,947	3,436	-0.14	3	0							
1120	11	0	336,244	490,498	8,750	3,609	0.30	6	1		-1.7148	-1.7148				-0.8574
1126	41	1	184,000	6,136,188	41,466	5,329	0.29	2	1							
1159	4	1	80,492	792,527	24,688	8,570	0.36	11	1	0.1140		0.114				0.057
1161	17	1	413,914	645,851	41,853	1,775	0.25	3	1	-0.7833		-0.7833		0.6948	0.6948	-0.0443

Company	CEO 2001				Total	Total	Earnings	Price /	Industry	2001 Annual CAR For Each Company						
Serial #	Years in Post	Education Level	No of Shares Held Ordinary	Incentives	No. of Employees	Market Capitalization	Per Share	Earnings Ratio	Sector Service/Not							
CoNo.	CeYPst	CeEdu	Ce#Osh	Ce#Ish	#Emplyees	£ Cap	EPS	PE	IndDum	Buy	Sell	OrdinaryS	BEO	SSO	IncentiveS	AllPortfolios
1220	4	1	387,523	433,473	21,942	17,174	0.48	9	1							
1222	2	1	10,000	1,650,000	1,024	378	-0.02	1	0				-4 2144		-4 2144	-2 1072
1247	1	0	4,124	197,397	11,762	1,697	-1.03	3	1							
1254	1	0	579,473	4,092,777	18,900	6,550	0.71	10	0	3.3327	1.1856	2.2592	1.6548	3.7716	2.7132	2.4862
1261	1	0	74,071	2,751,584	15,288	7,608	0.08	6	1	1.3218		1.3218				0.6609
1270	18	1	5,643,265	6,022,269	99,950	4,777	0.19	2	1	-0.2580		-0.2580				-0 1290
1272	1	1	10,266	977,761	17,265	12,162	0.46	9	1	-2.1824	-2.4072	-2.2948				-1.1474
1279	1	1	2,100	0	34,399	12,555	1.56	12	0	-0.5244		-0.5244	0.2016		0.2016	-0 1614
1288	9	1	117,290	610,459	46,600	3,588	0.11	2	0	2.5656		2.5656	2.3652		2.3652	2.4654
1296	3	1	71,340	1,006,548	51,720	7,111	0.04	5	1	1.9908		1.9908				0.9954
1297	2	1	64,703	350,351	83,300	45,594	1.01	17	1	1.0956		1.0956				0.5478
1311	16	1	8,504,650	4,500,000	4,632	2,980	0.09	2	1		-0.4752	-0.4752				-0.2376
1312	1	0	100,000	3,009,596	185,200	7,916	0.22	4	1	2.4996		2.4996	3.8892		3.8892	3.1944
1327	16	1	264,375	332,319	4,747	2,563	1.22	11	1	1.8528		1.8528	1.8462		1.8462	1.8495
1332	1	0	68,746	264,031	63,066	3,406	-0.42	5	1							
1333	3	1	86,620	63,027	8,427	5,782	0.64	7	0	0.7926		0.7926				0.3963
1340	2	1	86,316	142,385	22,401	9,060	0.21	5	0	1.9920		1.992				0.996
1372	1	1	52,668	774,814	38,000	58,274	0.65	6	0					1.1124	1.1124	0.5562
1402	1	1	212,547	4,408,646	108,185	127,529	0.97	20	0	0.9447		0.9447		0.5280	0.5280	0.7364
1403	4	0	326,750	351,000	15,521	4,279	0.81	14	0	0.6846		0.6846		0.5112	0.5112	0.5979
1407	13	1	6	450,000	1,560	4,080	0.58	5	0	-3.5400		-3.54	-7.2840		-7.284	-5.412
1425	4	1	92,999	975,481	30,500	9,127	0.84	8	1	-0.2388	-0.4830	-0.3609	-0 3384		-0.3384	-0.3497
1475	1	0	194,508	2,762,408	9,280	2,124	-0.24	1	1							
1484	9	0	1,653,850	3,459,189	152,210	17,445	0.15	3	1	0.2676	-0.2550	0.0063	2.1696	-0.0444	1.0626	0.53445
1498	2	0	59,608	487,644	2,692	259	-0.09	0	1							
1545	14	0	38,719	440,000	261,000	37,000	0.58	13	0	-0.5622		-0.5622				-0.2811
1550	5	0	481,713	1,531,804	13,446	2,965	4.13	6	1	0.6249	-0.1008	0.26205	0.0156	0.6540	0.3348	0.29843
1552	2	1	3,000	3,579	11,052	3,595	0.88	7	0				0.5574		0.5574	0.2787
1573	4	0	2,199,426	16,185,639	53,325	104,202	-0.12	2	1	-0.6858		-0.6858		-1.3244	-1.3244	-1.0051
1632	15	1	13,386,954	14,320,630	36,157	8,945	0.33	8	1	-0.7686		-0.7686				-0.3843
N	97	97	97	97	97	97	97.00	98	97	53	22	63	33	22	43	73
Mean	6	1	863,960	1,429,775	44698	14673	0.67	14	1	0.78	-0.50	0.37	60.59	-0.18	-0.13	0.12
Min	1	0	0	0	520	129	-2.07	0	0	-3.54	-4.25	-4.25	-7.28	-6.60	-7.28	-5.41
Max	41	1	26132860	16185639	261,000	131,164	16.42	322	1	4.83	2.21	4.83	2001.00	3.77	3.89	3.79
StdDev	6	0	3134154	2438842	50,782	26,200	2.05	42	0	1.50	1.49	1.59	348.34	2.14	2.02	1.31
Skew	2	-1	6	4	2	3	5.70	6	-1	-0.03	-0.47	-0.19	5.74	-1.12	-1.32	-0.62
Kurtois	9	-2	47	21	5	11	39.00	38	-2	0.74	0.70	1.05	33.00	3.08	3.67	4.36

Source:Corporate Registrar (PriceWaterHouseCoopers) **Sept. 2001**, Published By: HS Financial Publishing, London.

Appendix (A6.3) CEO Pay & Insider Trading Model:
Various Specifications For Equation 11
(v. 7.0) ROBUST 1999

Dependent Va	Model v1	Model v2	Model v3	Model v4	Model v5	Model v6	Model v7	Model v8	Model v9	Model v10	Model v11	Model v12	Model v13	Model v14
CEO Pay	Build Up Process								Without Years In Post					
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	12.398	12.332	12.218	10.793	9.369	8.482	8.635	8.797	12.258	10.753	9.329	8.452	8.617	8.749
	30.05*	27.16*	28.42*	17.820*	15.82*	13.00*	13.41*	14.49*	30.83*	17.16*	15.08*	12.58*	13.12*	13.83*
No.Of Insic	0.573	0.553	0.521	0.787	0.565	0.583	0.553	0.536	0.533	0.798	0.571	0.589	0.556	0.543
VAR 5	2.390**	2.420**	2.36**	4.19*	2.23**	2.35**	2.30**	2.28**	2.34**	4.19*	2.23**	2.34**	2.29**	2.27**
Years In Post		0.075	0.052	0.068	0.047	0.053	0.038	0.056						
VAR 6		0.890	0.610	0.900	0.770	0.840	0.640	0.960						
Education			0.332	0.283	0.243	0.272	0.293	0.277	0.345	0.313	0.263	0.294	0.309	0.302
VAR 12			2.37**	2.440*	2.33*	2.69*	2.80*	2.72*	2.52*	2.53*	2.48**	2.86*	2.96*	2.95*
Incentive Shareholdings				0.082	0.077	0.087	0.113	0.115		0.090	0.083	0.093	0.118	0.121
VAR 18				2.470*	2.41**	2.68*	3.41*	3.50*		2.68*	2.50*	2.76*	3.36*	3.47*
Employment					0.191	0.136	0.106	0.099			0.193	0.138	0.107	0.102
VAR 19					4.37*	2.43**	2.13**	1.99**			4.36*	2.47*	2.19**	2.09**
Capitalisation						0.144	0.143	0.145				0.141	0.142	0.142
VAR 21						2.60*	2.65*	2.81*				2.60*	2.66*	2.78*
EPS							0.124	0.134					0.127	0.137
VAR 22							2.65*	2.99*					2.64*	2.94*
Industry								-0.159						-0.137
VAR 23								-1.600						-1.420
No. of Obs	100	100	100	89	89	89	89	89	100	89	89	89	89	89
F-Value	5.730	2.930	4.010	5.630	14.270	17.620	16.930	16.230	5.810	7.130	16.490	18.940	19.110	17.550
Prob of F	0.0186*	*0.0583****	0.0098*	0.0005*	0.0000*	0.0000*	0.0000*	0.0000*	0.0041*	0.0003*	0.0000*	0.0000*	0.0000*	0.0000*
R-Square	12%	13%	18%	35%	53%	56%	59%	60%	17%	35%	53%	55%	59%	60%
Root MSE	0.708	0.708	0.693	0.570	0.489	0.477	0.461	0.457	0.691	0.570	0.487	0.476	0.459	0.457
R-Squared	11%	11%	15%	32%	50%	53%	56%	56%	16%	32%	51%	53%	56%	57%

Bold Figures Are **Significants**, ***Italic*** Figures Are Significant at *10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
Number of Insiders, Ordinary Shareholdings and CAR: Various Specifications
Evidence From FTSE100 During 1999 Using STATA Regression with Robust Standard Errors

Dependent Variable: CEO Pay	Panel A: No.of Insiders, Ordinary Shareholdings and CARs							Panel B: CAR Portfolios Only						
	Coefficients and T-Statistics for Model 3 Versions							Coefficients and T-Statistics for Model 4 Versions						
Independent Variables:	Model 3-1	Model 3-2	Model 3-3	Model 3-4	Model 3-5	Model 3-6	Model 3-7	Model 4-1	Model 4-2	Model 4-3	Model 4-4	Model 4-5	Model 4-6	Model 4-7
Constant	**7.992** 8.050***	**10.575** 5.950***	**8.479** 10.630***	**9.263** 8.930***	13.089 1.720	**9.136** 9.370***	**8.116** 9.970***	**8.631** 9.19***	**9.122** 8.99***	**8.898** 13.78***	**9.401** 9.68***	**12.025** 5.83***	**9.444** 11.03***	**8.463** 11.23***
No Of Insiders	**0.689** 2.480***	0.799 1.800	**0.644** 2.650***	0.086 0.680	0.454 0.790	0.386 1.500	**0.591** 2.910***							
Years In Post														
Education	**0.343** 2.700***	0.142 0.520	**0.259** 2.200**	*0.336* 1.960*	0.371 1.010	**0.343** 2.120**	**0.335** 3.030***	**0.489** 3.27***	0.530 1.520	**0.383** 3.06***	**0.368** 2.36**	0.588 1.020	**0.422** 2.31**	**0.484** 3.43***
Incentive Shareholdir	**0.145** 3.250***	0.075 1.550	**0.130** 3.750***	0.071 1.680	0.031 0.120	*0.092* 1.920*	**0.142** 4.110***	**0.143** 3.24***	0.090 1.660	**0.126** 3.14***	*0.075* 1.83*	0.004 0.020	*0.080* 1.72*	**0.138** 3.56***
Employment	0.049 0.800	-0.105 -0.520	0.083 1.580	**0.138** 3.400***	-0.062 -0.220	0.091 1.420	0.078 1.530	**0.137** 2.85***	*0.166* 2.05*	**0.175** 4.27***	**0.144** 4.46***	0.033 0.310	**0.141** 3.71***	**0.161** 4.30***
Capitalisation	**0.188** 2.270**	0.278 1.800	**0.143** 2.210**	**0.160** 2.130**	0.115 0.870	**0.167** 2.460**	**0.189** 3.020***	0.165 2.37**	0.139 1.360	**0.120** 2.11**	**0.176** 2.51**	0.121 1.260	**0.168** 2.66***	**0.166** 2.88***
EPS	**0.134** 3.000***	-0.160 -0.970	**0.111** 2.670***	**0.109** 2.580***	0.162 0.460	**0.094** 2.140**	**0.122** 2.700***	**0.130** 2.39**	0.062 0.500	**0.107** 2.39**	**0.113** 2.87***	0.238 1.140	**0.118** 2.87***	**0.137** 2.64***
Ordinary Shareholdir	0.023 0.570	-0.098 -1.070	0.010 0.330	0.023 0.700	-0.099 -0.400	0.006 0.190	0.004 0.110							
CAR Buy	0.042 0.500							0.068 0.530						
CAR Sell		-0.006 -0.050							-0.063 -0.510					
CAR All OS			0.101 1.220							0.137 1.070				
CAR BEO				0.064 1.210							*0.067* 1.71*			
CAR SSO					-0.005 -0.020							0.044 0.500		
CAR ESO						0.041 0.630							0.052 1.060	
CAR All							**0.134** 2.470***							*0.153* 1.72*
No of Observations	54	21	60	31	14	38	67	57	22	63	33	15	40	71
F-Value	7.920	5.530	10.900	5.710	2.580	6.310	10.250	13.110	7.760	15.520	8.710	4.380	9.380	16.010
Prob of F-value	0.0000***	0.0043***	0.0000***	0.0005***	0.1557	0.0001***	0.0000***	0.0000***	0.0006***	0.0000***	0.0000***	0.0295**	0.0000***	0.0000***
R-Squared	57%	70%	60%	61%	62%	57%	64%	45%	55%	51%	61%	51%	51%	56%
R-Squared Adjusted	49%	50%	54%	47%	2%	45%	59%	39%	37%	45%	52%	14%	42%	52%

The *t*-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).
(***) Significant at 1% or Less, (**) at 5% or Less, and (*) at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.xls
27/02/03

1999

Dependent Va: CEO Pay	Model v15	Model v16	Model v17	Model v18	Model v19	Model v20	Model v21	Model v22
	WITH Insider Trading Measures WITHOUT YearsInPost & Industry							
Independent Variables:	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics
Constant	**8.542** 11.61*	**8.133** 8.90*	**8.593** 7.45*	**8.475** 12.12*	**9.369** 9.38*	**11.015** 4.56*	**9.142** 10.20*	**8.136** 11.30*
No.Of Insid VAR 5	**0.622** 2.49**	**0.618** 2.37**	0.660 1.47	**0.571** 2.48**	0.047 0.43	0.517 1.05	0.320 1.33	**0.502** 2.950*
Years In Post VAR 6								
Education VAR 12	**0.274** 2.60*	**0.380** 3.24*	*0.388* 1.72***	**0.313** 2.83*	**0.365** 2.32**	0.476 1.09	**0.381** 2.44**	**0.402** 3.72*
Incentive S VAR 18	**0.128** 3.18*	**0.143** 3.83*	*0.106* 1.96***	**0.125** 3.65*	*0.078* 1.81***	0.089 0.54	**0.094** 1.98**	**0.135** 4.26*
Employme VAR 19	*0.093* 1.73***	0.067 1.17	0.044 0.31	**0.099** 2.00**	**0.136** 3.48*	-0.099 -0.47	0.096 1.52	**0.094** 1.97**
Capitalisat VAR 21	**0.140** 2.33**	**0.194** 2.55*	0.190 1.65	**0.153** 2.50**	**0.175** 2.48**	0.162 1.43	**0.175** 2.73**	**0.193** 3.31*
EPS VAR 22	**0.139** 2.78*	**0.105** 2.51**	-0.086 -0.63	**0.087** 2.13**	**0.109** 2.88*	0.300 1.13	**0.098** 2.37**	**0.109** 2.51*
Industry VAR 23								
Ordinary S VAR 17	0.002 0.09							
CAR Buy VAR 24		0.049 0.56						
CAR Sell VAR 25			0.040 0.55					
CAR All OS VAR 26				0.096 1.13				
CAR BEO VAR 27					0.062 1.38			
CAR SSO VAR 28						0.003 0.02		
CAR ESO VAR 29							0.025 0.41	
CAR All VAR 30								**0.129** 2.23**
No of Obs	84	57	22	63	33	15	40	71
F-Value	12.390	12.110	5.330	14.480	7.180	2.270	7.980	15.750
Prob.of F	0.0000*	0.0000*	0.0036*	0.0000*	0.0001*	0.1513	0.0000*	0.0000*
R-Square	59%	59%	67%	61%	61%	60%	56%	64%
Root MSE	0.464	0.492	0.430	0.465	0.336	0.557	0.403	0.440
R-Squared Adj	55%	53%	50%	56%	51%	20%	46%	60%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 a
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999
CePayStataRobust.Xls
1999
08/03/03

Dependent Va	Model v23	Model v24	Model v25	Model v26	Model v27	Model v28	Model v29
CEO Pay	WITH OSh & Insider Trading WITHOUT YearsInPost & Industry						
Independen	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	7.992	10.575	8.479	9.263	13.089	9.136	8.116
	8.050*	5.950*	10.830*	8.930*	1.720	9.370*	9.970*
No Of Insid	0.689	0.799	0.644	0.086	0.454	0.386	0.591
VAR 5	2.480*	1.600	2.650*	0.880	0.790	1.500	2.910*
Years In Post							
VAR 6							
Education	0.343	0.142	0.259	0.336	0.371	0.343	0.335
VAR 12	2.700*	0.520	2.200**	1.960***	1.010	2.120**	3.030*
Incentive S	0.145	0.075	0.130	0.071	0.031	0.092	0.142
VAR 18	3.250*	1.580	3.750*	1.660	0.120	1.920***	4.110*
Employme	0.049	-0.105	0.083	0.138	-0.062	0.091	0.078
VAR 19	0.800	-0.520	1.580	3.400*	-0.220	1.420	1.530
Capitalisat	0.188	0.278	0.143	0.160	0.115	0.167	0.189
VAR 21	2.270**	1.900	2.210**	2.130**	0.870	2.460**	3.020*
EPS	0.134	-0.160	0.111	0.109	0.162	0.094	0.122
VAR 22	3.800*	-0.970	2.670*	2.580*	0.480	2.140**	2.700*
Industry							
VAR 23							
Ordinary S	0.023	-0.098	0.010	0.023	-0.099	0.006	0.004
VAR 17	0.570	-1.070	0.330	0.700	-0.400	0.190	0.110
CAR Buy	0.042						
VAR 24	0.500						
CAR Sell		-0.006					
VAR 25		-0.050					
CAR All OS			0.101				
VAR 26			1.220				
CAR BEO				0.064			
VAR 27				1.210			
CAR SSO					-0.005		
VAR 28					-0.020		
CAR ESO						0.041	
VAR 29						0.630	
CAR All							0.134
VAR 30							2.470*
No. of Obs	54	21	60	31	14	38	67
F-Value	7.920	5.530	10.900	5.710	2.580	6.310	10.250
Prob of F	0.0000*	0.0043*	0.0000*	0.0006*	0.1567	0.0001*	0.0000*
R-Square	57%	70%	60%	61%	62%	57%	64%
Root MSE	0.497	0.440	0.466	0.353	0.631	0.415	0.440
R-Squared	49%	50%	54%	47%	2%	45%	59%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 a
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999
CePayStataRobust.Xls
1999
13/03/03

Dependent Va	Model v58	Model v59	Model v60	Model v61	Model v62	Model v63	Model v64
CEO Pay	WITH OSh & CAR WITHOUT NoOfInsiders&YearsInPost & Industry						
Independen	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	8.460	10.136	8.890	9.290	18.182	9.387	8.372
	7.62*	5.33*	11.12*	9.13*	2.35***	10.22*	9.10*
No.Of Insiders							
VAR 5							
Years In Post							
VAR 6							
Education	0.492	0.476	0.367	0.351	0.258	0.419	0.469
VAR 12	3.07*	1.350	2.84*	2.09**	0.630	2.11**	3.21*
Incentive S	0.146	0.071	0.128	0.068	-0.153	0.077	0.142
VAR 18	2.51*	1.330	3.06*	1.600	-0.730	1.58	3.23*
Employme	0.129	0.112	0.170	0.150	-0.077	0.145	0.157
VAR 19	2.48**	0.840	3.73*	4.37*	-0.250	3.65*	3.97*
Capitalisat	0.168	0.175	0.114	0.162	0.088	0.164	0.166
VAR 21	2.02**	1.350	1.83***	2.17**	0.800	2.49**	2.59*
EPS	0.140	-0.020	0.117	0.115	0.015	0.114	0.143
VAR 22	2.41**	-0.120	2.28**	2.54**	0.440	2.47**	2.54*
Industry							
VAR 23							
Ordinary S	0.016	-0.055	0.009	0.024	-0.230	0.009	0.007
VAR 17	0.390	-0.620	0.290	0.740	-0.890	0.320	0.220
CAR Buy	0.066						
VAR 24	0.510						
CAR Sell		-0.113					
VAR 25		-0.620					
CAR All OS			0.141				
VAR 26			1.070				
CAR BEO				0.069			
VAR 27				1.410			
CAR SSO					-0.147		
VAR 28					-0.390		
CAR ESO						0.053	
VAR 29						0.830	
CAR All							0.156
VAR 30							1.73***
No. of Obs	54	21	60	31	14	38	67
F-Value	6.950	6.140	9.110	6.660	1.750	7.440	8.830
Prob of F	0.0000*	0.0025*	0.0000*	0.0002*	0.2557	0.0000*	0.0000*
R-Square	40%	57%	46%	61%	58%	51%	52%
Root MSE	0.579	0.509	0.535	0.347	0.608	0.436	0.500
R-Squared	31%	33%	39%	49%	9%	39%	46%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 a
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999
CePayStataRobust.Xls
1999
13/03/03

Dependent Va	Model v65	Model v66	Model v67	Model v68	Model v69	Model v70	Model v71
CEO Pay	With CAR Without NoOfInsiders & Osh & YearsInPost & Industry						
Independen	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	8.631	9.122	8.898	9.401	12.025	9.444	8.463
	9.19*	8.99*	13.78*	9.68*	5.83*	11.03*	11.23*
No.Of Insiders							
VAR 5							
Years In Post							
VAR 6							
Education	0.489	0.530	0.383	0.368	0.588	0.422	0.484
VAR 12	3.27*	1.520	3.06*	2.36**	1.020	2.31**	3.43*
Incentive S	0.143	0.090	0.126	0.075	0.004	0.080	0.138
VAR 18	3.24*	1.660	3.14*	1.83***	0.020	1.72***	3.56*
Employme	0.137	0.166	0.175	0.144	0.033	0.141	0.161
VAR 19	2.85*	2.05***	4.27*	4.46*	0.310	3.71*	4.30*
Capitalisat	0.165	0.139	0.120	0.176	0.121	0.168	0.166
VAR 21	2.37**	1.360	2.11**	2.51**	1.260	2.66*	2.88*
EPS	0.130	0.062	0.107	0.113	0.238	0.118	0.137
VAR 22	2.39**	0.500	2.39**	2.87*	1.140	2.87*	2.64*
Industry							
VAR 23							
Ordinary Shareholdings							
VAR 17							
CAR Buy	0.068						
VAR 24	0.530						
CAR Sell		-0.063					
VAR 25		-0.510					
CAR All OS			0.137				
VAR 26			1.070				
CAR BEO				0.067			
VAR 27				1.71***			
CAR SSO					0.044		
VAR 28					0.500		
CAR ESO						0.052	
VAR 29						1.060	
CAR All							0.153
VAR 30							1.72***
No. of Obs	57	22	63	33	15	40	71
F-Value	13.110	7.760	15.520	8.710	4.380	9.380	16.010
Prob of F	0.0000*	0.0006*	0.0000*	0.0000*	0.0295**	0.0000*	0.0000*
R-Square	45%	55%	51%	61%	51%	51%	56%
Root MSE	0.560	0.484	0.520	0.330	0.579	0.418	0.484
R-Squared	39%	37%	45%	52%	14%	42%	52%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 a
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.Xls

1999 13/03/03

pendent Va	Model v30	Model v31	Model v32	Model v33	Model v34	Model v35	Model v36
CEO Pay	With Osh & LaggedCAR Without YearsInPost & Industry						
Independen	Coeff	Coeff.	Coeff	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	7.205	9.595	8.288	10.442	9.269	9.471	8.671
	7.20*	7.28*	9.23*	12.51*	5.90*	10.56*	11.50*
No Of Insi	*0.627*	1.031	0.473	0.593	0.947	0.653	0.513
VAR 5	*1.93****	4.01*	2.54*	2.94*	3.09*	2.73*	2.77*
Years In Post							
VAR 6							
Education	0.270	0.170	0.257	0.029	0.555	0.217	0.244
VAR 12	1.380	0.850	2.10**	0.280	2.47**	1.480	2.14**
Incentive S	0.094	0.087	0.093	0.032	0.192	0.097	0.085
VAR 18	1.240	1.370	2.58*	0.740	2.37**	2.23**	2.77*
Employme	-0.015	-0.003	0.119	0.005	-0.100	0.003	0.122
VAR 19	-0.180	-0.040	2.45**	0.090	-0.640	0.040	2.48**
Capitalisat	0.485	0.192	0.165	0.237	0.314	0.239	0.151
VAR 21	6.72*	1.390	2.50*	2.10**	2.58**	3.00*	2.75*
EPS	-0.034	*0.194*	0.076	-0.003	-0.007	-0.001	0.064
VAR 22	-0.380	*2.00****	1.040	-0.040	-0.100	-0.030	1.140
Industry							
VAR 23							
Ordinary S	-0.025	-0.049	0.040	-0.061	*-0.162*	-0.056	0.017
VAR 17	-0.340	-0.880	0.980	-1.530	*-1.78****	-1.300	0.480
CAR Buy	0.044						
VAR 24	0.880						
CAR Sell		0.134					
VAR 25		1.010					
CAR All OS			0.048				
VAR 26			0.940				
CAR BEO				-1.120			
VAR 27				-0.039			
CAR SSO					-0.141		
VAR 28					-0.720		
CAR ESO						-0.065	
VAR 29						-1.200	
CAR All							-0.000
VAR 30							-0.010
No of Obs	30	20	52	26	20	36	57
F-Value	9.860	14.230	11.240	11.600	12.990	10.310	11.540
Prob of F	0.0000*	0.0001*	0.0000*	0.0000*	0.0001*	0.0000*	0.0000*
R-Square	54%	77%	56%	79%	81%	67%	57%
Root MSE	0.433	0.410	0.412	0.273	0.365	0.357	0.398
R-Squared	36%	61%	47%	70%	68%	57%	50%

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.Xls

1999 13/03/03

Dependent Var 3	Model v37	Model v38	Model v39	Model v40	Model v41	Model v42	Model v43
CEO Pay	With LaggedCAR Without Osh& YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	6.940	8.153	8.475	9.712	7.157	9.037	8.685
	6.80*	8.01*	12.91*	10.93*	5.75*	11.56*	15.15*
No.Of Insiders	*5.826*	0.964	0.427	0.413	0.968	0.582	0.432
VAR 5	*1.90****	3.74*	2.35**	2.22**	2.35**	2.82*	2.58*
Years In Post							
VAR 6							
Education	0.316	0.325	0.295	0.105	0.355	*0.245*	0.287
VAR 12	1.560	1.420	2.44*	1.020	1.710	*1.86****	2.55*
Incentive Shareholdi	0.085	0.104	0.109	0.033	*0.098*	0.084	0.094
VAR 18	1.440	1.600	3.16*	0.850	*1.90****	2.24**	3.31*
Employment	-0.004	0.056	0.112	0.056	0.094	0.032	0.122
VAR 19	-0.050	0.760	2.35**	1.050	1.010	0.550	2.66*
Capitalisation	0.486	0.209	0.185	0.214	0.254	0.215	0.172
VAR 21	7.18*	1.700	2.87*	2.13**	2.47**	2.99*	3.22*
EPS	-0.029	0.205	0.067	0.000	-0.084	0.005	0.059
VAR 22	-0.280	2.42**	1.020	0.000	-1.070	0.080	1.110
Industry							
VAR 23							
Ordinary Shareholdings							
VAR 17							
CAR Buy	0.066						
VAR 24	0.900						
CAR Sell		0.161					
VAR 25		1.410					
CAR All OS			0.034				
VAR 26			0.710				
CAR BEO				-0.047			
VAR 27				-1.210			
CAR SSO					0.110		
VAR 28					0.700		
CAR ESO						-0.083	
VAR 29						-1.610	
CAR All							0.001
VAR 30							0.030
No. of Observations	31	21	54	27	21	37	60
F-Value	12.650	10.690	18.030	7.930	5.070	8.940	18.380
Prob.of F	0.0000*	0.0002*	0.0000*	0.0002*	0.0058*	0.0000*	0.0000*
R-Squared	53%	80%	62%	74%	73%	65%	62%
Root MSE	0.426	0.407	0.408	0.288	0.404	0.358	0.391
R-Squared Adjusted	38%	69%	56%	65%	59%	56%	57%

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.Xls

1999 13/03/03

Dependent Var 3	Model v44	Model v45	Model v46	Model v47	Model v48	Model v49	Model v50
CEO Pay	With LaggedCAR & Osh Without NoOfInsiders&YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	8.258	9.432	8.908	9.923	11.956	9.917	9.323
	8.83*	5.34*	11.05*	11.06*	7.16*	13.14*	13.74*
No.Of Insiders							
VAR 5							
Years In Post							
VAR 6							
Education	0.209	0.372	0.255	0.132	0.864	0.359	0.266
VAR 12	1.010	0.930	1.94**	0.970	2.54**	2.30**	2.09**
Incentive Shareholdin	0.078	0.146	0.097	0.083	*0.220*	0.117	0.090
VAR 18	1.060	1.580	2.69*	2.07**	*2.04****	2.73*	2.96*
Employment	-0.003	0.057	0.141	0.053	-0.137	0.087	0.143
VAR 19	-0.030	0.500	2.63*	1.030	-0.690	1.580	2.74*
Capitalisation	0.471	0.337	0.175	0.279	*0.279*	0.187	0.156
VAR 21	6.36*	2.30**	2.49**	2.74*	*2.01****	2.37**	2.59*
EPS	-0.060	0.070	0.054	-0.042	0.072	0.016	0.058
VAR 22	-0.670	0.640	0.820	-0.330	0.770	0.210	0.950
Industry							
VAR 23							
Ordinary Shareholdin	-0.003	-0.116	0.024	-0.061	*-0.231*	-0.052	0.006
VAR 17	-0.050	-1.260	0.580	-1.340	*-1.83****	-1.110	0.180
CAR Buy	0.004						
VAR 24	0.060						
CAR Sell		0.087					
VAR 25		0.460					
CAR All OS			0.025				
VAR 26			0.520				
CAR BEO				-0.054			
VAR 27				-1.070			
CAR SSO					*-0.396*		
VAR 28					*-1.81****		
CAR ESO						-0.062	
VAR 29						-1.040	
CAR All							-0.004
VAR 30							-0.070
No. of Observations	30	20	52	26	20	36	57
F-Value	13.210	5.130	10.020	5.250	6.810	7.420	9.610
Prob.of F	0.0000*	0.0067*	0.0000*	0.0021*	0.0021*	0.0000*	0.0000*
R-Squared	42%	57%	48%	69%	68%	54%	50%
Root MSE	0.474	0.540	0.439	0.327	0.458	0.414	0.428
R-Squared Adjusted	24%	32%	40%	57%	49%	43%	42%

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.Xls

1999 13/03/03

Dependent Var 3 CEO Pay	Model v51	Model v52	Model v53	Model v54	Model v55	Model v56	Model v57
	With LaggedCAR Without NoOfInsiders&Osh&YearsInPost & Industry						
Independent Variables:	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics
Constant	**8.093**	**7.822**	**8.910**	**9.587**	**9.278**	**9.531**	**9.184**
	9.22*	7.44*	15.62*	10.47*	9.13*	13.15*	18.12*
No Of Insiders VAR 5							
Years In Post VAR 6							
Education VAR 12	0.243	0.505	**0.285**	0.159	0.538	***0.339***	**0.286**
	1.180	1.420	2.24**	1.290	1.640	2.20**	2.35**
Incentive Shareholdings VAR 18	0.077	*0.153*	**0.108**	*0.066*	0.101	**0.102**	**0.095**
	1.340	1.83***	3.30*	1.80***	1.490	2.76*	3.54*
Employment VAR 19	0.001	0.140	**0.136**	*0.093*	0.098	**0.111**	**0.149**
	0.010	1.150	2.68*	1.74***	0.740	2.18**	3.09*
Capitalisation VAR 21	**0.479**	0.266	**0.192**	**0.222**	0.193	**0.159**	**0.164**
	6.56*	1.650	2.77*	2.41**	1.630	2.34**	2.84*
EPS VAR 22	-0.056	0.141	0.049	0.022	0.040	0.043	0.064
	-0.610	1.590	0.810	0.180	0.300	0.510	1.150
Industry VAR 23							
Ordinary Shareholdings VAR 17							
CAR Buy VAR 24	0.018						
	0.270						
CAR Sell VAR 25		0.183					
		1.040					
CAR All OS VAR 26			0.017				
			0.380				
CAR BEO VAR 27				-0.059			
				-1.200			
CAR SSO VAR 28					-0.127		
					-0.800		
CAR ESO VAR 29						-0.067	
						-1.190	
CAR All VAR 30							0.004
							0.090
No of Observations	31	21	54	27	21	37	60
F-Value	14.380	13.160	18.630	4.750	4.530	7.270	16.970
Prob of F	0.0000*	0.0000*	0.0000*	0.0037*	0.0094*	0.0001*	0.0000*
R-Squared	43%	65%	56%	66%	52%	51%	57%
Root MSE	0.459	0.520	0.429	0.324	0.518	0.413	0.415
R-Squared Adjusted	28%	50%	51%	56%	32%	42%	52%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999

CePayStataRobust.Xls

1999 Pay 1999 CAR (No Number Of Insiders) 29/04/03

Dependent Var 3 CEO Pay	Model v58	Model v59	Model v60	Model v61	Model v62	Model v63	Model v64
Independent Variables:	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics
Constant	**13.366**	**13.235**	**13.294**	**13.393**	**13.336**	**13.412**	**13.314**
	165.580*	104.090*	164.360*	167.390*	84.660*	154.740*	166.510*
No.Of Insiders VAR 5							
Years In Post VAR 6							
Education VAR 12							
Incentive Shareholdings VAR 18							
Employment VAR 19							
Capitalisation VAR 21							
EPS VAR 22							
Industry VAR 23							
Ordinary Shareholdings VAR 17							
CAR Buy VAR 24	0.013						
	0.090						
CAR Sell VAR 25		-0.159					
		-1.090					
CAR All OS VAR 26			0.047				
			0.310				
CAR BEO VAR 27				-0.034			
				-0.380			
CAR SSO VAR 28					-0.184		
					-1.020		
CAR ESO VAR 29						-0.074	
						-0.820	
CAR All VAR 30							0.017
							0.150
No of Observations	61	26	69	37	19	46	78
F-Value	0.010	1.190	0.100	0.140	1.050	0.680	0.020
Prob of F	0.9296	0.2869	0.7583	0.7087	0.3208	0.4157	0.8833
R-Squared	0%	6%	1%	1%	7%	2%	0%
Root MSE	0.708	0.651	0.707	0.484	0.684	0.582	0.698
R-Squared Adjusted	-2%	-3%	-4%	-12%	-29%	-13%	-10%

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Appendix (A6.4) The Managerial Incentive of Insider Trading Models 3 and 4,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999 Pay 1999 CAR (No Number Of Insiders)

CePayStataRobust.Xls

29/04/03

Dependent Var 3 CEO Pay	Model v65	Model v66	Model v67	Model v68	Model v69	Model v70	Model v71	Model v72
	All Ordinary Shares CAR (1999 OS)				ALL Transactions CAR (1999 ALL)			
	=Model v7	=Model v8	=Model v13	=Model v14	=Model v7	=Model v8	=Model v13	=Model v14
Independent Variables:	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics
Constant	**8.847**	**9.027**	**8.898**	**9.057**	**8.444**	**8.555**	**8.463**	**8.553**
	13.760*	14.690*	13.780*	14.390*	11.370*	11.830*	11.230*	11.500*
No.Of Insiders VAR 5								
Years In Post VAR 6	0.091	0.102			0.068	0.076		
	1.030	1.150			1.040	1.180		
Education VAR 12	**0.358**	**0.345**	**0.383**	0.374	**0.465**	**0.453**	**0.484**	**0.476**
	2.860*	2.760*	3.060*	3.010*	3.390*	3.350*	3.430*	3.400*
Incentive Shareholdings VAR 18	**0.120**	**0.117**	**0.126**	**0.123**	**0.133**	**0.132**	**0.138**	**0.138**
	3.350*	3.330*	3.140*	3.110*	3.620*	3.600*	3.580*	3.590*
Employment VAR 19	**0.178**	**0.171**	**0.175**	**0.168**	**0.161**	**0.156**	**0.161**	**0.157**
	4.200*	3.960*	4.270*	4.000*	4.210*	3.990*	4.300*	4.140*
Capitalisation VAR 21	**0.117**	**0.120**	**0.120**	**0.123**	**0.165**	**0.166**	**0.166**	**0.166**
	2.020**	2.180**	2.110**	2.260**	2.890*	2.990*	2.880*	2.980*
EPS VAR 22	**0.107**	**0.112**	**0.107**	**0.111**	**0.135**	**0.138**	**0.137**	**0.139**
	2.270**	2.370**	2.390**	2.470**	2.540*	2.600*	2.640*	2.680*
Industry VAR 23		-0.165		-0.141		-0.101		-0.081
		-1.320		-1.170		-0.890		-0.720
Ordinary Shareholdings VAR 17								
CAR Buy VAR 24								
CAR Sell VAR 25								
CAR All OS VAR 26	0.144	0.135	0.137	0.129				
	1.140	1.100	1.070	1.020				
CAR BEO VAR 27								
CAR SSO VAR 28								
CAR ESO VAR 29								
CAR All VAR 30					*0.150*	*0.145*	*0.153*	*0.150*
					1.740***	1.700***	1.720***	1.680***
No of Observations	63	63	63	63	71	71	71	71
F-Value	15.370	15.620	15.520	15.060	14.980	13.820	16.010	14.340
Prob of F	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
R-Squared	52%	53%	51%	52%	56%	57%	56%	56%
Root MSE	0.518	0.516	0.520	0.520	0.484	0.486	0.484	0.487
R-Squared Adjusted	45%	46%	43%	44%	51%	51%	50%	50%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5.
Number of Insiders, Ordinary Shareholdings, and Lagged CAR:
Evidence From FTSE100 During 1999 Using STATA Regression with Robust Standard Errors

Dependent Variable CEO Pay	Lagged CAR Portfolios Only						
Independent	Coefficients and T-Statistics for Model 5 Versions						
Variables:	Model 5-1	Model 5-2	Model 5-3	Model 5-4	Model 5-5	Model 5-6	Model 5-7
Constant	**8.093**	7.822	**8.910**	**9.587**	**9.278**	**9.531**	**9.184**
	9.22***	7.44***	15.62***	10.47***	9.13***	13.15***	18.12***
No.Of Insiders							
Years In Post							
Education	0.243	0.505	**0.285**	0.159	0.538	***0.339***	**0.286**
	1.180	1.420	2.24**	1.290	1.640	2.20**	2.35**
Incentive Shareholdin	*0.077*	***0.153***	**0.108**	***0.066***	0.101	**0.102**	**0.095**
	1.340	1.83*	3.30***	1.80*	1.490	2.76***	3.54***
Employment	0.001	0.140	**0.136**	***0.093***	0.098	**0.111**	**0.149**
	0.010	1.150	2.68***	1.74*	0.740	2.18**	3.09***
Capitalisation	0.479	0.266	**0.192**	**0.222**	0.193	**0.159**	**0.164**
	6.55*	1.650	2.77***	2.41**	1.630	2.34**	2.84***
EPS	-0.056	0.141	0.049	0.022	0.040	0.043	0.064
	-0.610	1.590	0.810	0.180	0.300	0.510	1.150
Ordinary Shareholdings							
CAR Buy	0.018						
	0.270						
CAR Sell		0.183					
		1.040					
CAR All OS			0.017				
			0.360				
CAR BEO				-0.059			
				-1.200			
CAR SSO					-0.127		
					-0.800		
CAR ESO						-0.067	
						-1.190	
CAR All							0.004
							0.090
No of Observations	31	21	54	27	21	37	60
F-Value	**14.380**	**13.160**	**18.630**	**4.750**	**4.530**	**7.270**	**16.970**
Prob of *F*-value	0.0000***	0.0000***	0.0000***	0.0037***	0.0084***	0.0001***	0.0000***
R-Squared	43%	65%	56%	66%	52%	51%	57%
R-Squared Adjusted	28%	50%	51%	56%	32%	42%	52%

The *t*-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent stand
(***) Significant at 1% or Less, (**) at 5% or Less, and (*) *at 10% or Less*.

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,

Dependent Var 3 CEO Pay	Model v30	Model v31	Model v32	Model v33	Model v34	Model v35	Model v36
	With Osh & LaggedCAR Without YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	**7.205**	**9.595**	**8.288**	**10.442**	**9.269**	**9.471**	**8.671**
	7.20*	7.26*	9.23*	12.51*	5.90*	10.56*	11.50*
No.Of Insiders VAR 5	***0.627***	**1.031**	**0.473**	**0.593**	**0.947**	**0.653**	**0.513**
	1.93***	4.01*	2.54*	2.94*	3.09*	2.73*	2.77*
Years In Post VAR 6							
Education VAR 12	0.270	0.170	**0.257**	0.029	**0.555**	0.217	**0.244**
	1.380	0.650	2.10**	0.280	2.47**	1.460	2.14**
Incentive Shareholdin VAR 18	0.094	0.087	**0.093**	0.032	**0.192**	**0.097**	**0.085**
	1.240	1.370	2.58*	0.740	2.37**	2.23**	2.77*
Employment VAR 19	-0.015	-0.003	**0.119**	0.005	-0.100	**0.003**	**0.122**
	-0.180	-0.040	2.45**	0.090	-0.640	0.040	2.48**
Capitalisation VAR 21	**0.485**	0.192	**0.165**	**0.237**	**0.314**	**0.239**	**0.151**
	6.72*	1.390	2.50*	2.10**	2.58**	3.00*	2.75*
EPS VAR 22	-0.034	***0.194***	0.076	-0.003	-0.007	-0.001	0.064
	-0.360	2.00***	1.040	-0.040	-0.100	-0.030	1.140
Industry VAR 23							
Ordinary Shareholdin VAR 17	-0.025	-0.049	0.040	-0.061	***-0.162***	-0.056	0.017
	-0.340	-0.680	0.960	-1.530	-1.78***	-1.300	0.480
CAR Buy VAR 24	0.044						
	0.660						
CAR Sell VAR 25		0.134					
		1.010					
CAR All OS VAR 26			0.048				
			0.940				
CAR BEO VAR 27				-1.120			
				-0.039			
CAR SSO VAR 28					-0.141		
					-0.720		
CAR ESO VAR 29						-0.065	
						-1.200	
CAR All VAR 30							-0.000
							-0.010
No. of Observation	30	20	52	26	20	36	57
F-Value	**9.860**	**14.230**	**11.240**	**11.600**	**12.990**	**10.310**	**11.540**
Prob of F	0.0000*	0.0001*	0.0000*	0.0000*	0.0001*	0.0000*	0.0000*
R-Squared	54%	77%	56%	79%	81%	67%	57%
Root MSE	0.433	0.410	0.412	0.273	0.365	0.357	0.398
R-Squared Adjusted	36%	61%	47%	70%	68%	57%	50%

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Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,

Dependent Var 3 CEO Pay	Model v37	Model v38	Model v39	Model v40	Model v41	Model v42	Model v43
	With LaggedCAR Without Osh& YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	**6.940**	**8.153**	**8.475**	**9.712**	**7.157**	**9.037**	**8.685**
	6.80*	8.01*	12.91*	10.93*	5.75*	11.56*	15.15*
No.Of Insiders VAR 5	***5.826***	**0.964**	**0.427**	**0.413**	**0.968**	**0.582**	**0.432**
	1.90***	3.74*	2.35**	2.22**	2.35**	2.82*	2.58*
Years In Post VAR 6							
Education VAR 12	0.316	0.325	**0.295**	0.105	**0.355**	***0.245***	**0.287**
	1.560	1.420	2.44*	1.020	1.710	1.86***	2.55*
Incentive Shareholdin VAR 18	0.085	0.104	**0.109**	0.033	***0.098***	**0.084**	**0.094**
	1.440	1.600	3.16*	0.850	1.90***	2.24**	3.31*
Employment VAR 19	-0.004	0.056	**0.112**	0.056	0.094	0.032	**0.122**
	-0.050	0.760	2.35**	1.050	1.010	0.550	2.86*
Capitalisation VAR 21	**0.486**	0.209	**0.185**	**0.214**	**0.254**	**0.215**	**0.172**
	7.18*	1.700	2.87*	2.13**	2.47**	2.99*	3.22*
EPS VAR 22	-0.029	**0.205**	0.067	0.000	-0.084	0.005	0.059
	-0.280	2.42**	1.020	0.000	-1.070	0.080	1.110
Industry VAR 23							
Ordinary Shareholdings VAR 17							
CAR Buy VAR 24	0.066						
	0.900						
CAR Sell VAR 25		0.161					
		1.410					
CAR All OS VAR 26			0.034				
			0.710				
CAR BEO VAR 27				-0.047			
				-1.210			
CAR SSO VAR 28					0.110		
					0.700		
CAR ESO VAR 29						-0.083	
						-1.610	
CAR All VAR 30							0.001
							0.030
No. of Observation	31	21	54	27	21	37	60
F-Value	**12.650**	**10.690**	**18.030**	**7.930**	**5.070**	**8.940**	**18.380**
Prob of F	0.0000*	0.0002*	0.0000*	0.0002*	0.0058*	0.0000*	0.0000*
R-Squared	53%	80%	62%	74%	73%	65%	62%
Root MSE	0.426	0.407	0.408	0.288	0.404	0.358	0.391
R-Squared Adjusted	38%	69%	56%	65%	59%	56%	57%

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(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,

Dependent Var 3 CEO Pay	Model v44	Model v45	Model v46	Model v47	Model v48	Model v49	Model v50
	With LaggedCAR & Osh Without NoOfInsiders&YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	8.258	9.432	8.908	9.923	11.956	9.917	9.323
	8.83*	5.34*	11.05*	11.06*	7.16*	13.14*	13.74*
No Of Insiders VAR 5							
Years In Post VAR 6							
Education VAR 12	0.209	0.372	0.255	0.132	0.864	0.359	0.266
	1.010	0.930	1.94**	0.970	2.54**	2.30**	2.09**
Incentive Shareholdin VAR 18	0.078	0.146	0.097	0.083	*0.220*	0.117	0.090
	1.060	1.680	2.89*	2.07**	*2.04****	2.73*	2.96*
Employment VAR 19	-0.003	0.057	0.141	0.053	-0.137	0.087	0.143
	-0.030	0.500	2.63*	1.030	-0.690	1.560	2.74*
Capitalisation VAR 21	0.471	0.337	0.175	0.279	*0.279*	0.187	0.156
	6.36*	2.30**	2.48**	2.74*	*2.01****	2.37**	2.59*
EPS VAR 22	-0.060	0.070	0.054	-0.042	0.072	0.016	0.058
	-0.870	0.840	0.820	-0.330	0.770	0.210	0.950
Industry VAR 23							
Ordinary Shareholdin VAR 17	-0.003	-0.116	0.024	-0.061	*-0.231*	-0.052	0.006
	-0.050	-1.260	0.580	-1.340	*-1.83****	-1.110	0.160
CAR Buy VAR 24	0.004						
	0.060						
CAR Sell VAR 25		0.087					
		0.480					
CAR All OS VAR 26			0.025				
			0.520				
CAR BEO VAR 27				-0.054			
				-1.070			
CAR SSO VAR 28					*-0.396*		
					*-1.81****		
CAR ESO VAR 29						-0.062	
						-1.040	
CAR All VAR 30							-0.004
							-0.070
No. of Observation	30	20	52	26	20	36	57
F-Value	13.210	5.130	10.020	5.250	6.810	7.420	9.610
Prob of F	0.0000*	0.0087*	0.0000*	0.0021*	0.0021*	0.0000*	0.0000*
R-Squared	42%	57%	48%	69%	68%	54%	50%
Root MSE	0.474	0.540	0.439	0.327	0.458	0.414	0.428
R-Squared Adjusted	24%	32%	40%	57%	49%	43%	42%

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,

Dependent Var 3 CEO Pay	Model v51	Model v52	Model v53	Model v54	Model v55	Model v56	Model v57
	With LaggedCAR Without NoOfInsiders&Osh&YearsInPost & Industry						
Independent	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables:	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics	T-Statistics
Constant	8.093	7.822	8.910	9.587	9.278	9.531	9.184
	9.22*	7.44*	15.62*	10.47*	9.13*	13.15*	18.12*
No.Of Insiders VAR 5							
Years In Post VAR 6							
Education VAR 12	0.243	0.505	0.285	0.159	0.538	*0.339*	0.286
	1.180	1.420	2.24**	1.290	1.640	*2.20***	2.35**
Incentive Shareholdin VAR 18	0.077	*0.153*	0.108	*0.066*	0.101	0.102	0.095
	1.340	*1.83****	3.30*	*1.80****	1.490	2.76*	3.54*
Employment VAR 19	0.001	0.140	0.136	*0.093*	0.098	0.111	0.149
	0.010	1.150	2.68*	*1.74****	0.740	2.18**	3.09*
Capitalisation VAR 21	0.479	0.266	0.192	0.222	0.193	0.159	0.164
	6.55*	1.650	2.77*	2.41**	1.630	2.34**	2.84*
EPS VAR 22	-0.056	0.141	0.049	0.022	0.040	0.043	0.064
	-0.610	1.590	0.810	0.180	0.300	0.510	1.150
Industry VAR 23							
Ordinary Shareholdings VAR 17							
CAR Buy VAR 24	0.018						
	0.270						
CAR Sell VAR 25		0.183					
		1.040					
CAR All OS VAR 26			0.017				
			0.360				
CAR BEO VAR 27				-0.059			
				-1.200			
CAR SSO VAR 28					-0.127		
					-0.800		
CAR ESO VAR 29						-0.067	
						-1.190	
CAR All VAR 30							0.004
							0.080
No. of Observation	31	21	54	27	21	37	60
F-Value	14.380	13.160	18.630	4.750	4.530	7.270	16.970
Prob of F	0.0000*	0.0000*	0.0000*	0.0037*	0.0084*	0.0001*	0.0000*
R-Squared	43%	65%	56%	66%	52%	51%	57%
Root MSE	0.459	0.520	0.429	0.324	0.518	0.413	0.415
R-Squared Adjusted	28%	50%	51%	56%	32%	42%	52%

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999 Pay 1999 CAR (No Number Of Insiders)

Dependent Var 3: CEO Pay	All Ordinary Shares CAR (1999 OS)				ALL Transactions CAR (1999 ALL)			
	Model v65	Model v66	Model v67	Model v68	Model v69	Model v70	Model v71	Model v72
	=Model v7	=Model v8	=Model v13	=Model v14	=Model v7	=Model v8	=Model v13	=Model v14
Independent Variables:	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics
Constant	8.847 13.780*	9.027 14.880*	8.898 13.780*	9.057 14.390*	8.444 11.370*	8.555 11.830*	8.463 11.230*	8.553 11.500*
No.Of Insiders VAR 5								
Years In Post VAR 6	0.091 1.030	0.102 1.150			0.068 1.040	0.076 1.160		
Education VAR 12	0.358 2.880*	0.345 2.760*	0.383 3.060*	0.374 3.010*	0.465 3.390*	0.453 3.350*	0.484 3.430*	0.476 3.400*
Incentive Shareholdin VAR 18	0.120 3.350*	0.117 3.330*	0.126 3.140*	0.123 3.110*	0.133 3.620*	0.132 3.660*	0.138 3.560*	0.138 3.590*
Employment VAR 19	0.178 4.200*	0.171 3.980*	0.175 4.270*	0.168 4.000*	0.161 4.210*	0.156 3.990*	0.161 4.300*	0.157 4.140*
Capitalisation VAR 21	0.117 2.020**	0.120 2.180**	0.120 2.110**	0.123 2.260**	0.165 2.890*	0.166 2.990*	0.166 2.880*	0.166 2.960*
EPS VAR 22	0.107 2.270**	0.112 2.370**	0.107 2.390**	0.111 2.470**	0.135 2.540*	0.138 2.600*	0.137 2.640*	0.139 2.680*
Industry VAR 23		-0.165 -1.320		-0.141 -1.170		-0.101 -0.890		-0.081 -0.720
Ordinary Shareholdings VAR 17								
CAR Buy VAR 24								
CAR Sell VAR 25								
CAR All OS VAR 26	0.144 1.140	0.135 1.100	0.137 1.070	0.129 1.020				
CAR BEO VAR 27								
CAR SSO VAR 28								
CAR ESO VAR 29								
CAR All VAR 30					*0.150* *1.740****	*0.145* *1.700****	*0.153* *1.720****	*0.150* *1.680****
No of Observation	63	63	63	63	71	71	71	71
F-Value	15.370	15.620	15.520	15.060	14.980	13.820	16.010	14.340
Prob of F	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
R-Squared	52%	53%	51%	52%	56%	57%	56%	56%
Root MSE	0.518	0.516	0.520	0.520	0.484	0.486	0.484	0.487
R-Squared Adjusted	45%	46%	43%	44%	51%	51%	50%	50%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.5) The Managerial Incentive of Insider Trading Models 5,
FTSE100 CEO Pay & Insider Trading Model Using STATA
(v. 7.0) ROBUST 1999 Pay 2001 CAR (No Number Of Insiders)

Dependent Var 3: CEO Pay	All Ordinary Shares CAR (2001 OS)				ALL Transactions CAR (2001 ALL)			
	Model v73	Model v74	Model v75	Model v76	Model v77	Model v78	Model v79	Model v80
	=Model v7	=Model v8	=Model v13	=Model v14	=Model v7	=Model v8	=Model v13	=Model v14
Independent Variables:	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics
Constant	8.920 16.550*	8.948 15.900*	8.910 15.620*	8.919 14.890*	9.181 19.040*	9.204 19.300*	9.184 18.120*	9.196 18.090*
No.Of Insiders VAR 5								
Years In Post VAR 6	0.083 1.410	0.087 1.430			0.080 1.520	0.084 1.550		
Education VAR 12	*0.240* *1.890****	*0.238* *1.830****	0.285 2.240**	0.286 2.230**	0.251 2.030**	0.249 1.970**	0.286 2.350**	0.286 2.330**
Incentive Shareholdin VAR 18	0.100 3.100*	0.100 3.030*	0.108 3.300*	0.108 3.280*	0.087 3.270*	0.089 3.350*	0.095 3.540*	0.096 3.590*
Employment VAR 19	0.140 2.690*	0.140 2.660*	0.136 2.680*	0.136 2.660*	0.154 3.130*	0.154 3.120*	0.149 3.090*	0.149 3.060*
Capitalisation VAR 21	0.188 2.740*	0.188 2.780*	0.192 2.770*	0.192 2.760*	0.160 2.750*	0.158 2.750*	0.164 2.840*	0.164 2.830*
EPS VAR 22	0.053 0.880	0.055 0.930	0.049 0.810	0.050 0.830	0.065 1.170	0.068 1.270	0.064 1.150	0.066 1.220
Industry VAR 23		-0.042 -0.310		-0.015 -0.110		-0.051 -0.430		-0.028 -0.240
Ordinary Shareholdings VAR 17								
CAR Buy 2001 VAR 31								
CAR Sell 2001 VAR 32								
CAR All OS 2001 VAR 33	0.027 0.550	0.024 0.460	0.017 0.360	0.016 0.310				
CAR BEO 2001 VAR 34								
CAR SSO 2001 VAR 35								
CAR ESO 2001 VAR 36								
CAR All 2001 VAR 37					0.005 0.100	0.003 0.050	0.004 0.090	0.003 0.060
No. of Observation	54	54	54	54	60	60	60	60
F-Value	19.390	17.230	18.630	15.810	17.030	15.130	16.970	14.560
Prob.of F	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
R-Squared	58%	58%	56%	57%	58%	58%	57%	57%
Root MSE	0.428	0.432	0.429	0.434	0.413	0.417	0.415	0.419
R-Squared Adjusted	50%	50%	49%	49%	51%	52%	50%	50%

Bold Figures Are Significants, *Italic Figures Are Significant at 10%*,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.6) The Managerial Incentive of Insider Trading Panel Model

CEO's Compensation and Number of Insiders: Fixed-Effects Panel Models 6 and 7

Evidence From FTSE100 For Two-Single Years 1999 & 2001, Using Fixed-Effects STATA OLS Regression

Dependent Variable: CEO Pay	Panel A: Various Specifications — Coefficients and T-Statistics for Model 6 Versions						Panel B: CAR Portfolios Only — Coefficients and T-Statistics for Model 7 Versions						
Independent Variables:	Model 6-1	Model 6-2	Model 6-3	Model 6-4	Model 6-5	Model 6-6	Model 7-1	Model 7-2	Model 7-3	Model 7-4	Model 7-5	Model 7-6	Model 7-7
Constant	10.278	10.379	10.279	10.376	10.423	10.509	10.941	10.898	10.803	10.887	11.393	10.841	10.476
	22.460***	23.480***	22.510***	23.530***	23.740***	25.640***	17.140***	15.460***	24.770***	16.990***	9.290***	18.260***	24.240***
No.Of Insiders	**0.382**	**0.373**	**0.371**	**0.364**	**0.367**	**0.366**							
	3.320***	3.260***	3.320***	3.270***	3.290***	3.290***							
Years In Post	-0.023	-0.019											
	-0.420	-0.350											
Education	**0.305**	**0.294**	**0.294**	**0.285**	**0.271**	**0.272**	**0.267**	0.290	**0.256**	0.141	0.038	0.189	**0.272**
	2.970***	2.890***	2.970***	2.900***	2.780***	2.800***	2.120**	1.560	2.530***	1.040	0.150	1.450	2.810***
Incentive Shareholding	0.015	0.016	0.014	0.014			**0.042**	0.029	**0.041**	***0.032***	0.026	***0.030***	**0.040**
	1.120	1.150	1.050	1.100			2.200***	1.220	3.020***	*1.820**	0.740	*1.790**	3.030***
Employment	**0.113**	**0.115**	**0.114**	**0.115**	**0.117**	**0.115**	**0.152**	**0.187**	**0.165**	**0.167**	0.123	**0.143**	**0.174**
	2.760***	2.790***	2.770***	2.800***	2.850***	2.830***	3.010***	2.240**	4.070***	3.310***	1.230	2.780***	4.280***
Capitalisation	**0.114**	**0.109**	**0.115**	**0.110**	**0.121**	**0.115**	0.053	0.026	0.052	0.062	0.083	0.098	0.079
	2.120**	2.050**	2.150**	2.080**	2.310**	2.250**	0.770	0.260	0.970	0.900	0.740	1.550	1.550
EPS	-0.013	-0.011	-0.014	-0.011	-0.024		**0.122**	**0.063**	**0.101**	**0.122**	***0.227***	**0.138**	**0.124**
	-0.290	-0.230	-0.310	-0.250	-0.560		2.060**	0.890	2.160**	2.010**	*1.750**	2.340**	2.700***
Industry	0.087		0.083										
	0.860		0.830										
Ordinary Shareholdings													
CAR Buy							0.073						
							1.390						
CAR Sell								-0.064					
								-0.710					
CAR All OS									0.060				
									1.490				
CAR BEO										0.011			
										0.200			
CAR SSO											-0.025		
											-0.190		
CAR ESO												-0.002	
												-0.040	
CAR All													**0.078**
													2.060**
No. of Observations	190	190	190	190	190	190	95	47	130	69	41	89	148
No. of Groups	2	2	2	2	2	2	2	2	2	2	2	2	2
F-Value	**7.770**	**8.790**	**8.890**	**10.280**	**12.080**	**15.080**	**5.020**	**3.130**	**9.970**	**4.610**	***2.180***	**5.930**	**12.830**
Prob of *F*-ratio	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0002***	.0134***	0.0000***	0.0006***	*0.0702**	0.0000***	0.0000***
R-Sq Within	26%	25%	26%	25%	25%	25%	26%	33%	33%	31%	28%	31%	35%
R-Sq Overall	26%	26%	26%	26%	25%	25%	28%	32%	34%	31%	29%	31%	37%
R-Squared Adjusted	23%	23%	23%	23%	22%	22%	23%	22%	31%	24%	17%	26%	34%

The *t*-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).
(***) Significant at 1% or Less, (**) at 5% or Less, and *(*) at 10% or Less*.

Appendix (A6.6)
FTSE100 CEO Pay & Insider Trading Panel Model
Evidence From Two-Single Years 1999 and 2001
OLS of Fixed-EffectsModel From STATA (v.7.0)

Dependent Va	Model v1	Model v2	Model v3	Model v4	Model v5	Model v6
CEO Pay	WITHOUT Insider Trading Measures					
Independe	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Variables	Z-Statistics	Z-Statistics	Z-Statistics	Z-Statistics	Z-Statistics	Z-Statistics
Constant	10.278	10.379	10.279	10.376	10.423	10.509
	22.460*	23.480*	22.510*	23.530*	23.740*	25.640*
No.Of Insi VAR 4	**0.382**	**0.373**	**0.371**	**0.364**	**0.367**	**0.366**
	3.320*	3.260*	3.320*	3.270*	3.290*	3.290*
Years In P VAR 5	-0.023	-0.019				
	-0.420	-0.350				
Education VAR 6	**0.305**	**0.294**	**0.294**	**0.285**	**0.271**	**0.272**
	2.970*	2.890*	2.970*	2.900*	2.780*	2.800*
Incentive VAR 8	0.015	0.016	0.014	0.014		
	1.120	1.150	1.050	1.100		
Employm VAR 9	**0.113**	**0.115**	**0.114**	**0.115**	**0.117**	**0.115**
	2.760*	2.790*	2.770*	2.800*	2.850*	2.830*
Capitalisa VAR 11	**0.114**	**0.109**	**0.115**	**0.110**	**0.121**	**0.115**
	2.120**	2.050**	2.150**	2.080**	2.310**	2.250**
EPS VAR 12	-0.013	-0.011	-0.014	-0.011	-0.024	
	-0.290	-0.230	-0.310	-0.250	-0.560	
Industry VAR 13	0.087		0.083			
	0.860		0.830			
Ordinary Shareholdings VAR 7						
CAR Buy VAR 14						
CAR Sell VAR 15						
CAR All OS VAR 16						
CAR BEO VAR 17						
CAR SSO VAR 18						
CAR ESO VAR 19						
CAR All VAR 20						
No. of Ob	190	190	190	190	190	190
No. of Gro	2	2	2	2	2	2
F-Value	**7.770**	**8.790**	**8.890**	**10.280**	**12.080**	**15.080**
Prob of *F*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*
R-Sq With	26%	25%	26%	25%	25%	25%
R-Sq Ove	26%	26%	26%	26%	25%	25%
R-Square	23%	23%	23%	23%	22%	22%
corr (u_i,	6%	6%	6%	6%	3%	3%
F test that	1.31	1.30	1.34	1.30	1.99	2.09

Bold Figures Are Significants, ***Italic* Figures Are Significant at 10%**.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or L

Appendix (A6.6)
FTSE100 CEO Pay & Insider Trading Panel Model
Evidence From Two-Single Years 1999 and 2001
OLS of Fixed-EffectsModel From STATA (v. 7.0)

Dependent Va	Model v7	Model v8	Model v9	Model v10	Model v11	Model v12	Model v13	Model v14
CEO Pay	WITH Insider Trading Measures							
Independent Variables	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics
Constant	**10.335**	**10.197**	**10.694**	**10.434**	**10.740**	**10.362**	**10.250**	**10.130**
	22.550*	15.840*	13.700*	23.030*	15.800*	8.290*	16.020*	22.67*
No Of Insi VAR 4	**0.395**	**0.490**	0.133	**0.284**	**0.076**	**0.819**	**0.309**	**0.308**
	3.430*	3.370*	0.620	2.370**	0.450	2.700*	2.010**	2.670*
Years In P VAR 5	0.008	0.058	0.045	0.043	-0.007	-0.096	0.019	0.020
	0.140	0.800	0.400	0.760	-0.080	-0.660	0.270	0.380
Education VAR 6	**0.295**	***0.217***	0.266	**0.239**	0.157	0.042	0.175	**0.260**
	2.870*	*1.790****	1.380	2.300**	1.070	0.170	1.330	2.700*
Incentive S VAR 8	0.020	**0.479**	0.031	**0.041**	0.029	0.043	***0.028***	**0.040**
	1.450	2.800*	1.240	3.000*	1.570	1.150	*1.640****	3.030*
Employm VAR 9	**0.113**	**0.100**	0.154	**0.139**	**0.156**	-0.031	***0.104***	**0.137**
	2.750*	1.930**	1.540	3.200*	2.720*	-0.270	*1.890****	3.210*
Capitalisa VAR 11	**0.123**	0.096	0.043	0.064	0.073	***0.208***	**0.141**	**0.097**
	2.290**	1.470	0.390	1.200	1.020	*1.810****	2.170**	1.920**
EPS VAR 12	-0.015	**0.113**	0.065	**0.099**	***0.116***	**0.272**	**0.131**	**0.121**
	-0.320	2.040**	0.700	2.160**	*1.820****	2.240**	2.240**	2.690*
Industry VAR 13	0.088	-0.040	0.136	0.049	0.097	0.062	0.141	0.061
	0.870	-0.330	0.650	0.490	0.660	0.220	1.020	0.630
Ordinary S VAR 7	-0.023							
	-1.380							
CAR Buy VAR 14		0.065						
		1.290						
CAR Sell VAR 15			-0.030					
			-0.300					
CAR All OS VAR 16				0.062				
				1.500				
CAR BEO VAR 17					0.008			
					0.120			
CAR SSO VAR 18						-0.054		
						-0.410		
CAR ESO VAR 19							-0.018	
							-0.300	
CAR All VAR 20								***0.068***
								*1.78****
No of Ob	190	95	47	130	69	41	89	148
No of Gro	2	2	2	2	2	2	2	2
F-Value	**7.150**	**5.540**	***2.110***	**7.860**	**3.020**	**2.660**	**4.760**	**9.920**
Prob of F	0.0000*	0.0000*	*0.0551****	0.0000*	0.0051*	0.0213**	0.0000*	0.0000*
R-Sq With	26%	37%	34%	37%	32%	44%	35%	39%
R-Sq Ove	27%	39%	34%	38%	32%	42%	36%	40%
R-Square	23%	34%	24%	35%	25%	32%	29%	37%
corr (u_i,	5%	17%	3%	12%	-2%	-8%	6%	12%
F test that	1.51	2.08	0.74	5.90**	0.50	0.86	0.48	2.52

Bold Figures Are Significants, ***Italic*** **Figures Are Significant at** ***10%*** ,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.6)
FTSE100 CEO Pay & Insider Trading Panel Model
Evidence From Two-Single Years 1999 and 2001
OLS of Fixed-EffectsModel From STATA (v. 7.0)

Dependent Va	Model v15	Model v16	Model v17	Model v18	Model v19	Model v20	Model v21	Model v22
CEO Pay	WITH Insider Trading Measures WITHOUT YrInPst & Industry							
Independent Variables	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics
Constant	**10.435**	**10.221**	**10.901**	**10.530**	**10.854**	**10.255**	**10.470**	**10.215**
	23.620*	16.450*	15.390*	24.130*	16.690*	8.750*	17.310*	23.740*
No.Of Insi VAR 4	**0.389**	**0.527**	0.157	**0.311**	0.065	**0.737**	**0.321**	**0.321**
	3.460*	3.860*	0.780	2.740*	0.390	2.930*	2.180	2.920*
Years In Post VAR 5								
Education VAR 6	**0.290**	**0.244**	0.257	**0.248**	0.134	0.001	0.158	**0.258**
	2.960*	2.080**	1.340	2.520*	0.970	0.010	1.240	2.730*
Incentive S VAR 8	0.021	**0.051**	0.031	**0.042**	***0.032***	0.047	**0.033**	**0.041**
	1.530	2.870*	1.300	3.190*	*1.810****	1.440	2.000**	3.210*
Employm VAR 9	**0.114**	***0.089***	***0.154***	**0.132**	**0.158**	-0.007	***0.100***	**0.134**
	2.780*	*1.800****	*1.640****	3.200*	2.840*	-0.070	*1.860****	3.220*
Capitalisa VAR 11	**0.117**	0.098	0.033	0.062	0.064	***0.197***	***0.197***	***0.094***
	2.210**	1.510	0.320	1.180	0.920	*1.800****	*1.800****	*1.880****
EPS VAR 12	-0.011	**0.118**	0.063	**0.100**	**0.120**	**0.277**	**0.277**	**0.122**
	-0.250	2.150**	0.700	2.190**	1.950**	2.350**	2.350**	2.710*
Industry VAR 13								
Ordinary S VAR 7	-0.022							
	-1.410							
CAR Buy VAR 14		0.578						
		1.180						
CAR Sell VAR 15			-0.053					
			-0.580					
CAR All OS VAR 16				0.052				
				1.310				
CAR BEO VAR 17					0.005			
					0.080			
CAR SSO VAR 18						-0.029		
						-0.250		
CAR ESO VAR 19							-0.029	
							-0.250	
CAR All VAR 20								***0.063***
								*1.690****
No. of Ob	190	95	47	130	69	41	89	148
No. of Gro	2	2	2	2	2	2	2	2
F-Value	**9.140**	**7.120**	**2.740**	**10.080**	**3.920**	**3.520**	**6.000**	**12.810**
Prob.of F	0.0000*	0.0000*	0.0208**	0.0000*	0.0014*	0.0065*	0.0000*	0.0000*
R-Sq With	26%	37%	34%	37%	31%	44%	34%	39%
R-Sq Ove	26%	38%	33%	37%	31%	43%	35%	40%
R-Square	24%	34%	23%	34%	25%	33%	30%	37%
corr (u_i,	5%	17%	1%	11%	0%	-1%	9%	*12%*
F test that	1.49	2.16	1.04	6.33*	0.37	0.59	0.29	*2.66****

Bold Figures Are Significants, ***Italic*** Figures Are Significant at *10%* ,
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.6)
FTSE100 CEO Pay & Insider Trading Panel Model
Evidence From Two-Single Years 1999 and 2001
OLS of Fixed-EffectsModel From STATA (v. 7.0)

Dependent Va	Model v23	Model v24	Model v25	Model v26	Model v27	Model v28	Model v29
CEO Pay	WITH Osh & Insider Trading Measures WITHOUT YrInPst & Industry						
Independent Variables	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics
Constant	**9.884**	**10.673**	**10.198**	**10.778**	**8.761**	**10.154**	**9.792**
	15.800*	13.210*	22.800*	15.630*	7.880*	16.150*	22.330*
No.Of Insi VAR 4	**0.480**	0.150	**0.303**	0.099	**0.648**	**0.333**	**0.318**
	3.280*	0.730	2.610*	0.580	2.430**	2.190**	2.820*
Years In Post VAR 5							
Education VAR 6	**0.246**	0.271	**0.254**	0.136	0.012	0.177	**0.268**
	2.050**	1.340	2.520*	0.940	0.050	1.320	2.770*
Incentive VAR 8	*0.037*	0.026	**0.033**	0.023	0.033	0.022	**0.030**
	1.850***	1.100	2.360**	1.320	0.950	1.280	2.280**
Employm VAR 9	**0.102**	*0.172*	**0.144**	**0.163**	0.107	**0.115**	**0.149**
	2.000**	1.760***	3.430*	2.840*	1.100	2.090**	3.500*
Capitalisa VAR 11	0.104	0.033	0.073	0.066	*0.199*	**0.136**	**0.111**
	1.670	0.310	1.370	0.930	1.690***	2.090**	2.210**
EPS VAR 12							
Industry VAR 13							
Ordinary S VAR 7	0.027	0.005	0.013	-0.005	0.034	0.007	0.012
	1.070	0.160	0.730	-0.240	0.820	0.310	0.730
CAR Buy VAR 14	0.069						
	1.370						
CAR Sell VAR 15		-0.064					
		-0.700					
CAR All OS VAR 16			0.053				
			1.310				
CAR BEO VAR 17				-0.028			
				-0.460			
CAR SSO VAR 18					0.055		
					0.440		
CAR ESO VAR 19						-0.045	
						-0.760	
CAR All VAR 20							0.057
							1.490
No. of Ob	95	47	130	69	41	89	148
No. of Gr	2	2	2	2	2	2	2
F-Value	**6.380**	**2.650**	**9.150**	**3.190**	**2.480**	**4.950**	**11.280**
Prob of *F*	0.0000*	0.0248**	0.0000*	0.0062*	0.0374**	0.0001*	0.0000*
R-Sq With	34%	33%	35%	27%	35%	30%	36%
R-Sq Ove	37%	32%	36%	27%	36%	31%	37%
R-Square	32%	22%	33%	20%	25%	26%	35%
corr (u_i,	21%	-2%	13%	0%	16%	12%	14%
F test tha	1.47	1.13	5.23**	0.34	0.02	0.13	1.88

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Less

Appendix (A6.6)
FTSE100 CEO Pay & Insider Trading Panel Model
Evidence From Two-Single Years 1999 and 2001
OLS of Fixed-Effects Model From STATA (v. 7.0)

Dependent Va	Model v24	Model v25	Model v26	Model v27	Model v28	Model v29	Model v30
CEO Pay	With CARs Only						
Independent Variables	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics	Coeff. Z-Statistics
Constant	**10.941**	**10.898**	**10.803**	**10.887**	**11.393**	**10.841**	**10.476**
	17.140*	15.460*	24.770*	16.990*	9.290*	18.260*	24.240*
No.Of Insiders VAR 4							
Years In Post VAR 5							
Education VAR 6	**0.267**	0.290	**0.256**	0.141	0.038	0.189	**0.272**
	2.120**	1.560	2.530*	1.040	0.150	1.450	2.810*
Incentive VAR 8	**0.042**	0.029	**0.041**	*0.032*	0.026	*0.030*	**0.040**
	2.200*	1.220	3.020*	1.820***	0.740	1.790***	3.030*
Employm VAR 9	**0.152**	**0.187**	**0.165**	**0.167**	0.123	**0.143**	**0.174**
	3.010*	2.240**	4.070*	3.310*	1.230	2.780*	4.280*
Capitalisa VAR 11	0.053	0.026	0.052	0.062	0.083	0.098	0.079
	0.770	0.260	0.970	0.900	0.740	1.550	1.550
EPS VAR 12	**0.122**	**0.063**	**0.101**	**0.122**	*0.227*	**0.138**	**0.124**
	2.060**	0.690	2.160**	2.010**	1.750***	2.340**	2.700*
Industry VAR 13							
Ordinary Shareholdings VAR 7							
CAR Buy VAR 14	0.073						
	1.390						
CAR Sell VAR 15		-0.064					
		-0.710					
CAR All OS VAR 16			0.060				
			1.490				
CAR BEO VAR 17				0.011			
				0.200			
CAR SSO VAR 18					-0.025		
					-0.190		
CAR ESO VAR 19						-0.002	
						-0.040	
CAR All VAR 20							**0.078**
							2.060**
No. of Ob	95	47	130	69	41	89	148
No. of Gr	2	2	2	2	2	2	2
F-Value	**5.020**	**3.130**	**9.970**	**4.610**	*2.180*	**5.930**	**12.830**
Prob.of *F*	0.0002*	.0134*	0.0000*	0.0006*	*0.0702****	0.0000*	0.0000*
R-Sq With	26%	33%	33%	31%	28%	31%	35%
R-Sq Ove	28%	32%	34%	31%	29%	31%	37%
R-Square	23%	22%	31%	24%	17%	26%	34%
corr (u_i,	0.1979	0.0064	0.1204	-0.0003	0.1518	0.0917	0.1449
F test that	1.89	1.05	5.830**	0.42	0.05	0.27	1.96

Bold Figures Are Significants, *Italic* Figures Are Significant at *10%*.
(*) Significant at 1% or Less, (**) Significant at 5% or Less, (***) Significant at 10% or Les

Appendix (A6.7) The Managerial Incentive of Insider Trading Panel Model

CEO's Compensation and Number of Insiders: Random-Effects Panel Models

Random-Effects STATA OLS Regression Evidence From FTSE100 For Two-Single Years 1999 & 2001

DependentVariable CEO Pay	Panel A: Various Specifications						Panel B: CAR Portfolios Only						
Independent Variables:	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics	Coeff. T-Statistics
Constant	**10.250** 22.410***	**10.350** 23.430***	**10.251** 22.460***	**10.346** 23.480***	**10.399** 23.640***	**10.497** 25.540***	**10.759** 17.140***	**11.029** 15.900***	**10.704** 24.180***	10.885 17.070***	11.306 9.880***	10.801 18.430***	10.393 24.200***
No.Of Insiders	**0.375** 3.260***	**0.366** 3.200***	**0.363** 3.250***	**0.357** 3.200***	**0.358** 3.210***	**0.357** 3.210***							
Years In Post	-0.024 -0.450	-0.020 -0.370											
Education	**0.314** 3.060***	**0.303** 2.970***	**0.301** 3.050***	**0.293** 2.990***	**0.277** 2.840***	**0.278** 2.860***	**0.266** 2.100**	**0.308** 1.660*	**0.275** 2.680***	0.157 1.180	0.057 0.240	0.202 1.590	**0.289** 3.010***
Incentive Shareholding	0.018 1.390	0.019 1.420	0.017 1.320	0.017 1.370			**0.048** 2.540***	**0.036** 1.620*	**0.047** 3.450*	**0.033** 1.980**	0.029 0.980	*0.032* *1.990***	**0.043** 3.380***
Employment	**0.116** 2.840***	**0.117** 2.860***	**0.117** 2.850***	**0.118** 2.870***	**0.121** 2.950***	**0.120** 2.930***	**0.162** 3.220***	**0.187** 2.240**	**0.172** 4.160***	**0.167** 3.310***	0.128 1.340	**0.144** 2.830***	**0.180** 4.460***
Capitalisation	**0.110** 2.060**	**0.106** 1.98**	**0.112** 2.090**	**0.107** 2.020**	**0.119** 2.280**	**0.113** 2.200**	0.054 0.790	0.003 0.030	0.047 0.850	0.059 0.860	0.081 0.730	0.097 1.550	0.074 1.460
EPS	-0.013 -0.290	-0.010 -0.230	-0.014 -0.310	-0.011 -0.250	-0.028 -0.630		**0.117** 1.980**	0.081 0.920	**0.098** 2.060**	**0.121** 2.010**	*0.223* *1.770**	**0.137** 2.330**	**0.122** 2.650***
Industry	0.086 0.850		0.082 0.810										
Ordinary Shareholdings													
CAR Buy							*0.090* *1.750**						
CAR Sell								-0.066 -0.720					
CAR All OS									0.061 1.480				
CAR BEO										0.009 0.160			
CAR SSO											-0.022 -0.170		
CAR ESO												-0.002 -0.040	
CAR All													**0.085** 2.240**
No. of Observations	190	190	190	190	190	190	95	47	130	69	41	89	148
No. of Groups	2	2	2	2	2	2	2	2	2	2	2	2	2
Wald Chi2	**63.470**	**62.840**	**63.540**	**62.990**	**60.820**	**60.620**	**34.510**	**19.030**	**63.130**	**27.940**	**14.100**	**36.830**	**81.980**
Prob.> chi2	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0041***	0.0000***	0.0001***	0.0285**	0.0000***	0.0000***
R-Sq Within	26%	25%	26%	25%	25%	25%	26%	32%	33%	31%	28%	31%	35%
R-Sq Overall	26%	26%	26%	26%	25%	25%	28%	32%	34%	31%	29%	31%	37%
R-Squared Adjusted	23%	23%	23%	23%	23%	23%	22%	20%	30%	23%	14%	25%	34%

The t-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).

(***) Significant at **1%** or Less, (**) at **5%** or Less, and *(*) at 10% or Less*.

Appendix (A6.8) The Managerial Incentive of Insider Trading Panel Model

CEO's Compensation and Number of Insiders: Random-Effects Panel Models

Random-Effects STATA GLS with Heteroskedasticity Regression Years 1999 & 2001
Evidence From FTSE100 For Two-Single

Dependent Variable: CEO Pay / Independent Variables:	Panel A: Various Specifications						Panel B: CAR Portfolios Only						
	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics	Coeff. / T-Statistics
Constant	10.256	10.358	10.257	10.354	10.406	10.500	10.842	10.901	10.752	10.420	11.677	10.666	10.343
	23.010***	24.020***	23.000***	24.010***	24.110***	25.960***	17.860***	17.420***	24.990***	19.980***	11.680***	20.250***	24.730***
No.Of Insiders	0.373	0.363	0.362	0.355	0.355	0.353							
	3.340***	3.270***	3.320***	3.260***	3.250***	3.230***							
Years In Post	-0.024	-0.019											
	-0.450	-0.360											
Education	0.315	0.304	0.303	0.295	0.280	0.281	0.259	0.341	0.270	0.207	0.192	0.241	0.298
	3.160***	3.070***	3.150***	3.080***	2.920***	2.930***	2.140**	2.010**	2.710***	2.040**	0.970	2.140**	3.190***
Incentive Shareholding	0.018	0.018	0.016	0.017			0.049	*0.033*	0.047	0.039	0.025	*0.032*	0.044
	1.390	1.420	1.320	1.370			2.710***	*1.620****	3.530***	3.140***	1.070	*2.350****	3.560***
Employment	0.118	0.118	0.118	0.119	0.122	0.121	0.160	0.167	0.171	0.154	0.069	0.137	0.180
	2.940***	2.960***	2.940***	2.960***	3.040***	3.010***	3.320***	2.210**	4.250***	4.010***	0.840	3.070***	4.600***
Capitalisation	0.109	0.104	0.110	0.106	0.117	0.111	0.047	0.039	0.044	0.110	0.106	0.116	0.078
	2.080**	2.00**	2.100**	2.020**	2.270**	2.190**	0.710	0.430	0.830	2.040**	1.050	2.010**	1.560
EPS	-0.013	-0.010	-0.013	-0.011	-0.026		0.122	0.083	0.099	0.112	0.276	0.133	0.121
	-0.280	-0.220	-0.300	-0.240	-0.610		2.160**	0.970	2.150**	2.360**	2.360***	2.540***	2.670***
Industry	0.087		0.082										
	0.880		0.840										
Ordinary Shareholdings													
CAR Buy							*0.089*						
							*1.800**						
CAR Sell								-0.093					
								-1.110					
CAR All OS									0.058				
									1.440				
CAR BEO										0.022			
										0.460			
CAR SSO											-0.101		
											-0.950		
CAR ESO												-0.002	
												-0.040	
CAR All													0.088
													2.420***
No. of Observations	190	190	190	190	190	190	95	47	130	69	41	89	148
No. of Groups	2	2	2	2	2	2	2	2	2	2	2	2	2
Wald Chi2	67.190	66.150	66.930	65.990	63.540	63.080	36.300	24.630	65.220	51.580	21.190	49.900	88.590
Prob.> chi2	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0004*	0.0000*	0.0000*	0.0017*	0.0000*	0.0000*
Log Likelihood	-183.74	-184.13	-183.84	-184.19	-184.12	-185.31	-81.59	-37.32	-105.93	-42.00	-39.28	-69.15	-121.34

The t-ratios, given beneath the coefficient values, are based on the heteroscedasticity-consistent standard-errors of White (1980).
(***) Significant at **1%** or Less, (**) at **5%** or Less, and *(*) at 10% or Less.*