



## **Director dealings as an investment indicator**

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## Abstract

This research report investigated directors' dealings on the Johannesburg Stock Exchange (JSE) in order to determine if an investor should use director dealings as an investment indicator.

Share data, directors' dealings, market capitalisation data and beta values for JSE listed shares over the six years from 1 April 2002 until 31 March 2008 was obtained from McGregor BFA (Pty) Ltd. Only the first transaction of the week was analysed, and event day was categorised as day<sub>0</sub>. Abnormal Returns (AR), Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) were then calculated for day 1 through to day 252. The CAAR was then tested for statistical significance at a 5% confidence level.

The overall CAAR for the 252 holding period was found to be a statistically significant positive 0.31%, with the CAAR for buy transactions being a statistically significant positive 0.33% and the CAAR for sale transactions being a statistically significant positive 0.29% at the 252 holding period. The individual CAARs for the sale and buy transactions fluctuated over the period with the sale transactions consistently outperforming the buy transactions.

## Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.



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# 1 INTRODUCTION

## 1.1 Background

Directors and corporate insiders (collectively referred to as insiders) often hold superior knowledge of their companies' prospects as compared to normal shareholders, analysts and the general public (collectively referred to as outsiders). Insiders are in a particularly good position to be informed about mergers and acquisitions, special dividends, share repurchase and corporate restructuring activity, and they could utilise this information to potentially unfairly enrich themselves before the information becomes public knowledge. While trading by insiders is allowed, in certain circumstances these trades by insiders could be illegal. The Financial Services Board (FSB) and the Johannesburg Stock Exchange Limited (JSE) acknowledge the possible illegal exploitation of this insider knowledge. Since 2 October 2002 directors of companies have to disclose dealings in the shares of firms on whose boards they sit (JSE Securities Exchange, 2000). For the first time was regular information about director dealings in South African companies available.

Proponents of insider trading argue that insider trading increases the information value of the shares being traded and that the share prices would then more accurately reflect the true value of the company while detractors maintain that the utilisation of insider knowledge to generate unfair profits is unethical and in some cases illegal. This study will present the insider trading laws as pertains to South



Africa as well as investigate whether there is a correlation between director dealing and subsequent share value.

## **1.2 Aims and objectives**

The aims and objectives of the study are the following:

- to define the Insider Trading Act of 1998;
- to explain the rule governing directors' share dealings in terms of the JSE's listing requirements;
- to review South African and international studies regarding directors' share dealings;
- to investigate whether directors' earn a statistically significant abnormal return on their dealings;
- to provide what could be the initial step of building a portfolio based on director's dealings.

## **1.3 Outline of study**

In this study, directors' share dealings in a sample of companies are examined. The study will define the Insider Trading Act of 1998, who is an insider and what is insider information. The directors' share dealings of a number of South African companies and the subsequent share prices will be examined over a period from 1 April 2002 to 31 March 2008. The findings and conclusion of the study will then be presented.

## 1.4 Scope of study

Directors of companies are generally assumed to be better informed than the average investor about the prospects and values of their companies (Lakonishok and Lee 2001). Due to directors' closeness to the companies' and the fiduciary duties conferred on them by the Companies Act, outsiders may conclude that benefits can be derived from watching and then copying directors' actions in their firms shares (Lakonishok and Lee 2001). While purchasing transactions may seem a favourable indicator, are sales transactions a negative indicator? Directors' sell shares for many reasons: portfolio re-weighting; option exercises; to release cash or because they feel the share price over-values the firm and therefore it is possible that by merely following directors' sales transactions investors can get a better return than by simply following the overall market.

From October 2000, all directors have to disclose dealings in shares of company's board on which they sit (JSE Securities Exchange, 2000). The requirement makes mandatory the following: share dealings have to be reported within a stipulated period; the board of the company has to approve the dealing and the nature of the transaction must be disclosed. This study looks at directors' dealings and assesses whether or not they make abnormal returns as a result of their trading activities and whether an investor can expect better returns by following director trading activity.

Because share liquidity is of prime concern to a study of this nature, only the top 100 companies by market capitalisation will be examined. The study covers the period 1 April 2002 to 31 March 2008 during which time the returns of directors' trading will be monitored.

## **1.5 Layout of the research report**

This research report is set out as follows: Chapter 2 is the literature review that firstly defines insider trading as regulated by South African law and the Johannesburg Stock Exchange; and then describes the relevant theory base; Chapter 3 sets out the research hypotheses; Chapter 4 describes and justifies the research methodology that was used; Chapter 5 presents the results; Chapter 6 discusses the results and Chapter 7 presents the conclusion.

## **2 LITERATURE REVIEW**

### **2.1 Introduction**

While the study of director dealings is not a new one, since numerous international studies have been done in this area, only four studies of this nature have been identified for the JSE. The greater part of the literature reviewed below stems directly from international studies and wherever applicable, reference is made to the South African studies. The insider trading regulations as pertains to South Africa and the JSE are described first in order to provide a background to the study.

### **2.2 Defining insider trading**

On 17 January 1999 the Insider Trading Act, 135 of 1998 came into operation. Prior to this Act insider trading was legislated in The Companies Act of 1973. While the previous Act contained criminal sanction, not a single case had come to court despite the fact that South African markets had a reputation for insider trading (Financial Services Board, 2004).

#### **2.2.1 What is insider trading**

The following information is essential to fully understand what is meant by insider trading.

In terms of the Insider Trading Act, 1998 (South African Government Gazette, 1998):

“inside information” means specific or precise information which has not been made public and which-

- (a) is obtained or learned as an insider; and
- (b) if it were made public would likely to have a material effect on the price or value of any securities or financial instrument.

“insider” means an individual who has inside information-

- (a) through-
  - (i) being a director, employee or shareholder of an issuer of securities or financial instruments to which the inside information relates; or
  - (ii) having access to such information by virtue of his or her employment, office or profession; or
- (b) where such individual knows that the direct or indirect source of the information was a person contemplated in paragraph (a); (ii)

All trades by insiders are not illegal - it is only illegal if the information on which the trade is based has not been made public and has a price effect.

### **2.2.2 What is the actual offence**

The Insider Trading Act, 1998 (South African Government Gazette, 1998) defines offences as follows:

- (1) Subject to section 4(1), any individual who knows that he or she has inside information and who-

- (a) Deals directly or indirectly, for his or her own account or for any other person, in the securities or financial instruments to which such information relates or which are likely to be affected by it; or
- (b) Encourages or causes another person to deal or discourages or stops another person from dealing in the securities or financial instruments to which such information relates or which are likely to be affected by it,

Shall be guilty of an offence.

(2) Subject to section 4(2), any individual who knows that he or she has inside information and who discloses that information to another person, shall be guilty of an offence.

### **2.2.3 When is the information public**

The Insider Trading Act, 1998 (South African Government Gazette, 1998) defines Publication as follows

- (1) For the purposes of this Act, information shall be regarded as being made public in circumstances, which include but are not limited to those when-
- (a) it is published in accordance with the rules of the relevant regulated market for the purpose of informing investors and their professional advisers; or
  - (b) it is contained in records maintained by the relevant statutory regulator which by virtue of any enactment are open to inspection by the public; or

(c) it can be readily acquired by those likely to deal in any securities or financial instruments-

- (i) to which the information relates; or
- (ii) of an issuer to which the information relates; or

(d) it is derived from information which has been made public.

(2) Inside information may be regarded as having been made public even though-

- (a) it can be acquired only by persons exercising diligence, or expertise or by observation;
- (b) it is communicated to a section of the public and not to the public at large;
- (c) it is communicated only on payment of a fee; or
- (d) it is only published outside the Republic.

### **2.3 How do the rules and regulations of the JSE apply to insider trading**

This section deals with the JSE rules pertaining to using insider information

The JSE only regards information or announcements as public once the announcement has been made on SENS. In order to prevent the misuse of information the JSE has introduced additional Listing Requirements regarding dealings by directors. A director may only deal in securities relating to the issuer once he or she has received clearance from the chairperson or other designated director (JSE Securities Listing Requirements, 2000).

Further to the above, a director must not be given clearance to deal during prohibited periods. Prohibited periods are defined as closed periods and any period where there exists unpublished price-sensitive information relating to the issued securities (irrespective of whether or not the director has any knowledge of such information)

### **2.3.1 The JSE listing requirements**

The JSE Listing Requirements (JSE Securities Listing Requirements, 2000) define a closed period as:"

- (a) the date from the financial year end up to the date of earliest publication of the preliminary report (refer to paragraph 3.22), abridged report (refer to paragraph 3.21) or provisional reports (refer to paragraph 3.16);
- (b) the date from the expiration of the first six month period of a financial year up to the date of publication of the interim results;
- (c) the date from the expiration of the second six month period of a financial year up to the date of publication of the interim results, in cases where the financial period covers more than 12 months (refer to paragraph 3.15);
- (d) in the case of reporting on a quarterly basis, the date from the end of the quarter up to the date of the publication of the quarterly results; and



(e) any period when an issuer is trading under a cautionary announcement.”

If a director trades in securities of the issuer he is required to disclose to the issuer without delay and in any event by no later than 24 hours after dealing, the following information:”

- (a) the name of the director;
- (b) the name of the company of which he is a director;
- (c) the date on which the transaction was affected;
- (d) the price, number, total value and class of securities concerned;
- (e) in the case of options or any other similar right or obligation, the option strike price, strike dates and periods of exercise and/or vesting;
- (f) the nature of the transaction;
- (g) the nature and the extent of the director’s interest in the transaction; and
- (h) confirmation that clearance has been given in terms of paragraph 3.66.”

As can be seen – insider trading is only illegal if the information upon which the trade is based is not in the public domain and has a price effect. The director only falls foul of the JSE rules if the above is not complied with.

## **2.4 Market Efficiency**

Market efficiency can be defined as the speed at which markets reflect known information. Fama (1970) was the first author to assemble a comprehensive review of both the theory and evidence of market efficiency. Fama's paper reviewed both the theoretical and empirical literature on the efficient markets model. Three empirical tests were performed with the first being weak form tests (where the information set is historical prices), the second being semi-strong tests (where consideration is given to obviously available public information e.g. Share splits, announcement of annual results etc) and the third being strong form tests (which looked at whether given investors or groups have monopolistic access to relevant information). Bajo and Petracchi (2006) state, "every attempt at investigating the phenomenon of insider trading is based on the efficient capital market hypothesis, formulated by Fama (1970)".

### **2.4.1 The concept of market efficiency**

Dimson and Mussavian (2000) define an efficient market as one in which trading on available information fails to provide an abnormal profit. Hogan (1989) says that the efficient capital market hypothesis denies the possibility of an individual participant being able to earn consistently positive abnormal returns after taking into account transactions costs of trading. That interpretation rests upon all information, public and private, being available to market participants. A less demanding view, called the semi-strong form of the hypothesis, refers to the efficiency of the market reacting to all public information. With this interpretation,

there is scope for earning positive abnormal returns at least for some brief period during which private information is acted upon. The weak form of the hypothesis claims that prices fully reflect the information implicit in the sequence of past prices. Profits to outsiders who merely mimic insider trades are a serious exception to the efficient market hypothesis because they violate semi-strong form market efficiency (Rozeff and Zaman, 1988).

#### **2.4.2 Insider trading as a contributor to market efficiency**

In a market which is strong form efficient, insiders who trade in their firms should not realise any abnormal gains. However, the act of trading may be construed by the market as an informational one that leads to subsequent trade in the company shares. Insider trading is useful in providing interim information about the firm. Udpa (1996) and Rozeff and Zaman (1988) say that it has been routinely assumed that insiders can and do earn abnormal returns - both by proponents of market efficiency, who stop short of declaring that even corporate insiders do not have monopolistic access to information and by defenders of insider trading who accept insider profits as a fact, but argue that all attempts to eliminate them cost society more than the incentive benefits they produce.

Theoretical research (Fishman and Hagerty, 1992; Khanna, Sleza and Bradley, 1994) has argued that insider trading crowds out information acquisition by outside investors and compromises the efficiency of the capital market. In contrast, critics of insider trading regulations point out that permitting insiders to benefit from their

information advantage through trading allows information to reach the market quickly and thus improve market efficiency (Hsieh, Ng and Wang, 2005).

Lakonishok and Lee (2001) examined insider trading activities of all companies listed on the New York Stock Exchange, American Stock Exchange and the Nasdaq during a 20 year period from 1975 – 1995. They found that while insiders in aggregate are contrarian investors, they do predict market movements better than simple contrarian strategies. Across their sample they found that insiders' ability to predict good returns are more prevalent in small companies rather than larger ones. They also conclude that of the information contained in insider trades, more information comes from purchases while insider sales appears to have no predictive ability.

Bajo and Petracci (2006) in an investigation into insider trading activities on the Italian Stock Exchange analysed insider trading activities over a four year period and found a positive relationship between the change of holdings and the sign of market movement. Consistent with other international studies they also found that abnormal returns are higher for purchase as compared to sale transactions. Over the four year period it was quite clear that the Italian market responded to insider trading, with responses being higher for sales and for insiders owning more than 50% of the company.

While insider trading activities can be shown to contribute to market efficiency, studies have shown that insider trading can be a major contributor to market volatility. Du and Wei (2004), in a study across stock exchanges in the world, found that even after controlling for the volatility of the real output growth, volatility of monetary and fiscal policies and maturity of the stock market - insider trading is found to be associated with higher market volatility. The quantitative effect of insider trading is also high when compared to the effect of the volatility of the other fundamentals.

## **2.5 Results of previous studies**

Most of the work in this field has been done in the United States of America. However, four studies done on the JSE were located.

### **2.5.1 Insiders are better informed**

Due to their closeness to the company and their familiarity with the value and prospects of the company, insiders are generally assumed to be better informed about the companies' prospects. Seyhun (1990) found that following the 1987 United States stock market crash, insiders were responsible for heavy purchasing activity suggesting that insiders are more likely to buy when they feel the share is undervalued.

Benesh and Pari (1987) investigated whether outsiders could earn abnormal returns by following corporate insiders. Using the Consensus of Insiders (COI)

newsletters - which every month provided its subscribers a listing of 20 shares based primarily on the level of insider trading activity for the previous four months. The 20 shares were the most bought shares, after looking at the insider open-market purchases and share options exercised less insider open-market sales. Their analysis covered an eight-year period and covered 96 monthly newsletters and discovered that users of the COI recommendations could have earned moderate excess returns by systematically acquiring shares of these companies and holding them over a 12 month period starting in the month the newsletter was published or the month immediately after.

If insiders buy when a share is undervalued or future earnings are good, when do they sell. Insiders are likely to sell when they feel the share is overvalued or ahead of a decrease in the performance of a firm. Ke, Hiddart and Petroni (2003) analysed the trading patterns on the Dow Jones of insiders in the quarters leading up to a break in a series of consecutive earnings increases and found evidence that insiders do possess, and trade upon knowledge of specific and economically significant accounting disclosures as long as two years before the disclosure. Partly due to the highly regulated nature of the Dow Jones, they found that there is little abnormal selling in the two quarters immediately prior to the break.

If insiders are better informed – what about the financial analysts who upgrade and downgrade company shares on a regular basis. Hsieh, Ng and Wang (2005) compared insider trades to financial analyst recommendations and found that

insiders' trading activities and financial analysts' recommendations produce contradictory information signals: insiders' trade against the recommendations. Insiders tend to buy more of their companies shares when the share is unfavourably recommended or being downgraded than when the share is being favourable recommended or upgraded by financial analysts. It was also found that insiders are more likely to buy shares after than before the analysts' downgrade, and sell shares after rather than before analysts' upgrade. Interestingly enough, the study found that insider trades did not exhibit any significant influence on the revision of the analysts' recommendations.

Multiple studies (Lakonishok and Lee, 2001; Hsieh, Ng and Wang, 2005) have found that insider trade contrary to what analysts think and in so doing earn abnormal returns.

### **2.5.2 Insider buying transactions generate abnormal returns**

Bettis, Vickrey and Vickrey (1997), show that outside investors can earn abnormal profits by analysing information available to the public regarding director dealings.

Givoly and Palmon (1985) contend that the mere occurrence of insider trading, regardless of whether it is based on inside information, may generate abnormal returns. In their study (Givoly and Palmon, 1985) analysed a random sample of 83 companies whose fiscal year end was 31 December and that were listed on the American Stock Exchange (AMEX) throughout the period from 1973 – 1985, the

AMEX was chosen rather than the New York Stock Exchange (NYSE) because the NYSE has an abundance of information and the heavy flow of reports would have made it more difficult to track share price movements attributable to particular news reports. Their results show that outside investors accept the superior knowledge of insiders and follow in their investment footsteps. Outsiders tend to follow insiders and may unintentionally cause a greater change in the share price and thereby generate a greater abnormal return to insiders.

Insiders tend to buy more when their company shares are undervalued. By virtue of their exposure to sensitive information insiders are more likely to know when their companies' are undervalued. Adebowale (2006) found that director purchases and sales trigger significant market reactions of 3.12% and 0.37% respectively on the Johannesburg Stock Exchange indicating that the South African market does respond to director purchasing and sales activity.

### **2.5.3 Results of short term studies**

More attention has been paid to shorter-term studies both internationally and here in South Africa. Seyhun (1986), Lakonishok and Lee (2001) and Aktas, de Bodt and Van Oppens (2007) have all published short-term event studies on insider trading. They observe economically unimportant but statistically significant market movements around insider net purchase and net sale days. It should be mentioned that the small returns could be considered economically significant as the sample



contains trades that contain private information as well as those that are uninformative.

In a paper examining abnormal returns on the days around director trades Friederich, Gregory, Matatko and Tonks (2002) examined trades by United Kingdom directors for the 20 days before and after the day of insider trading. They found patterns in abnormal returns in the days around a director's trade that are consistent with short-term market timing by directors and reported positive gross, but not net, abnormal returns to imitating some of the trades by insiders. Consistent with most international studies they found that the abnormal returns of buy trades larger than that of sell trades.

In their 2003 study of insider trading on the Johannesburg Stock Exchange Mordant and Muller studied the effects of directors' dealings from 29 September 2000 to 31 March 2002 and found that directors can earn abnormal returns from their share transaction, however they conclude that the bulk of the out-performance is as a result of the market effects of size, value and resources and not due to the fact that the director traded in the share (Mordant and Muller, 2003).

#### **2.5.4 Results of long term studies**

Jaffe (1974); Finnerty (1976); Seyhun (1986, 1998); Lin and Howe (1990) and Jeng, Metrick and Zeckhauser (2003) all show that portfolios which are long on shares purchased by insiders and short on shares sold by insiders, outperform the

market over time (ranging from one month to several months). It is, however, important to note that the reported abnormal performance seems to be driven by latent risk factors such as price / earning, book-to-market and size (Rozeff and Zaman, 1988; Lakonishok and Lee, 2001).

Bris (2005) in a study of 4 541 acquisitions from 52 countries over a 10 year period found that insider trading enforcement both increased the incidence and profitability of insider trading. A further finding of the study was that harsher laws work better at reducing the incidence of illegal insider trading. Interestingly enough he found that the profits from insider trading in South Africa were negative.

In a study of multi-company directors Cook and Huabing (2007) studied the trades of unique director-company pairs over 10 years. They found that private information plays an important role in directors' selection of shares to trade. Directors are more likely to buy (sell) shares of firms they direct that have better (worse) future returns. There was a strong correlation between their finding and previous findings (Hsieh, Ng and Wang, 2005) that directors prefer to purchase shares that have experienced previous price declines and to sell shares that have experienced previous price appreciations.

Aktas, de Bodt, Riachi and de Smedt (2007) analysed the Euronext Amsterdam Stock Exchange over a seven year period and found results contrary to the findings of the bulk of research on insider trading. Their results show that financial

markets do not significantly respond to purchases and the abnormal returns associated with sales do not have the expected sign – they did however find that over a longer time horizon of greater than 40 days the average cumulated average returns were positive for purchases and negative for sales by insiders. In a similar manner to Ke, Hiddart and Petroni's (2003) study on the Dow Jones the results suggest that insiders could be using long-term information for their trading activities.

## **2.6 Conclusion**

South African studies (Mordant and Muller, 2003; Adebowale, 2006) have differed in their results - in that Mordant and Muller (2003) found that sales transactions are a more pronounced source of out performance than purchase transactions while Adebowale's (2006) findings were that returns on directors' purchases were greater than the return on sales. Adebowale's findings are more consistent with the US and UK studies, however, his study were done with a different methodology and sample size to that of Mordant and Muller.

The differing results of studies on the Johannesburg Stock Exchange are consistent with international studies which seem to sometimes contradict their findings around whether or not directors actually do earn abnormal results. This research report will use a larger sample over a longer period to previous research in order to investigate if mimicking insiders is a profitable investment strategy.

## 3 RESEARCH HYPOTHESES

### 3.1 Introduction

The purpose of this study is to clearly establish whether or not there is a statistically significant correlation between director dealings and subsequent share prices. The tests are designed to establish whether directors trade on superior information and whether it is possible for outsiders to benefit from this information.

### 3.2 Hypothesis 1

By purchasing shares in their firm, directors send a positive signal to the market about the future value of the firm. Directors' purchases are credible signals as the directors put their own wealth at stake and bear the cost of holding less than optimally diversified investment portfolios making the signal a costly one (Fidrmuc, Goergen and Renneboog, 2004). The first null hypothesis states that the cumulative average abnormal return (CAAR) on the shares bought by directors is not significantly different from zero. The first alternative hypothesis states that the cumulative average abnormal return (CAAR) on the shares bought by directors is significantly greater than zero.

$$H1_0: CAAR_t = 0$$

$$H1_A: CAAR_t > 0$$

where:

$CAAR_t$  the cumulative average abnormal return during the post-transaction period or event window.

### 3.3 Hypothesis 2

Contrary to hypothesis one, is that by selling shares, directors convey negative news. Although Aktas *et al.* (2007) postulate that insider sells are more likely to be driven by motives other than private information (e.g. diversification and liquidity reasons). Huddart, Ke, and Shi (2007) documented that insiders sell after good earnings announcements implying that insiders may sell when the market is dominated by the buy side. The second null hypothesis states that the cumulative average abnormal return (CAAR) on the shares sold by directors is not significantly different from zero. The second alternative hypothesis states that the cumulative average abnormal return (CAAR) on the shares sold by directors is significantly greater than zero.

$$H_{2_0} : CAAR_t = 0$$

$$H_{2_A} : CAAR_t > 0$$

where:

$CAAR_t$  the cumulative average abnormal return during the post-transaction period or event window.

### 3.4 Hypothesis 3

However, the selling of shares by directors is not necessarily as credible as a buying signal because directors sell for a variety of reasons and liquidity needs - rather than changes in their expectations about the firm's future cash flows may force directors to sell (Lakonishok and Lee, 2001). Because of the different reasons behind sales, it is expected that the market reaction to sales is less than

that of purchases but still present. Therefore the third null hypothesis states that the cumulative average abnormal buying return ( $CAAR_b$ ) on the shares bought by directors is less than the cumulative average abnormal selling return ( $CAAR_s$ ) on the shares sold by directors. The third alternative hypothesis states that that the cumulative average abnormal buying return ( $CAAR_b$ ) on the shares bought by directors is greater than the cumulative average abnormal selling return ( $CAAR_s$ ) on the shares sold by directors

$$H_{3_0} : CAAR_b < CAAR_s$$

$$H_{3_A} : CAAR_b > CAAR_s$$

where:

$CAAR_b$  the cumulative average abnormal return during the post-transaction period or event window after buying;

$CAAR_s$  the cumulative average abnormal return during the post-transaction period or event window after selling.

## **4 RESEARCH METHODOLOGY**

### **4.1 Introduction**

The methodology and models will be presented and justified in this section.

### **4.2 Methodology**

#### **4.2.1 The event study methodology**

The event study methodology has been used in this research report. The event study method has become popular because it obviates the need to analyse accounting-based measures of profit. The accounting-based measure of profit has been criticised (McWilliams and Siegel, 1997) because it is often not a very good indicator of the true performance of firms. Benston (1982) postulated that managers can manipulate accounting profits because they can select the accounting procedures.

An event study is used to examine reactions of the market to events of interest.

The event study used involved the following steps:

- (a) Identifying the event of interest and defining an event window
- (b) Selecting a set of cases to include in the analysis
- (c) Predicting a 'normal' outcome during the event window in the absence of the event

- (d) Estimating the abnormal outcome within the event window, where the abnormal return is defined as the difference between the actual and predicted returns during the event window.
- (e) Testing whether the abnormal return is different from zero.

The market model is a statistical model which relates the return of any given security to the return of the market portfolio. The market return used was the All Share Index (ALSI) which was return of all shares listed on the JSE for the period under investigation.

#### **4.2.2 The event study methodology as used in this report**

- (a) A director transaction was identified as the event of interest,
- (b) The event window was defined as Day<sub>0</sub> (the day on which the transaction took place) to Day<sub>252</sub>,
- (c) The actual returns for the respective days were calculated using the actual share and ALSI return,
- (d) The abnormal return was calculated,
- (e) The cumulative average abnormal return was calculated, and
- (f) The cumulative average abnormal return was tested for a significant difference from zero.



## 4.3 Calculation of the returns

### 4.3.1 Actual share returns

Actual share returns were calculated by dividing the closing share price for the day by the closing share price of the previous day.

For company  $i$  and event date  $t$  the actual return is

$$R_{it} = \ln(R_t / R_{t-1}) \quad (\text{Equation 1})$$

where:

$R_{it}$  is the actual return for period  $t$  for the company;

$R_t$  is the actual closing share price at  $t$ ;

$R_{t-1}$  is the actual closing share price for the previous day;

$t$  is the period.

### 4.3.2 Actual market returns

Actual market returns were calculated by dividing the closing market value for the day by the closing market value of the previous day.

For event date  $t$  the actual market return is

$$R_{mt} = (R_{mt} / R_{mt-1}) \quad (\text{Equation 2})$$

where:

$R_{mt}$  is the actual return for period  $t$  for the index;

$R_{mt}$  is the actual closing index value at  $t$ ;

$R_{mt-1}$  is the actual closing index value at the previous day;

$t$  is the period.

### 4.3.3 Abnormal returns

Abnormal returns were calculated by subtracting the result of the market return and beta value from the actual return.

For company  $i$  and event date  $t$  the abnormal return is

$$AR_{it} = R_{it} - [\beta R_{mt}] \quad (\text{Equation 3})$$

where:

$AR_{it}$  is the abnormal return;

$R_{it}$  is the actual share return in terms of Equation 1;

$\beta$  is the sensitivity to the market return;

$R_{mt}$  is the ALSI market return in terms of Equation 2;

$t$  is the period.

Insider trading studies require that abnormal returns from directors' sales transactions be multiplied by -1 so that they are positive for both purchase and sales trades (Mordant and Muller, 2003), once the abnormal returns for sales was calculated, they were then multiplied by -1.

#### 4.3.4 Average abnormal return

The average abnormal return was calculated by averaging the abnormal returns for the period.

The average abnormal return is

$$AAR_t = \sum_{i=1}^n AR_{it} / n \quad (\text{Equation 4})$$

where:

$AAR_t$  is the average abnormal return of all sample shares at period $_t$ ;

$n$  is the number of share transactions in the sample;

$AR_{it}$  is the abnormal return in period $_t$  in terms of Equation 3.

#### 4.3.5 Cumulative average abnormal return

Performance over an extended period of time was calculated by summing the abnormal returns across all companies for the period.

The cumulative average abnormal return is

$$CAAR_t = \sum_{i=1}^{t2} AR_{it} \quad (\text{Equation 5})$$

where:

$CAAR_t$  is the cumulative average abnormal return in period $_t$ ;

$AR_{it}$  is the abnormal return in period $_t$  in terms of Equation 4.

#### 4.4 Significance tests

The significance of the CAARs over a range of event windows was tested using a one-tailed t-test for all hypotheses. A one-tailed t-test was used because the hypotheses are uni-directional. The significance of the CAARs was tested at 5% using the following formula used previously by Atallah and El-Amrani (2005):

$$t_t = \text{CAAR}_t - H_0\text{value} / [\sigma_t^2 / (N)^{1/2}] \quad (\text{Equation 6})$$

where:

$\text{CAAR}_t$  is the CAAR for each day  $t$  respectively in the estimation window;

$N$  is the number of transactions;

$H_0\text{value}$  is usually zero as we assume no abnormal return

and  $\sigma_t^2$  is the approximation of the standard deviation according to Equation 7,

$$\sigma_t^2 = \left[ \sum_{i=1}^N (\text{CAAR}_i - \text{CAR}_t)^2 / N - 1 \right]^{1/2} \quad (\text{Equation 7})$$

where:

$\text{CAR}_t = \text{CAR}$  for each stock  $N$  and day  $t$  in the estimation window.

The calculated t-value was then compared with the critical t-value, based on a 5% significance level. If the calculated t-value was larger than the critical t-value,  $H_0$  was rejected. The degrees of freedom used were  $N-1$ .

#### **4.5 Unit of Analysis**

The unit of analysis will be the share price of the JSE listed companies that have consistently been in the JSE top 150 companies by market capitalisation between 1 April 2002 and 31 March 2008.

#### **4.6 Population of relevance**

The shares of the top 100 companies consistently in the JSE top 150 companies by market capitalisation listed on the JSE between 1 April 2002 and 31 March 2008. The starting date was selected, as it is the first day after Mordant and Muller's (2003) population. Director dealings in the shares of the top 100 companies consistently in the JSE top 150 companies by market capitalisation listed on the JSE between 1 April 2002 and 31 March 2008.

#### **4.7 Data collection process**

Only secondary data was used. The data that was collected and analysed consisted of the following:

- Daily closing prices for all shares listed on the JSE between 1 April 2002 and 31 March 2008;
- Market capitalisation data for all shares listed on the JSE between 1 April 2002 and 31 March 2008 in six monthly periods;
- Director transactions for the period 1 April 2002 to 31 March 2008;

- The beta values for the shares under investigation as at the first working day in January of each year.
- The closing value for the All Share Index (ALSI)

The share data, market capitalisation data, beta values, closing index prices and the directors' transactions were obtained from McGregor BFA (Pty) Ltd.

#### 4.8 Sampling Method and size

The data was received in Excel format. The following tables indicate the format the data was received in.

Table 4.1 Raw Data – Sample Share Closing Prices Anglo Platinum

DATE	HIGH	LOW	CLOSE	VOLUME	Div Yld	Ern Yld	P:E
31/03/2008	121999	117000	119000	323489	4.30	4.40	22.73
28/03/2008	125500	117500	120000	275363	4.30	4.30	23.26
27/03/2008	125550	121000	122500	265360	4.20	4.20	23.81
26/03/2008	120869	113600	120500	240122	4.30	4.30	23.26
25/03/2008	122500	113800	113800	538846	4.50	4.60	21.74
20/03/2008	125000	117000	118000	934995	4.40	4.40	22.73
19/03/2008	130700	123501	124000	616191	4.10	4.20	23.81
18/03/2008	127958	119500	124800	257978	4.10	4.10	24.39
17/03/2008	126700	118500	121990	224329	4.20	4.20	23.81
14/03/2008	126580	122509	126580	161234	4.10	4.10	24.39
13/03/2008	127980	122500	123775	232603	4.20	4.20	23.81
12/03/2008	127000	122202	125000	302248	4.10	4.10	24.39
11/03/2008	127999	122006	125000	804724	4.10	4.10	24.39
10/03/2008	124000	121000	123300	448643	4.20	4.20	23.81
07/03/2008	129000	123001	124900	344980	4.10	4.10	24.39
06/03/2008	132800	125026	126500	539913	4.10	4.10	24.39
05/03/2008	136200	128500	128500	448720	4.00	4.00	25.00
04/03/2008	137997	130000	137401	498080	3.70	3.80	26.32
03/03/2008	131499	121000	130000	496404	4.00	4.00	25.00
29/02/2008	124000	118610	124000	318370	4.10	4.20	23.81
28/02/2008	123000	118000	120001	214195	4.30	4.30	23.26
27/02/2008	127899	119555	123400	176841	4.20	4.20	23.81
26/02/2008	125208	120000	121800	340704	4.20	4.30	23.26
25/02/2008	129500	125001	125100	228388	4.10	4.10	24.39

Table 4.2 Raw Data - Sample Market Capitalisation

20020402			20020902			20030401		
Key	Company Name	Market Cap	Key	Company Name	Market Cap	Key	Company Name	Market Cap
AGL	ANGLO AMERICAN PLC	286150293975	AGL	ANGLO AMERICAN PLC	199418208617	AGL	ANGLO AMERICAN PLC	167904142467
BIL	BHP BILLITON PLC	152560834219	BIL	BHP BILLITON PLC	123407350100	BIL	BHP BILLITON PLC	99219509480
RCH	RICHEMONT SECURITIES DR	136503000000	RCH	RICHEMONT SECURITIES DR	103878000000	SOL	SASOL LTD	60144028939
AMS	ANGLO PLATINUM LTD	114342946373	SOL	SASOL LTD	80025507000	RCH	RICHEMONT SECURITIES DR	55384200000
SOL	SASOL LTD	88243319030	AMS	ANGLO PLATINUM LTD	76629850425	ANG	ANGLOGOLD ASHANTI LTD	51901727044
SAB	SABMILLER PLC	67249309053	SAB	SABMILLER PLC	73706475990	AMS	ANGLO PLATINUM LTD	51397036996
ANG	ANGLOGOLD ASHANTI LTD	63746183606	GFI	GOLD FIELDS LTD	59152454298	SAB	SABMILLER PLC	49840250189
OML	OLD MUTUAL PLC	62506173053	ANG	ANGLOGOLD ASHANTI LTD	54448647120	GFI	GOLD FIELDS LTD	39242489323
GFI	GOLD FIELDS LTD	56322513480	OML	OLD MUTUAL PLC	50494230763	OML	OLD MUTUAL PLC	38320594800
IMP	IMPALA PLATINUM HLGS LD	42018065040	SBK	STANDARD BANK GROUP LTD	37739682702	SBK	STANDARD BANK GROUP LTD	36378942278
SBK	STANDARD BANK GROUP LTD	39623069383	IMP	IMPALA PLATINUM HLGS LD	36405175844	FSR	FIRSTRAND LTD	35939000387
SAP	SAPPI LTD	37056143260	FSR	FIRSTRAND LTD	35013298862	IMP	IMPALA PLATINUM HLGS LD	28116000484
FSR	FIRSTRAND LTD	36211265541	REM	REMGRO LTD	33957256770	REM	REMGRO LTD	25195506133
REM	REMGRO LTD	30357203760	SAP	SAPPI LTD	31677025690	NED	NEDBANK GROUP LTD	23875588737
NED	NEDBANK GROUP LTD	28828112956	LBT	LIBERTY INTERNATIONL PLC	27707116612	SAP	SAPPI LTD	22711829740
LON	LONMIN P L C	27657894180	NED	NEDBANK GROUP LTD	27095603392	LBT	LIBERTY INTERNATIONL PLC	22349367755
LBT	LIBERTY INTERNATIONL PLC	26144151060	HAR	HARMONY G M CO LTD	25210956750	MTN	MTN GROUP LTD	19808171175
MTN	MTN GROUP LTD	22473991571	SLM	SANLAM LTD	21502022402	ASA	ABSA GROUP LIMITED	19546402470
SLM	SANLAM LTD	19882734295	LON	LONMIN P L C	19931866455	HAR	HARMONY G M CO LTD	17617840340
HAR	HARMONY G M CO LTD	18797682048	ASA	ABSA GROUP LIMITED	17819803585	SLM	SANLAM LTD	16591066668
GMF	GENCOR LTD	17429512850	GMF	GENCOR LTD	15634273026	TKG	TELKOM SA LTD	16460290251
ASA	ABSA GROUP LIMITED	17265988848	MTN	MTN GROUP LTD	15342322771	LGL	LIBERTY GROUP LTD	12720570880
LGL	LIBERTY GROUP LTD	14819564985	LGL	LIBERTY GROUP LTD	14527873396	BVT	BIDVEST LTD ORD	12694618398
EXX	EXXARO RESOURCES LTD	13868162806	BVT	BIDVEST LTD ORD	13954798874	GMF	GENCOR LTD	12671255841

Table 4.3 Raw Data - Sample Director Dealings

Company	Surname	Firstname	Initials	Position	Date	Nature	Typecd	Generaltypecd	Volume	Price
A E C I LIMITED	Leeming	Michael John	MJ	Non-Executive Director	31-Oct-02	Buying of shares in market	Buy	Ordinary shares	2000	2500
ABSA GROUP LIMITED	Bosman	Ewald Renaldo	E R	Director: Executive	29-Nov-02	Selling of shares held	Sell	Ordinary shares	52872	3597
ABSOLUTE HOLDINGS LIMITED	Krastanov	NULL	MJ		14-Jan-03	Buying of shares in market	Buy	Ordinary shares	256811	5
ACUITY GROUP HOLDINGS	Roux	NULL	S		08-Jul-03	Buying of shares in market	Buy	Ordinary shares	150000	5
ACUITY GROUP HOLDINGS	Roux	NULL	S		09-Jul-03	Buying of shares in market	Buy	Ordinary shares	200000	5
ACUITY GROUP HOLDINGS	Roux	NULL	S		16-Jul-03	Buying of shares in market	Buy	Ordinary shares	100000	5
ACUITY GROUP HOLDINGS	Roux	NULL	S		18-Jul-03	Buying of shares in market	Buy	Ordinary shares	80825	5
ADAPTIT HOLDINGS LTD	Collins	NULL	RP		03-Jun-03	Buying of shares in market	Buy	Ordinary shares	38082	22
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	07-Oct-02	Buying of shares in market	Buy	Ordinary shares	65500	25
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	11-Nov-02	Buying of shares in market	Buy	Ordinary shares	51890	30
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	25-Feb-03	Buying of shares in market	Buy	Ordinary shares	6090	22
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	26-Feb-03	Buying of shares in market	Buy	Ordinary shares	72380	22
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	02-Jun-03	Buying of shares in market	Buy	Ordinary shares	13	0
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	02-Jun-03	Buying of shares in market	Buy	Ordinary shares	13307	26
ADAPTIT HOLDINGS LTD	Dunsdon	Tiffany	T	Commercial Director	13-Feb-03	Buying of shares in market	Buy	Ordinary shares	46824	22



Table 4.4 Raw Data - Sample Beta Values

Key	Company Name	20020102	20030102	20040102	20050103	20060103	20070102
ABL	AFRICAN BANK INVESTMENTS	1.34698	1.17709	0.64826	0.43308	0.51074	0.70836
ACL	ARCELORMITTAL SA LTD	0.72004	0.68167	1.15802	0.64676	0.46215	1.09893
ACP	ACUCAP PROPERTIES LTD	NULL	-0.10596	0.07885	0.08304	0.13967	0.09812
AEG	AVENG LTD	0.60498	0.59744	0.48877	0.43639	0.28974	0.54921
AFE	A E C I LTD ORD	0.77249	0.80914	0.76177	0.67099	0.62351	0.63522
AFX	AFRICAN OXYGEN LTD ORD	0.70462	0.70705	0.68484	0.54588	0.48956	0.60767
AGL	ANGLO AMERICAN PLC	0.98268	0.94018	1.39607	1.53341	1.55124	1.32795

Table 4.5 Raw Data - Sample Index Prices

Date	All Share Index Close	Daily Return on ALSI	TRI Close	Daily Return on TRI
06-Oct-08	21022.63	-7.300	229047	-7.116
03-Oct-08	22678.25	0.521	246596	0.521
02-Oct-08	22560.77	-3.308	245318	-3.308
01-Oct-08	23332.65	-2.112	253712	-2.112
30-Sep-08	23835.97	3.241	259185	3.241
29-Sep-08	23087.67	-5.764	251048	-5.731
26-Sep-08	24499.94	-1.750	266310	-1.751
25-Sep-08	24936.43	0.053	271055	0.052
23-Sep-08	24923.34	-3.746	270913	-3.746

The original sample comprised of the top 100 companies by market capitalisation listed on the JSE for the period under review, however the sample was reduced to 72 companies due to the exclusions listed below. Companies that are smaller than the top 100 companies have specifically been excluded as their shares may be not be traded as often as the top 100 companies.

#### 4.8.1 Exclusion rules

The following was excluded from the population:

- All transactions that took place in shares that were not ordinary shares, other than single-stock futures;
- Transactions involving the exercise of options and, where indicated as such, the sale of these option acquired shares;
- Transactions involving the restructuring by directors of their share portfolios;
- Transactions involving the sale of shares and the immediate purchase of single-stock futures;
- Sale transactions followed immediately by
- Purchase transactions at a lower price than the lowest intra-day trading price;
- Sale and purchase transactions on the same day that had a net effect of zero;
- Only the first trading day of the week was considered, all subsequent transactions in the week was excluded;
- Companies that only had transactions that fell into any of the exclusions above;
- Companies that were not in the top 150 JSE listed companies by market capitalisation for the period;
- Companies that did not have any director dealings in the period.

## 4.9 Data analysis

The event of interest was the director's share transaction. The event date was the day on which a director transacted in the companies shares. This was denoted as "Day<sub>0</sub>"

Mordant and Muller (2003) measured daily the impact on the price of the share starting from fixed event day, Day<sub>0</sub> to Day<sub>0+252</sub>. The authors took into account public holidays and calculated that each month had an average of 21 trading days (21 \* 12 = 252 days = one year). In this study the abnormal returns, average abnormal returns and cumulative average abnormal returns were calculated for Day<sub>1</sub> to Day<sub>252</sub>.

## 4.10 Data preparation

The closing share prices of the 72 remaining companies (after the exclusions listed above) were then mapped to the director dealing's. Director dealing's in each company was then categorised as follows in a single spread-sheet:

- Single Buy (SB) – Only 1 director buying for the day,
- Multiple Buy (MB) – Multiple directors buying for the day,
- Net Buy (NB) – The net effect of all directors transactions for the day was a buy,
- Buy (B) – The sum of the above buy transactions,
- Single Sell (SS) – Only 1 director selling for the day,

- Multiple Sell (MS) – Multiple directors selling for the day,
- Net Sell (NS) – The net effect of all directors transactions for the day was a sell,
- Sell (S) – The sum of the above sell transactions,

A sample of the resultant spreadsheet is presented as Table 4.6

Table 4.6 Director Dealing's per Company - Sample

DATE	Transaction Type	Beta	Company	Share Close	All Share Index Close
01/09/2004	MB	1.44187	AMS	29150	11145.12
03/05/2006	SS	1.71483	AMS	61000	21362.71
04/08/2006	SS	1.71483	AMS	75861	21001.68
06/06/2006	MB	1.71483	AMS	57200	20007.75
07/11/2006	SS	1.71483	AMS	88000	24022.61
08/03/2007	MB	1.55881	AMS	101010	25616.63
08/05/2006	MS	1.71483	AMS	65500	21756.9

The day on which the transaction took place was denoted as Day<sub>0</sub>, and returns for Day<sub>1</sub> until Day<sub>252</sub> were calculated. For the period 1 April 2002 until 31 March 2008, there were 1501 trading days and 1 439 event days. For event days that occurred after 27 March 2007 (trading day 1249) the abnormal returns, average abnormal returns and cumulative average abnormal returns were calculated until the last trading day in the period therefore all 1 349 event days will not have a full 252 days worth of abnormal, average abnormal and cumulative average abnormal returns.

Appendix 1 contains the list of companies.

Appendix 2 contains the beta values used.

#### **4.11 Research Limitations**

The research that was performed had certain limitations namely:

- Only the first transaction day of the week for each company was analysed and the event(s) could be of a different sort to the trend the directors were following for the week;
- This study did not investigate insider trading in derivatives;
- This study did not take into account the volume traded by insiders;
- Neither did it take into account the volume traded versus the volume held by the insider;
- All listed companies were not included in the sample.

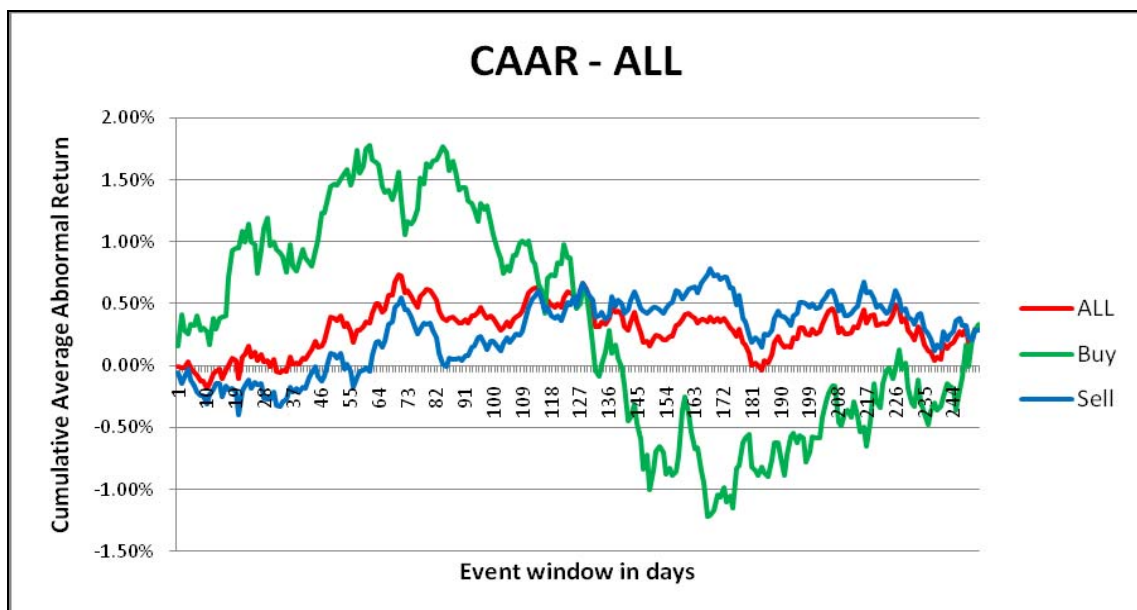
Chapter 5 presents the results achieved.

## 5 RESULTS

### 5.1 Overall Sample

Figure 5.1 shows the CAARs calculated for all director transactions in the period 1 April 2002 until 31 March 2008. The CAARs are shown for the period beginning with the event day plus one, Day<sub>1</sub> for all transactions and then for holding periods increasing in increments of one day to a maximum holding period of one year (Day<sub>252</sub>).

Figure 5.1 CAAR - All



The returns experienced by directors seem to be varied with both purchase and sale transactions experiencing both positive and negative CAARs for different holding periods. In order to make generalisations about directors' dealings it is

necessary to test statistically if the CAARs are significantly different to zero. Table 5.2 illustrates the CAAR for each day and the results of the hypothesis testing.

Directors' purchase transactions earned a significant abnormal positive return after two holding days up until a holding period of 10 days. While, on the eleventh day there is a positive abnormal return of 0.17% - this is however not a statistically significant return.

From day 12 through to day 130 there are significant positive abnormal returns. However for holding periods of day 139 to day 250 the returns are not statistically significant.

Directors' sales transactions earned a negative abnormal return from day one through to day 47. However, from day 64 through to Day 84, directors' earned positive abnormal returns on their sales transactions. From Day 87 through to a holding period on one year, directors' experienced a statistically significant positive abnormal return on sales transactions.

Table 5.1 Makeup of Sample

<b>Transaction</b>	<b>Number</b>	<b>% of Sample</b>
Purchases	315	22%
Sales	1124	78%

Table 5.2 Daily CAARs and results of hypothesis testing



Day	Buy		Sell		Day	Buy		Sell		Day	Buy		Sell	
	CAAR	Accept / Reject	CAAR	Accept / Reject		CAAR	Accept / Reject	CAAR	Accept / Reject		CAAR	Accept / Reject	CAAR	Accept / Reject
1	0.16%	Accept	-0.05%	Accept	85	172%	Reject	-0.01%	Accept	169	-17%	Accept	0.72%	Reject
2	0.47%	Reject	-0.44%	Accept	86	158%	Reject	0.06%	Accept	170	-104%	Accept	0.73%	Reject
3	0.28%	Reject	-0.09%	Accept	87	165%	Reject	0.05%	Reject	171	-106%	Accept	0.69%	Reject
4	0.25%	Reject	-0.03%	Accept	88	157%	Reject	0.05%	Reject	172	-0.99%	Accept	0.72%	Reject
5	0.33%	Reject	-0.11%	Accept	89	147%	Reject	0.06%	Reject	173	-1.10%	Accept	0.77%	Reject
6	0.32%	Reject	-0.16%	Accept	90	143%	Reject	0.04%	Reject	174	-1.05%	Accept	0.63%	Reject
7	0.40%	Reject	-0.21%	Accept	91	144%	Reject	0.08%	Reject	175	-1.15%	Accept	0.62%	Reject
8	0.29%	Reject	-0.24%	Accept	92	133%	Reject	0.08%	Reject	176	-0.83%	Accept	0.49%	Reject
9	0.30%	Reject	-0.24%	Accept	93	137%	Reject	0.15%	Reject	177	-0.81%	Accept	0.57%	Reject
10	0.28%	Reject	-0.37%	Accept	94	126%	Reject	0.16%	Reject	178	-0.63%	Accept	0.39%	Reject
11	0.17%	Accept	-0.23%	Accept	95	117%	Reject	0.22%	Reject	179	-0.59%	Accept	0.35%	Reject
12	0.38%	Reject	-0.19%	Accept	96	137%	Reject	0.23%	Reject	180	-0.55%	Accept	0.25%	Reject
13	0.30%	Reject	-0.14%	Accept	97	126%	Reject	0.18%	Reject	181	-0.81%	Accept	0.19%	Reject
14	0.38%	Reject	-0.14%	Accept	98	129%	Reject	0.13%	Reject	182	-0.85%	Accept	0.23%	Reject
15	0.39%	Reject	-0.25%	Accept	99	115%	Reject	0.20%	Reject	183	-0.89%	Accept	0.27%	Reject
16	0.40%	Reject	-0.16%	Accept	100	105%	Reject	0.19%	Reject	184	-0.81%	Accept	0.15%	Reject
17	0.77%	Reject	-0.19%	Accept	101	0.95%	Reject	0.16%	Reject	185	-0.87%	Accept	0.26%	Reject
18	0.93%	Reject	-0.18%	Accept	102	0.86%	Reject	0.12%	Reject	186	-0.89%	Accept	0.24%	Reject
19	0.94%	Reject	-0.21%	Accept	103	0.74%	Reject	0.18%	Reject	187	-0.76%	Accept	0.29%	Reject
20	0.95%	Reject	-0.40%	Accept	104	0.80%	Reject	0.22%	Reject	188	-0.62%	Accept	0.38%	Reject
21	1.09%	Reject	-0.20%	Accept	105	0.76%	Reject	0.19%	Reject	189	-0.63%	Accept	0.44%	Reject
22	1.00%	Reject	-0.16%	Accept	106	0.89%	Reject	0.22%	Reject	190	-0.74%	Accept	0.47%	Reject
23	1.14%	Reject	-0.11%	Accept	107	0.89%	Reject	0.25%	Reject	191	-0.88%	Accept	0.39%	Reject
24	1.00%	Reject	-0.18%	Accept	108	0.98%	Reject	0.25%	Reject	192	-0.71%	Accept	0.37%	Reject
25	0.98%	Reject	-0.14%	Accept	109	1.01%	Reject	0.28%	Reject	193	-0.57%	Accept	0.32%	Reject
26	0.75%	Reject	-0.15%	Accept	110	0.97%	Reject	0.40%	Reject	194	-0.54%	Accept	0.40%	Reject
27	0.94%	Reject	-0.14%	Accept	111	1.01%	Reject	0.47%	Reject	195	-0.62%	Accept	0.42%	Reject
28	1.11%	Reject	-0.26%	Accept	112	0.85%	Reject	0.53%	Reject	196	-0.56%	Accept	0.51%	Reject
29	1.19%	Reject	-0.26%	Accept	113	0.82%	Reject	0.56%	Reject	197	-0.58%	Accept	0.57%	Reject
30	0.96%	Reject	-0.27%	Accept	114	0.66%	Reject	0.60%	Reject	198	-0.78%	Accept	0.50%	Reject
31	1.00%	Reject	-0.21%	Accept	115	0.62%	Reject	0.55%	Reject	199	-0.70%	Accept	0.47%	Reject
32	0.94%	Reject	-0.31%	Accept	116	0.42%	Reject	0.44%	Reject	200	-0.57%	Accept	0.49%	Reject
33	0.91%	Reject	-0.32%	Accept	117	0.70%	Reject	0.47%	Reject	201	-0.58%	Accept	0.45%	Reject
34	0.88%	Reject	-0.29%	Accept	118	0.73%	Reject	0.40%	Reject	202	-0.58%	Accept	0.47%	Reject
35	0.75%	Reject	-0.27%	Accept	119	0.72%	Reject	0.39%	Reject	203	-0.42%	Accept	0.51%	Reject
36	0.97%	Reject	-0.17%	Accept	120	0.84%	Reject	0.40%	Reject	204	-0.29%	Accept	0.56%	Reject
37	0.80%	Reject	-0.21%	Accept	121	0.82%	Reject	0.36%	Reject	205	-0.22%	Accept	0.60%	Reject
38	0.76%	Reject	-0.18%	Accept	122	0.97%	Reject	0.42%	Reject	206	-0.17%	Accept	0.60%	Reject
39	0.84%	Reject	-0.21%	Accept	123	0.87%	Reject	0.50%	Reject	207	-0.17%	Accept	0.56%	Reject
40	0.94%	Reject	-0.18%	Accept	124	0.87%	Reject	0.49%	Reject	208	-0.46%	Accept	0.44%	Reject
41	0.87%	Reject	-0.18%	Accept	125	0.55%	Reject	0.55%	Reject	209	-0.49%	Accept	0.49%	Reject
42	0.83%	Reject	-0.10%	Accept	126	0.46%	Reject	0.47%	Reject	210	-0.38%	Accept	0.41%	Reject
43	0.80%	Reject	-0.06%	Accept	127	0.50%	Reject	0.61%	Reject	211	-0.36%	Accept	0.40%	Reject
44	0.93%	Reject	-0.01%	Accept	128	0.62%	Reject	0.66%	Reject	212	-0.41%	Accept	0.42%	Reject
45	1.02%	Reject	-0.09%	Accept	129	0.57%	Reject	0.61%	Reject	213	-0.29%	Accept	0.45%	Reject
46	1.23%	Reject	-0.13%	Accept	130	0.42%	Reject	0.57%	Reject	214	-0.41%	Accept	0.47%	Reject
47	1.23%	Reject	-0.08%	Accept	131	0.16%	Accept	0.53%	Reject	215	-0.53%	Accept	0.57%	Reject
48	1.36%	Reject	0.03%	Accept	132	-0.03%	Accept	0.39%	Reject	216	-0.49%	Accept	0.67%	Reject
49	1.45%	Reject	0.10%	Accept	133	-0.09%	Accept	0.40%	Reject	217	-0.65%	Accept	0.58%	Reject
50	1.46%	Reject	0.09%	Reject	134	0.01%	Accept	0.43%	Reject	218	-0.45%	Accept	0.60%	Reject
51	1.45%	Reject	0.07%	Reject	135	0.11%	Accept	0.37%	Reject	219	-0.15%	Accept	0.53%	Reject
52	1.50%	Reject	0.10%	Reject	136	0.29%	Reject	0.40%	Reject	220	-0.29%	Accept	0.47%	Reject
53	1.56%	Reject	-0.02%	Accept	137	0.10%	Accept	0.55%	Reject	221	-0.34%	Accept	0.49%	Reject
54	1.58%	Reject	0.01%	Accept	138	0.16%	Reject	0.48%	Reject	222	-0.15%	Accept	0.46%	Reject
55	1.45%	Reject	-0.05%	Accept	139	0.06%	Accept	0.52%	Reject	223	-0.04%	Accept	0.42%	Reject
56	1.52%	Reject	-0.18%	Accept	140	-0.01%	Accept	0.50%	Reject	224	-0.02%	Accept	0.44%	Reject
57	1.73%	Reject	-0.10%	Accept	141	-0.15%	Accept	0.42%	Reject	225	-0.11%	Accept	0.53%	Reject
58	1.55%	Reject	-0.05%	Accept	142	-0.45%	Accept	0.45%	Reject	226	-0.02%	Accept	0.60%	Reject
59	1.61%	Reject	-0.03%	Accept	143	-0.41%	Accept	0.53%	Reject	227	0.13%	Accept	0.54%	Reject
60	1.75%	Reject	-0.02%	Accept	144	-0.31%	Accept	0.60%	Reject	228	-0.02%	Accept	0.44%	Reject
61	1.78%	Reject	-0.05%	Accept	145	-0.46%	Accept	0.55%	Reject	229	0.02%	Accept	0.46%	Reject
62	1.66%	Reject	0.08%	Accept	146	-0.59%	Accept	0.46%	Reject	230	-0.18%	Accept	0.40%	Reject
63	1.64%	Reject	0.19%	Reject	147	-0.84%	Accept	0.44%	Reject	231	-0.30%	Accept	0.38%	Reject
64	1.62%	Reject	0.19%	Reject	148	-0.72%	Accept	0.42%	Reject	232	-0.33%	Accept	0.33%	Reject
65	1.45%	Reject	0.15%	Reject	149	-1.01%	Accept	0.44%	Reject	233	-0.11%	Accept	0.41%	Reject
66	1.40%	Reject	0.20%	Reject	150	-0.85%	Accept	0.47%	Reject	234	-0.29%	Accept	0.42%	Reject
67	1.41%	Reject	0.33%	Reject	151	-0.69%	Accept	0.47%	Reject	235	-0.39%	Accept	0.30%	Reject
68	1.34%	Reject	0.35%	Reject	152	-0.65%	Accept	0.45%	Reject	236	-0.48%	Accept	0.26%	Reject
69	1.40%	Reject	0.47%	Reject	153	-0.69%	Accept	0.42%	Reject	237	-0.37%	Accept	0.22%	Reject
70	1.56%	Reject	0.50%	Reject	154	-0.88%	Accept	0.46%	Reject	238	-0.30%	Accept	0.12%	Accept
71	1.34%	Reject	0.55%	Reject	155	-0.83%	Accept	0.49%	Reject	239	-0.35%	Accept	0.17%	Reject
72	1.05%	Reject	0.45%	Reject	156	-0.89%	Accept	0.51%	Reject	240	-0.32%	Accept	0.14%	Reject
73	1.16%	Reject	0.45%	Reject	157	-0.85%	Accept	0.60%	Reject	241	-0.25%	Accept	0.27%	Reject
74	1.14%	Reject	0.40%	Reject	158	-0.73%	Accept	0.59%	Reject	242	-0.15%	Accept	0.20%	Reject
75	1.17%	Reject	0.33%	Reject	159	-0.35%	Accept	0.54%	Reject	243	-0.16%	Accept	0.25%	Reject
76	1.26%	Reject	0.25%	Reject	160	-0.25%	Accept	0.57%	Reject	244	-0.18%	Accept	0.27%	Reject
77	1.51%	Reject	0.29%	Reject	161	-0.39%	Accept	0.62%	Reject	245	-0.36%	Accept	0.36%	Reject
78	1.47%	Reject	0.35%	Reject	162	-0.53%	Accept	0.62%	Reject	246	-0.19%	Accept	0.38%	Reject
79	1.63%	Reject	0.34%	Reject	163	-0.67%	Accept	0.64%	Reject	247	-0.09%	Accept	0.33%	Reject
80	1.60%	Reject	0.34%	Reject	164	-0.66%	Accept	0.58%	Reject	248	0.17%	Accept	0.32%	Reject
81	1.65%	Reject	0.28%	Reject	165	-0.84%	Accept	0.66%	Reject	249	-0.01%	Accept	0.23%	Reject
82	1.66%	Reject	0.22%	Reject	166	-0.95%	Accept	0.69%	Reject	250	0.22%	Accept	0.21%	Reject
83	1.70%	Reject	0.10%	Accept	167	-1.22%	Accept	0.74%	Reject	251	0.29%	Reject	0.28%	Reject
84	1.77%	Reject	0.01%	Accept	168	-1.20%	Accept	0.78%	Reject	252	0.33%	Reject	0.29%	Reject

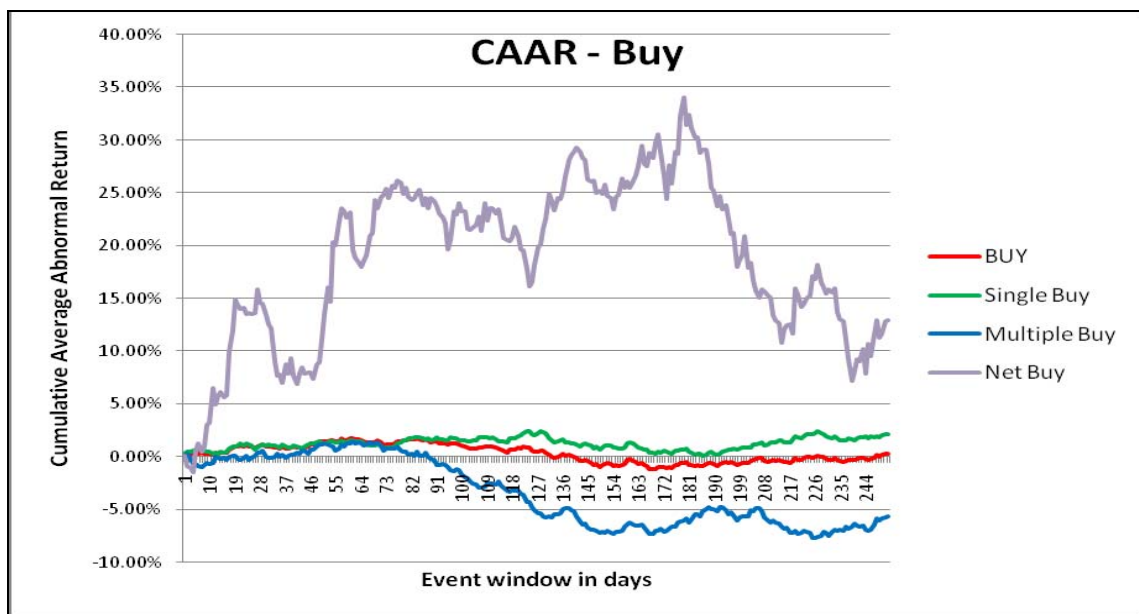


The sample was then split into 2 sub-samples of purchase and sale transactions.

## 5.2 Purchase sub-sample

Figure 5.2 shows the CAARs calculated for all director purchase transactions in the period 1 April 2002 until 31 March 2008. The CAARs are shown for the period beginning with the event day plus one, Day<sub>1</sub> for all transactions and then for holding periods increasing in increments of one day to a maximum holding period of one year (Day<sub>252</sub>).

Figure 5.2 CAAR - Buy



While the CAAR for the overall buy sample does not vary much from zero, the CAARs for both Net Buy and Multiple Buy do appear to be substantial. Table 5.3 shows the number and type of transactions analysed.

Table 5.3 Number and Type of Purchase Transactions

<b>Transaction</b>	<b>Number</b>	<b>% of Buy Sample</b>
Buy	315	100%
Single Buy	233	74%
Multiple Buy	78	28.8%
Net Buy	4	1.3%

In order to make generalisations about director buying it is necessary to test statistically if the CAARs are significantly different from zero. A sample of the results is shown in Table 5.4 and the full spreadsheet can be found as Appendix 3.

Table 5.4 Sample of Daily Purchase CAARs and hypothesis testing for Purchase sub-sample

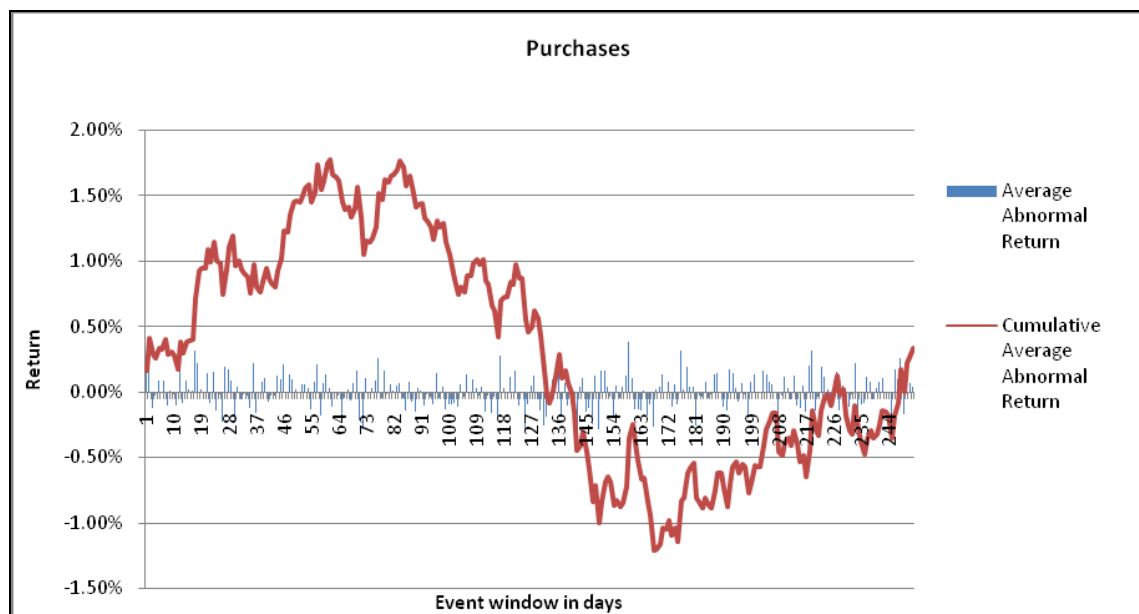
Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject H0	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
1	0.16%	Accept	0.32%	Accept	-0.31%	Accept	0.11%	Accept
2	0.41%	Reject	0.47%	Reject	0.28%	Accept	-0.88%	Accept
3	0.28%	Reject	0.49%	Reject	-0.26%	Accept	-1.12%	Accept
4	0.25%	Reject	0.60%	Reject	-0.72%	Accept	-1.48%	Accept
5	0.33%	Reject	0.68%	Reject	-0.74%	Accept	0.58%	Accept
6	0.32%	Reject	0.69%	Reject	-0.87%	Accept	1.28%	Reject
7	0.40%	Reject	0.84%	Reject	-0.96%	Accept	0.46%	Accept
8	0.29%	Reject	0.62%	Reject	-0.78%	Accept	0.97%	Reject
9	0.30%	Reject	0.53%	Reject	-0.58%	Accept	3.04%	Reject
10	0.28%	Reject	0.53%	Reject	-0.66%	Accept	3.17%	Reject
11	0.17%	Accept	0.31%	Accept	-0.58%	Accept	6.49%	Reject
12	0.38%	Reject	0.45%	Reject	-0.05%	Accept	4.95%	Accept
13	0.30%	Reject	0.34%	Reject	-0.12%	Accept	5.69%	Reject
14	0.38%	Reject	0.49%	Reject	-0.23%	Accept	6.17%	Reject
15	0.39%	Reject	0.46%	Reject	-0.08%	Accept	5.67%	Reject
16	0.40%	Reject	0.55%	Reject	-0.32%	Accept	5.88%	Reject
17	0.71%	Reject	0.79%	Reject	-0.01%	Accept	9.91%	Reject
18	0.93%	Reject	1.01%	Reject	0.10%	Accept	11.93%	Reject
19	0.94%	Reject	0.98%	Reject	0.08%	Reject	14.93%	Reject
20	0.95%	Reject	1.08%	Reject	-0.17%	Accept	14.38%	Reject
21	1.09%	Reject	1.30%	Reject	-0.26%	Accept	14.03%	Reject
22	1.00%	Reject	1.14%	Reject	-0.13%	Accept	14.11%	Reject
23	1.14%	Reject	1.28%	Reject	0.05%	Accept	13.54%	Reject
24	1.00%	Reject	1.22%	Reject	-0.32%	Accept	13.66%	Reject
25	0.98%	Reject	1.12%	Reject	-0.11%	Accept	13.55%	Reject

Directors' buys with the exception of Net Buys show a pattern of very small positive abnormal returns which are positive for holding days 2 through to 10. Significant positive abnormal returns of around 1% percent are made for days 18 through to 33. Net Buys show a significant increasing positive abnormal return of more than

3% from day 9 through to a peak of 12.17% at day 32, days 54 – 60 show a significant positive abnormal return of more than 20%.

Cumulative Average Abnormal returns are calculated by summing the Average Abnormal Returns. Figure 5.3 shows the AARs against the CAARs for all Purchase transactions.

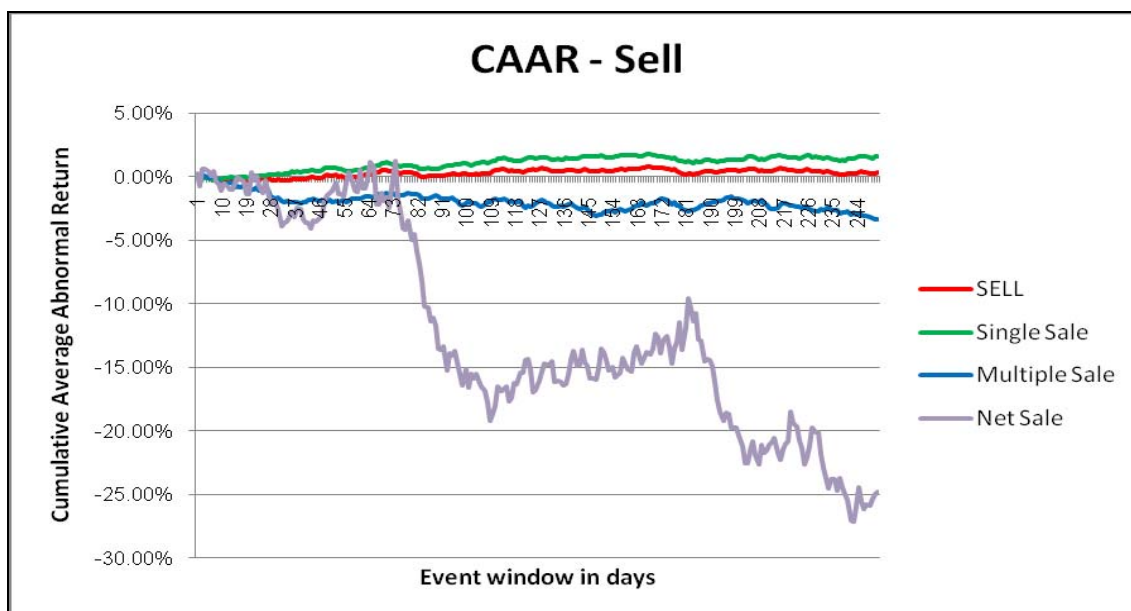
Figure 5.3 AAR's and CAARs for Purchase sub-sample



### 5.3 Sale sub-sample

Figure 5.4 shows the CAARs calculated for all director sale transactions in the period 1 April 2002 until 31 March 2008. The CAARs are shown for the period beginning with the event day plus one, Day<sub>1</sub> for all transactions and then for holding periods increasing in increments of one day to a maximum holding period of one year (Day<sub>252</sub>).

Figure 5.4 CAAR - Sale



While the CAAR for the overall sell sample does not vary much from zero, the CAAR for Single Sell is positive. Table 5.5 shows the number and type of transactions analysed.

Table 5.5 Number and Type of Sell Transactions

Transaction	Number	% of Sell Sample
Sell	1124	100%
Single Sell	844	75%
Multiple Sell	273	24%
Net Sell	7	1%

In order to make generalisations about director selling it is necessary to test statistically if the CAARs are significantly different from zero. A sample of the results is shown in Table 5.5 and the full spreadsheet can be found as Appendix 4.

Table 5.5 Sample of Daily Sale CAARs and hypothesis testing for Sale sub-sample

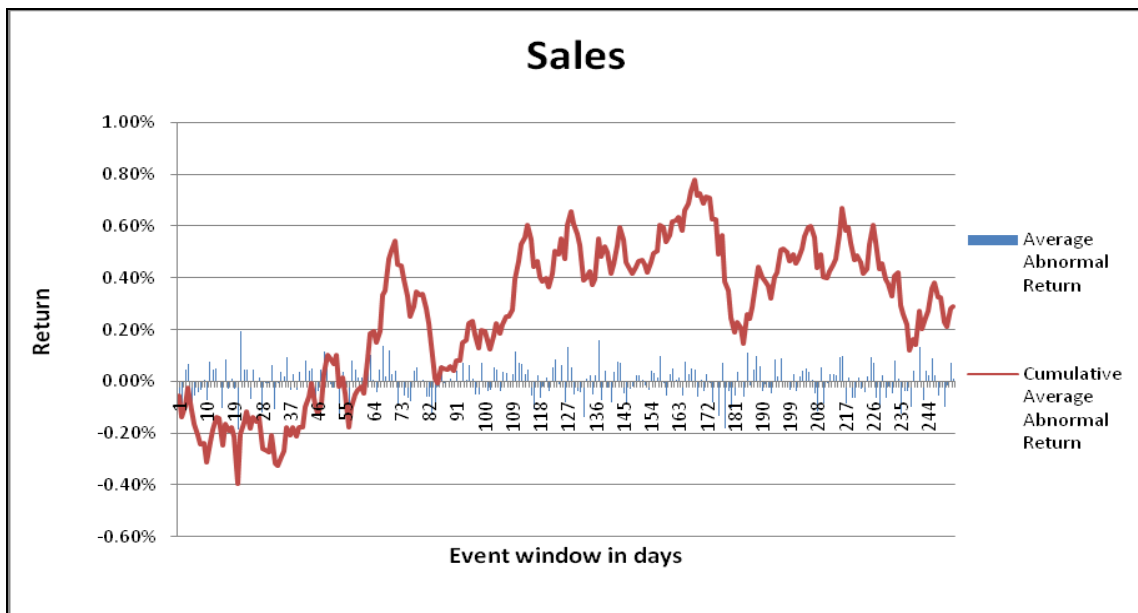
Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
1	-0.05%	Accept	-0.07%	Accept	0.00%	Accept	0.19%	Accept
2	-0.14%	Accept	-0.19%	Accept	0.05%	Accept	-0.78%	Accept
3	-0.09%	Accept	-0.18%	Accept	0.14%	Accept	0.57%	Accept
4	-0.03%	Accept	-0.06%	Accept	0.05%	Accept	0.58%	Reject
5	-0.11%	Accept	-0.10%	Accept	-0.15%	Accept	0.40%	Accept
6	-0.16%	Accept	-0.20%	Accept	-0.07%	Accept	0.08%	Accept
7	-0.21%	Accept	-0.25%	Accept	-0.08%	Accept	0.42%	Reject
8	-0.24%	Accept	-0.29%	Accept	-0.10%	Accept	-0.43%	Accept
9	-0.24%	Accept	-0.20%	Accept	-0.36%	Accept	-0.62%	Accept
10	-0.31%	Accept	-0.17%	Accept	-0.75%	Accept	-1.11%	Accept
11	-0.23%	Accept	-0.12%	Accept	-0.62%	Accept	-0.55%	Accept
12	-0.19%	Accept	-0.06%	Accept	-0.58%	Accept	-0.76%	Accept
13	-0.14%	Accept	-0.02%	Accept	-0.50%	Accept	-1.04%	Accept
14	-0.14%	Accept	-0.04%	Accept	-0.47%	Accept	-0.99%	Accept
15	-0.25%	Accept	-0.06%	Accept	-0.84%	Accept	-0.51%	Accept
16	-0.16%	Accept	0.02%	Accept	-0.77%	Accept	-0.03%	Accept
17	-0.19%	Accept	0.00%	Accept	-0.81%	Accept	-0.25%	Accept
18	-0.18%	Accept	0.00%	Accept	-0.77%	Accept	-0.44%	Accept
19	-0.21%	Accept	-0.04%	Accept	-0.74%	Accept	-1.40%	Accept
20	-0.40%	Accept	-0.15%	Accept	-1.18%	Accept	-1.35%	Accept
21	-0.20%	Accept	0.04%	Accept	-1.02%	Accept	0.31%	Accept

The CAAR for Sell transactions is negative for abnormal returns until Day 61. Thereafter from day 63 the Sell CAAR has a positive abnormal return that is statistically significant to a high of 0.78% on day 168. Between days 168 and 170 Single Sells have statistically significant positive abnormal return around 1.7%. Net

Sells show a consistently increasing negative abnormal return to a low of 27.12% at day 243.

Cumulative Average Abnormal returns are calculated by summing the Average Abnormal Returns. Figure 5.5 shows the AARs against the CAARs for all Sale transactions.

Figure 5.5 AAR's and CAARs for Sale sub-sample



## **6 DISCUSSION OF RESULTS**

The objectives of and results achieved by this study are discussed in further detail in this section.

### **6.1 Definition of the Insider Trading Act of 1998**

The Insider Trading Act of 1998 was presented and discussed in Section 2.2. The Act replaced sections dealing with insider trading in The Companies Act of 1973 and provided a more detailed and comprehensive definition of insider trading and the sanctions that could be applied. The Act details the definition of an insider; the actual offence committed by the insider and also clarifies when information can be regarded as public knowledge.

### **6.2 Explanation of the rule governing directors' share dealings in terms of the JSE's listing requirements**

The rule governing directors' share dealing was discussed in Section 2.3 and the relevant sections highlighted in order to give some background to the study. The difference between legal and illegal insider trading was clearly presented in conjunction with the Insider Trading Act of 1998



### **6.3 Review South African and international studies regarding directors' share dealings**

A number of international and a few local studies were discussed in depth in Sections 2.4 – 2.5. The concept of market efficiency was introduced and discussed. Insider trading as a contributor to market efficiency was also discussed. It was found that both international and local studies results differ with regards to the actual abnormal returns that directors' earn in their share dealings. Studies dealing with both the effect of directors' dealings on the market, as well as the abnormal returns that directors achieve, were also reviewed.

### **6.4 To investigate whether directors' earn a statistically significant abnormal return on their dealings**

Chapters 3 and 4 discussed what was going to be investigated in this study and presented the research hypotheses, methodology and data used in order to elicit a result.

## **6.5 Hypothesis Testing**

### **6.5.1 Hypothesis 1**

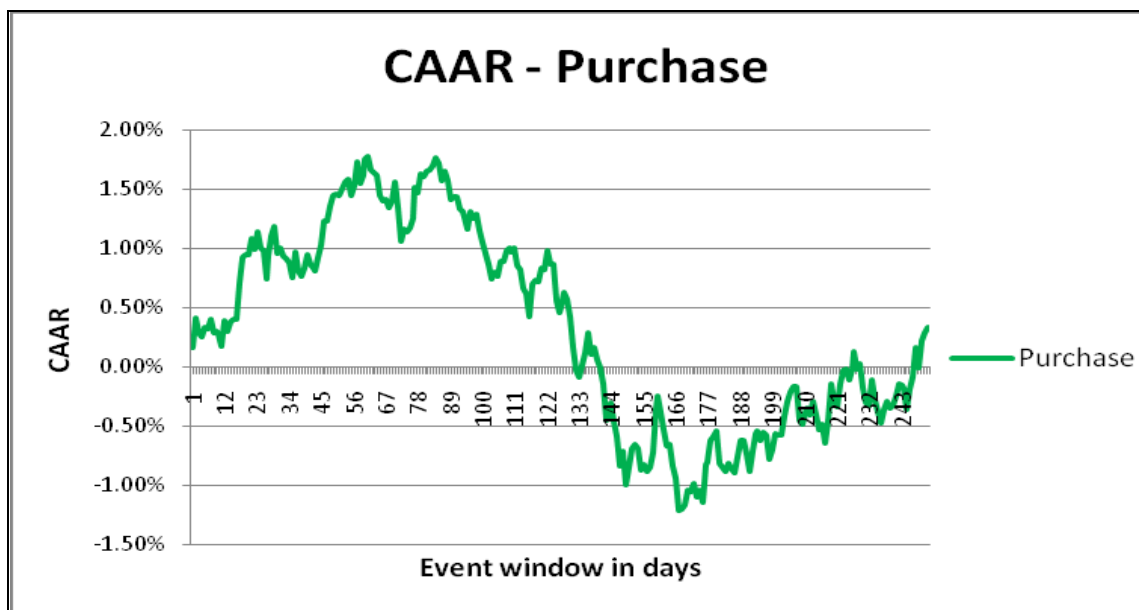
The first null hypothesis stated that the cumulative average abnormal return (CAAR) on the shares bought by directors is not significantly different from zero. The first alternative hypothesis states that the cumulative average abnormal return (CAAR) on the shares bought by directors is significantly greater than zero.

$$H_{10}: CAAR_t = 0$$

$$H_{1A}: CAAR_t > 0$$

Figure 6.1 shows a positive CAAR for directors' buy transactions for holding periods of day 1 to day 139 and day 250 to day 252 with a negative CAAR for holding periods of day 140 to 249. Appendix 3 displayed the results of the t-value being compared to the t-statistic at a 5% confidence interval for the duration of the period under study.  $H_{10}$  was accepted for holding periods of 1; 11; 131 – 135; 137 and 139 – 250. However  $H_{10}$  was rejected for all other holding periods.  $H_{10}$  was accepted for 120 holding periods while  $H_{10}$  was rejected for 132 holding periods.

Figure 6.1 CAAR – Purchase



Mordant and Muller (2003) show a very similar picture to Figure 6.1 when presenting their CARs for the purchases sub-sample. Directors' abnormal returns

are positive for a period immediately after the transaction, then decline into negative abnormal returns and finally towards the end of the holding period show a return to positive returns. Figure 6.1 shows a return to positive abnormal returns that is statistically significant in day 250 and the return stays positive to day 252.

A concern raised by the results is that the CAAR achieved by purchase transactions is different to that of most international studies in that, the return is negative rather than positive. A possible reason for this is that only the first trading day for the week of each company was considered, and the transaction(s) could be in an opposite direction to the trades executed during the rest of the week.

### **6.5.2 Hypothesis 2**

The second null hypothesis stated that the cumulative average abnormal return (CAAR) on the shares sold by directors is not significantly different from zero. The second alternative hypothesis states that the cumulative average abnormal return (CAAR) on the shares sold by directors is significantly greater than zero.

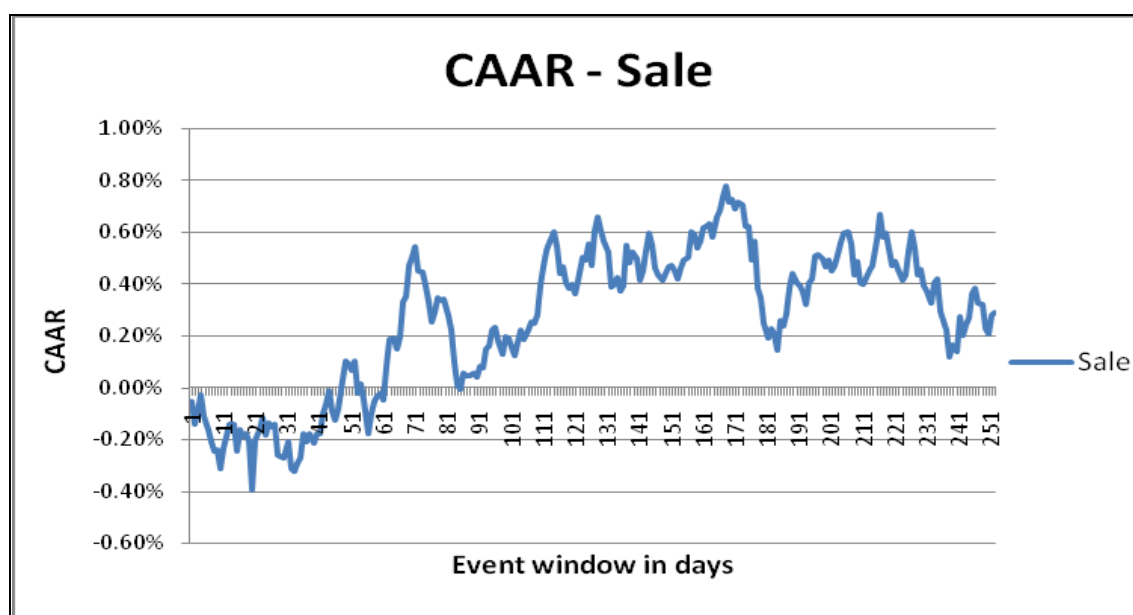
$$H_{2_0} : CAAR_t = 0$$

$$H_{2_A} : CAAR_t > 0$$

Figure 6.2 shows a negative CAAR for directors' sell transactions for the holding periods day 1 to day 47; day 53; day 55 to day 61 and day 85. Appendix 4 displayed the results of the t-value being compared to the t-statistic at a 5% confidence interval.  $H_{2_0}$  was accepted for holding periods of 1 – 49; 53 – 62; 83 –

86 and 238. However  $H_0$  was rejected for all other holding periods.  $H_0$  was accepted for 64 holding periods and  $H_0$  was rejected for 188 holding periods.

Figure 6.2 CAAR – Sale



The results achieved correspond to a certain degree to the study done on the Amsterdam Stock Exchange by Aktas *et al.* (2007) in that, the abnormal returns for sale transactions was negative for at least 20 days after the event. The results show that even though directors may be trading on insider information, the South African stock market is efficient enough, to prevent concerns about excessive returns to directors’.

### 6.5.3 Hypothesis 3

The selling of shares by directors is not necessarily as credible as a buying signal because directors sell for a variety of reasons and liquidity needs - rather than

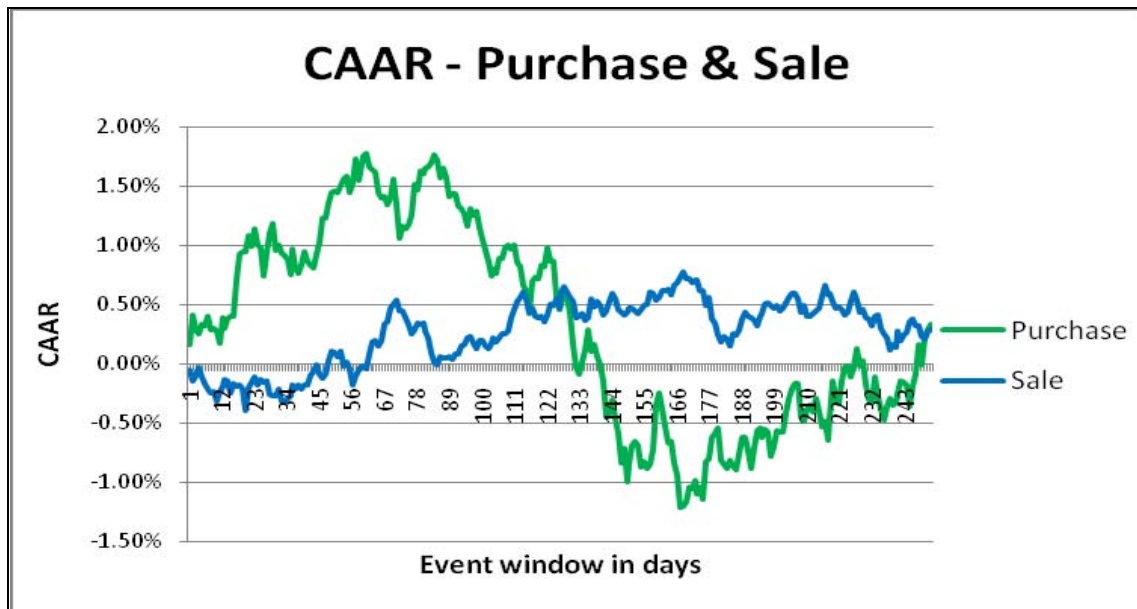
changes in their expectations about the firm's future cash flows may force directors to sell (Lakonishok and Lee, 2001). Because of the different reasons behind sales, it is expected that the market reaction to sales is less than that of purchases but still present. Therefore the third null hypothesis states that the cumulative average abnormal buying return ( $CAAR_b$ ) on the shares bought by directors is less than the cumulative average abnormal selling return ( $CAAR_s$ ) on the shares sold by directors. The third alternative hypothesis states that that the cumulative average abnormal buying return ( $CAAR_b$ ) on the shares bought by directors is greater than the cumulative average abnormal selling return ( $CAAR_s$ ) on the shares sold by directors

$$H_{3_0} : CAAR_b < CAAR_s$$

$$H_{3_A} : CAAR_b > CAAR_s$$

Figure 5.1 shows that the  $CAAR_s$  is positive for a greater number of holding periods than  $CAAR_b$ . However  $CAAR_b$  shows a greater amplitude than  $CAAR_s$ . Testing at a significance level of 5%  $H_{3_0}$  is accepted.

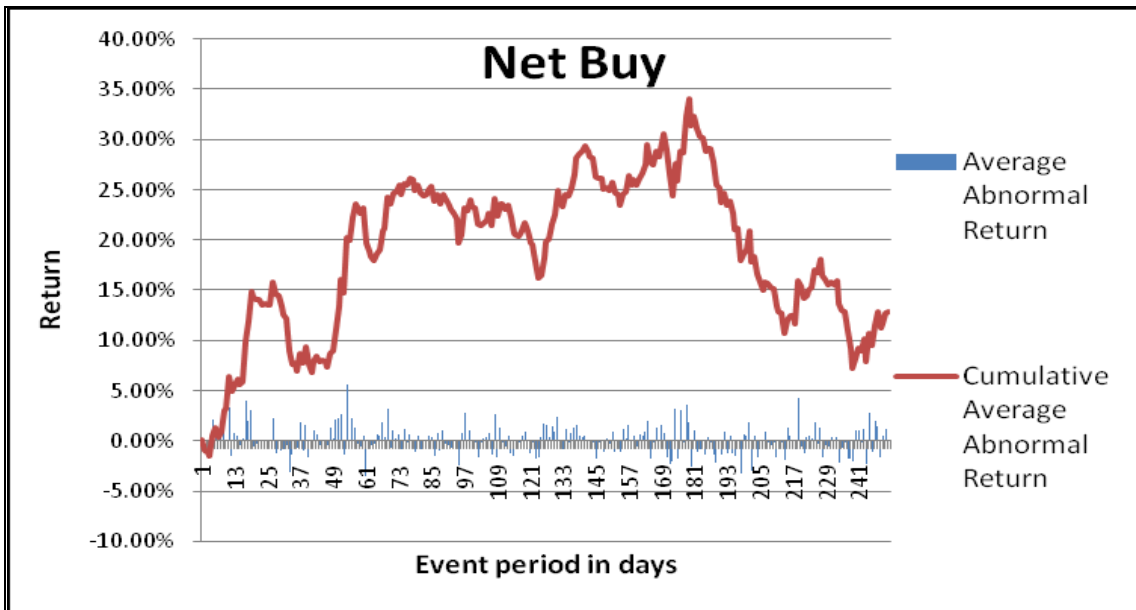
Figure 6.3 CAAR – Purchase and Sale



## 6.6 To provide what could be the initial step of building a portfolio based on directors' trades

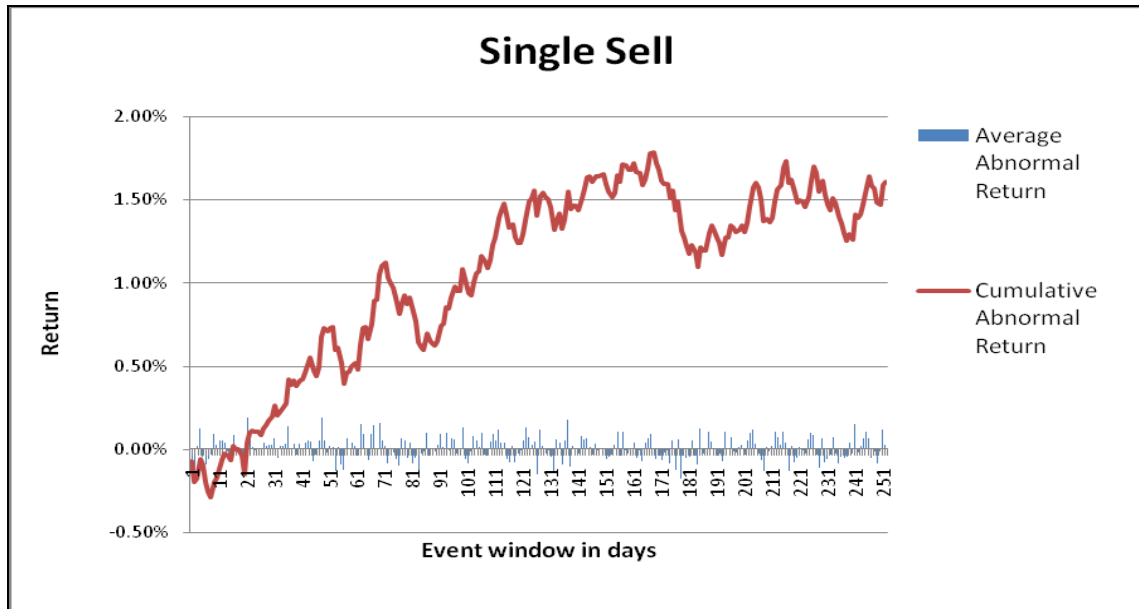
While it has been shown (Table 5.2) that the abnormal results achieved by directors' are statistically significant and positive for more holding periods than not, the abnormal return (which excludes transaction costs) does not justify a strategy of building a portfolio based on directors' trades. However directors' trades can still be used as the initial steps in building a portfolio along with in-depth company research and making sure that the company fundamentals are strong.

Figure 6.4 Net Buy



Net Buy transactions are a particularly interesting aspect of directors' purchase trades as for the period under review the abnormal returns have been positive for all holding periods except days 2 – 4. Day 179 shows a significant positive abnormal return of 34.09%. Figure 6.4 shows the four Net buy events which are those days on which directors' bought and sold shares – with the net effect being more shares bought than sold.

Figure 6.5 Single Sell



On the sale transactions, Single Sell transactions are the best performers being positive for 233 holding periods. Figure 6.5 shows the 844 Single Sell transactions which are those days that there was only one director in the market. Day 168 shows a statistically significant positive return of 1.79%.



Figure 6.6 shows the AAR and CAAR for all directors' trades.

Figure 6.6 AAR and CAAR All

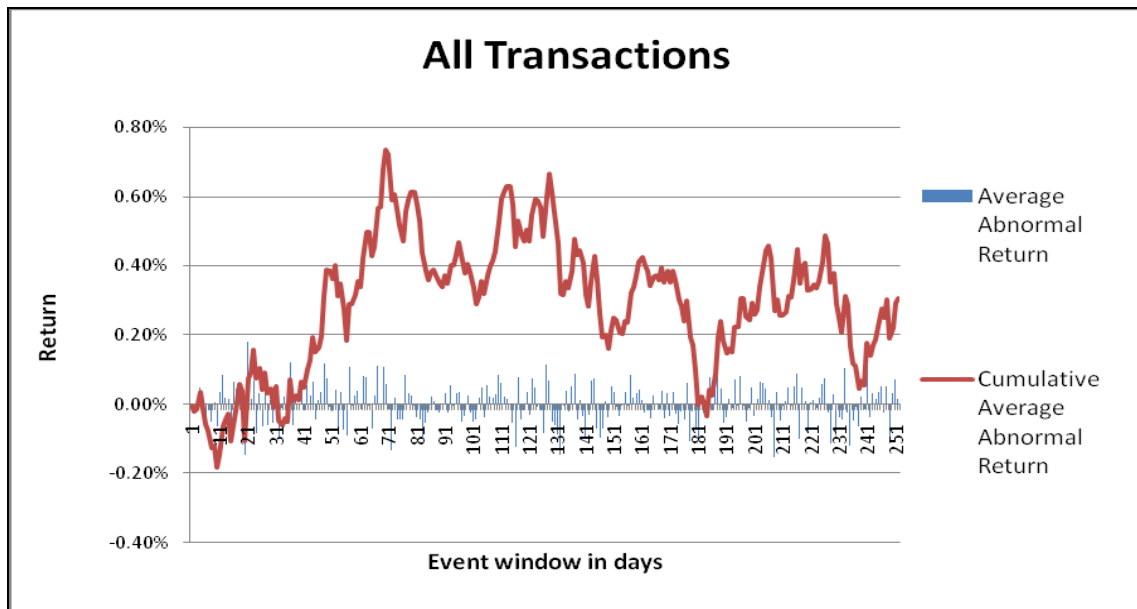


Figure 6.6 shows  $CAAR_{All}$  to be mostly positive, with a statistically significantly positive return of 0.79% on day 70.

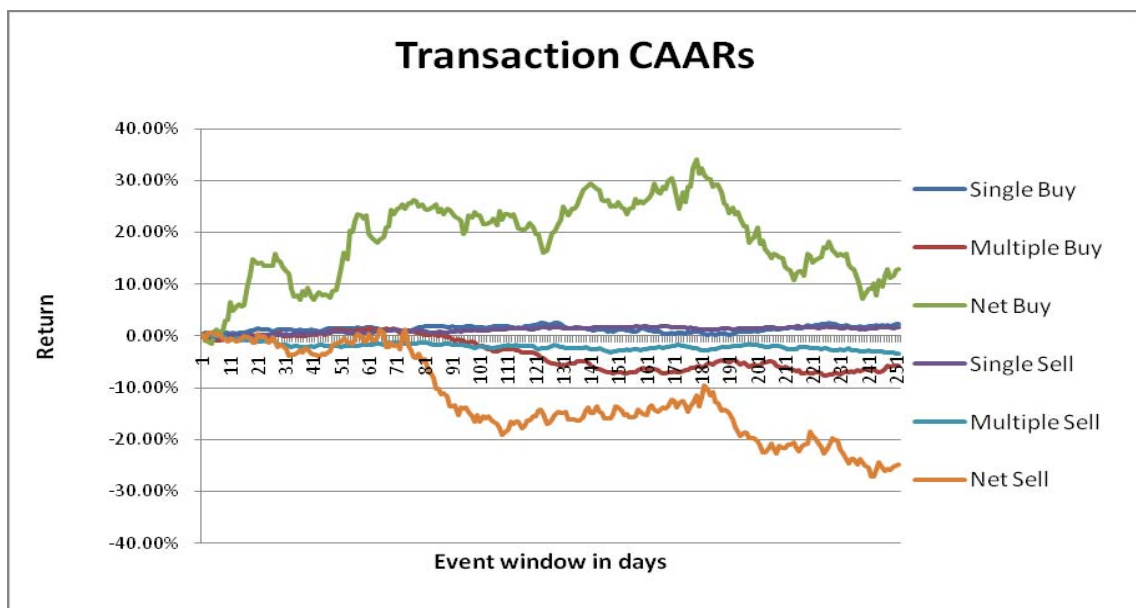
While the  $CAAR_{All}$  is not as high as that of international studies, it does show a positive return over an extended period and supports among others Ke, Hiddart and Petroni's (2003) study that directors do earn abnormal returns.

The negative abnormal returns achieved by directors' purchases support Adebowale's (2005) finding that directors' purchase transactions on the Johannesburg Stock Exchange under perform in the long run.

The difference in performance between purchase and sales transactions shows that sale transactions on the JSE outperform purchase transactions supporting Mordant and Muller's (2003) findings on the JSE that sales transactions are a more pronounced source of out-performance than purchases.

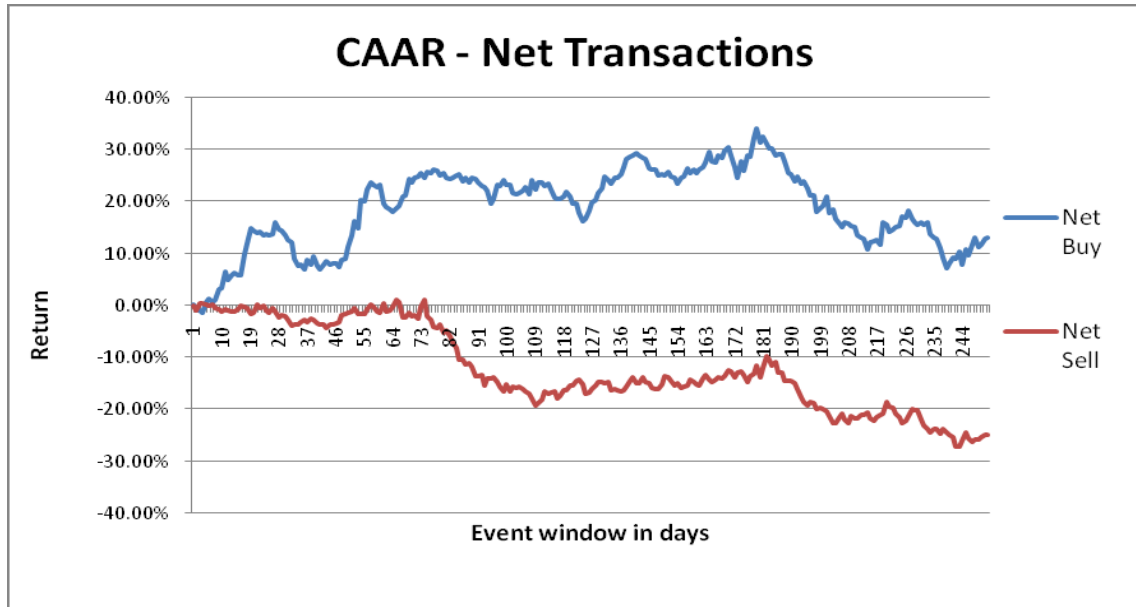
Figure 6.7 shows the results of all the different Buy and Sell Transactions. The type of transactions are then analysed as pairs.

Figure 6.7 All transaction types



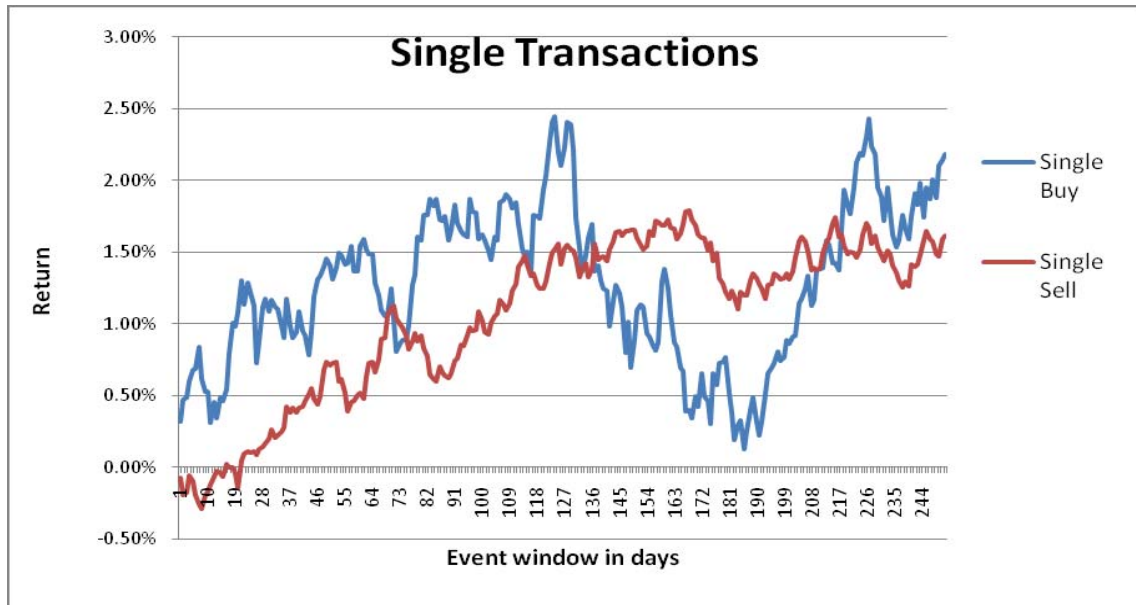
The 2 lines for Net Sell and Net Buy immediately stand out as the two lines with the highest amplitude. Figure 6.8 displays only these two lines.

Figure 6.8 CAAR - Net Buy and Net Sell



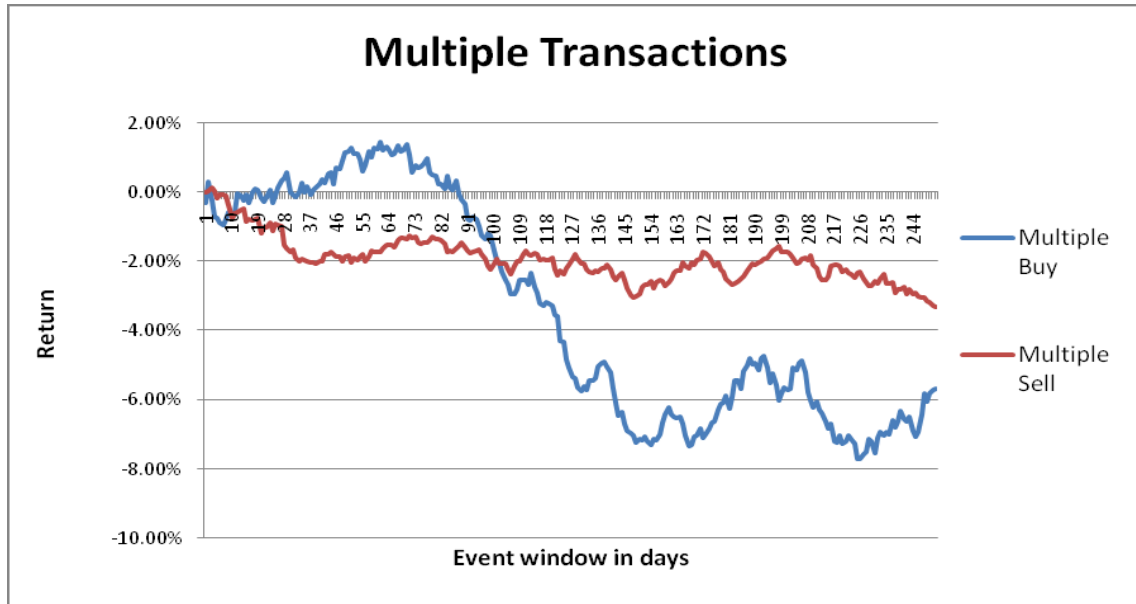
The statistically significant positive abnormal return of 34.09% achieved by Net Buy on day 179 is the highest abnormal return observed in the entire sample. The abnormal return achieved by Net Buy is positive for all days except the holding periods of day 2 – 4. The positive returns of over 7% achieved after day 34 through to day 252 are all statistically significant. It should, however, be noted that there were only four Net Buying events in the entire sample. Net Sell with seven events in the entire sample show a very different pattern – with negative abnormal returns being observed from days 8 – 252.

Figure 6.9 CAARs - Single Buy and Single Sell



With the exception of holding periods of day 1 – 20 for Single sell transactions, the abnormal return on Single Buy and Sell transactions are positive. From day 22 to day 252 the positive abnormal returns for Single Sell transactions are statistically significant with a peak of 1.79% on day 168. Single Buy transactions have a positive abnormal return from day 1 to a statistically significant high of 2.44% on day 124 and 2.43% on day 227.

Figure 6.10 CAARs - Multiple Buy and Multiple Sell



Both Multiple transactions have a downward trend. Multiple Buy transactions have a negative abnormal return from day 1 to day 17; it is briefly positive but only the positive return of 0.08% on day 19 is statistically significant. There is then a positive trend for holding periods of day 34 to day 87 with a statistically significant positive return of 1.45% on day 61. From day 88 the abnormal return is then negative for the remaining holding periods. Multiple Sell transactions have a statistically insignificant positive return until day 4 and then have a negative abnormal return for the rest of the holding periods.

## 7 CONCLUSION

This study reviewed the Insider Trading Act of 1998 and the JSE listing requirements to determine who is an insider and what is legal and illegal insider trading. Directors' are allowed to legally trade in the shares of companies on whose boards they sit as long as the information on which the trades are made is in the public domain; further to this directors' have to disclose their trades, within 24 hours, to the JSE which publishes this information on SENS.

Trading days from 1 April 2002 to 31 March 2008 (1501 days in total) were analysed for director trades. Only the first trading day of the week was taken into account and all subsequent trading days for that company in that week was excluded. In total 1439 event days were analysed and the abnormal returns for the event day to day 252 in the future was calculated. The results of the abnormal returns, average abnormal returns and cumulative abnormal returns were presented in Chapter 6. The significance of the cumulative average abnormal return was then calculated at a 5% significance level and presented.

The most substantial contribution made by this study is that it seems to be the only South African study that took into account data across six years of trading days in conjunction with the new laws that require directors' to disclose their trades within 24 hours.

While the results of this study are in line with international studies, the magnitude of the abnormal director returns was not as great as most international studies. However the two similar studies identified on the JSE, Mordant and Muller (2003) and Adebowale (2005) have corresponding results. It was therefore concluded that South African directors' do experience abnormal returns but not at the levels experienced by their international counterparts.

As suggested by this research study, insider trading while illegal, still continues to happen. However the abnormal returns achieved by directors' do not seem to be excessive. The results of this study show that insider trading is hard to measure and prove. The first conviction for insider trading on the JSE only occurred in 2007, and that after a lengthy court case. The Insider Trading Act of 1998 and this conviction could serve as a strong deterrent to insider trading in South Africa.

The results of the study also suggest that the South African market follows the semi-strong form efficient market hypothesis in that abnormal returns achieved by directors' are not excessive.

Insider trading and the abnormal returns achieved by directors on the JSE is a field that deserves further research. The following future research suggestions are offered:

- All director transactions for all listed companies should be analysed for abnormal returns over an extended period;

- The effect of a directors' trade relative to the volume traded versus the volume held by the director;
- Insider trading in derivatives and the abnormal returns achieved.

While this study has shown limited positive abnormal returns for directors trades, it has shown statistically significant positive abnormal returns. A prospective investor would do well to take into account how directors' are trading in the shares of companies the investor is interested in, as well as in the fundamentals of the company. Investors in companies cannot merely use directors' trades as a proxy for a sound investment strategy.



## 8 REFERENCES

- Adebowale, E. (2006) Unpublished Masters of Business Administration thesis. *An analysis of directors' share dealings on shares listed on the Johannesburg stock exchange and the effect on share prices: a five year case study*. Master of Business Administration. University of Pretoria.
- Aktas, N., de Bodt, E., Riachi, I. & de Smedt, J. (2007) Legal insider trading and stock market reaction: Evidence from the Netherlands. *Universit  catholique de Louvain*, Core Discussion Paper, 2007/67.
- Aktas, N., de Bodt, E. & Van Oppens, H. (2007) Evidence on the contribution of legal insider trading to market efficiency. *Universit  catholique de Louvain*, Core Discussion Paper, 2007/14.
- Atallah, Z. & El Amrani, N. (2008) Follow the insider: an event study on the impact of insider transactions. [Internet] Available from <http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-5965> (accessed 01/11/2008).
- Ausubel, L.M. (1990) Insider trading in a rational expectations economy. *The American Economic Review*, 80(5), 1022 –1041.
- Benesh, G.A. & Pari, R.A. (1987) Performance of stocks recommended on the basis of insider trading activity. *The Financial Review*. 22(1), 145 – 158.
- Bajo, E. & Petracchi, B. (2006) Do what insiders do. *Studies in Economy and Finance*, 23(2), 94 – 118.
- Benston, G.J. (1982) Accounting numbers and economic values. *Antitrust Bulletin*, 27, 39, 161 – 215.
- Bernhardt, D., Hollifield, B. & Hughson, E. (1995) Investment and insider trading. *The Review of Financial Services*, 8(2), 501 – 543.
- Bettis, C., Vickrey, D. & Vickrey, D.W. (1997) Mimickers of corporate insiders who make large volume trades. *Financial Analysts Journal*, 53, 57 - 66.
- Bris, A. (2005) Do insider trading laws work? *European Financial Management*, 11(3), 267 – 312.

- Cook, D.O. & Huabing, B. (2007) Insiders' informative trading: Evidence from multi-company directors [Internet] Available from [http://www.fma.org/Orlando/Papers/Insidersnn\\_Informative\\_Trading.pdf](http://www.fma.org/Orlando/Papers/Insidersnn_Informative_Trading.pdf) (accessed 20/06/2008).
- Dimson, E. & Mussavian, M. (2000) Market efficiency. *The Current State of Business Disciplines*, 3, 959 – 970.
- Du, J. & Wei, S. (2004) Does insider trading raise market volatility? *The Economic Journal*, 114(October), 916 – 942.
- Fama, E. (1970) Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25, 383 – 417.
- Fidrmuc, J.P., Goergen, M. & Renneboog, L. (2004) Directors' Share Dealings and Corporate Control. [Internet]. Available from <http://www.ipeg.org.uk/papers/Goergen%20revised%20version.pdf> (accessed 25/07/2008).
- Financial Services Board (FSB) (2004) *The impact of South Africa's insider trading regime*. Johannesburg: FSB. Summary at <ftp://ftp.fsb.co.za/public/insider/activities.pdf> (accessed 21 September 2008).
- Finnerty, J.E. (1976) Insiders and market efficiency. *Journal of Finance*, 31, 1141 – 1148.
- Fishman, M.J. & Hagerty, K.M. (1992) Insider trading and efficiency of stock prices. *Rand Journal of Economics*, 23(1), 106 – 122.
- Givoly, D. & Palmon, D. (1985) Insider trading and the exploitation of inside information: some empirical evidence. *The Journal of Business*, 58(1), 69 – 87.
- Gregory, A., Matatko, M. & Tonks, I. (1996) Detecting Information from directors' trades: signal definition and variable size effects. *Journal of Business Finance & Accounting*, 24, 309 – 341.
- Hogan, W.P. (1989) Insider trading: implications and responses. *ABACUS*, 25(2), 85 – 96.
- Hsieh, J., Ng, L.. & Wang, Q. (2005) Analysts recommendations and insider trading [Internet]. Available from

[http://www.american.edu/academic.depts/ksb/finance\\_realestate/mrobe/Seminar/Hsieh.pdf](http://www.american.edu/academic.depts/ksb/finance_realestate/mrobe/Seminar/Hsieh.pdf) (accessed 25/05/2008).

Hubbard, R. & Armstrong, J.S. (1994) Replication and extensions in marketing: rarely published but quite contrary. *International Journal of Research Marketing*, 11: 233 - 248.

Huddart, S., Hughes, J.S. & Levine, C.B. (2001) Public disclosure and the dissemination of insider trades. *Econometrica*, 69(3), 665 – 681.

Huddart, S., Ke, B. & Shi, C. (2007) Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings. *Journal of Accounting and Economics*. 43, 3 – 36.

Friederich, S., Gregory, A., Matatko, J. & Tonks, I. (2002) Short-run returns around the trades of corporate insiders on the London Stock Exchange. *European Financial Management*, 8(1), 7 – 30.

Insider Trading Act (1998) Republic of South Africa Government Gazette, 402(19546).

Jaffe, J.F. (1974) Special information and insider trading. *Journal of Business*, 47, 410 – 428.

Jeng, L., Metrick, A. & Zeckhauser, R. (2003) The profits to insider trading: A performance evaluation perspective. *Review of Economics and Statistics*, 85, 453 – 471.

JSE Securities Exchange. (2000) Dealing in Securities by directors of listed companies. *JSE Securities Exchange Listing Requirements*.

Ke, B., Huddart, S. & Petroni, K. (2003) What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of Accounting and Economics*. 35, 315 – 346.

Lakonishok, J. & Lee, I. (2001) Are insider trades informative? *The Review of Financial Studies*, 14(1), 79-111.

Lin, J. & Howe, J. (1990) Insider trading in the OTC market. *Journal of Finance*, 45, 1273 – 1284.

Mafu, T. (2008) Brokers brace for online share trading [Internet]. Johannesburg: Business Report. Available from

<http://www.busrep.co.za/index.php?fSectionId=&fArticleId=4232228> (accessed 01/06/2008).

Masson, R.T. & Madhavan, A. (1991) Insider trading and the value of the firm. *The Journal of Industrial Economics*, 39(4), 333 – 353.

McWilliams, A. & Siegel, D. (1997) Event studies in management research: theoretical and empirical issues. *The Academy of Management Journal*, 40(3), 626 – 657.

Mordant, N. & Muller, C. (2003) Profitability of directors' share dealings on the JSE. *Investment Analysts Journal*, 57, 17 – 32.

Rozeff, M.S. & Zaman, M.A. (1988) Market efficiency and insider trading: new evidence. *The Journal of Business*, 61(1), 25 – 44.

Seyhun, H.N. (1986) Insiders' profits, costs of trading, and market efficiency. *Journal of Financial Economics*, 16, 189 – 212.

Seyhun, H.N. (1988) The information content of aggregate insider trading. *The Journal of Business*, 61(1), 1 – 24.

Seyhun, H.N. (1990) Over-reaction or fundamentals: some lessons from insiders' response to the market crash of 1987. *Journal of Finance*, 45, 197-226.

Udpa, S.C. (1996) Insider trading and the information content of earnings. *Journal of Business Finance & Accounting*, 23(8), 1069 – 1095.

## APPENDICES

### Appendix 1 – List of companies analysed

KEY	Company Name	KEY	Company Name
ATN	ALLIED ELECTRONICS CORP	JDG	JD GROUP LTD
BEL	BELL EQUIPMENT LTD	LGL	LIBERTY GROUP LTD
ABL	AFRICAN BANK INVESTMENTS	MAF	MUTUAL AND FEDERAL INS
ACL	ARCELORMITTAL SA LTD	MDC	MEDI-CLINIC CORP LTD ORD
AEG	AVENG LTD	MET	METROPOLITAN HLDGS LTD
AFE	A E C I LTD ORD	MPC	MR PRICE GROUP LTD
AFX	AFRICAN OXYGEN LTD ORD	MRF	MERAFE RESOURCES LTD
AGL	ANGLO AMERICAN PLC	MSM	MASSMART HOLDINGS LTD
ALT	ALLIED TECHNOLOGIES	MTN	MTN GROUP LTD
AMS	ANGLO PLATINUM LTD	MUR	MURRAY AND ROBERTS H ORD
ANG	ANGLOGOLD ASHANTI LTD	MVL	MVELAPHANDA RESOURCES LD
APN	ASPEN PHARMACARE HLDGS.	NCL	NEW CLICKS HLDGS LTD
ARI	AFRICAN RAINBOW MINERALS	NED	NEDBANK GROUP LTD
ASA	ABSA GROUP LIMITED	NHM	NORTHAM PLATINUM LTD
ASR	ASSORE LTD	NPK	NAMPAK LTD ORD
AVI	AVI LTD	NPN	NASPERS LTD -N-
BAW	BARLOWORLD LTD	NTC	NETCARE LIMITED
BIL	BHP BILLITON PLC	OML	OLD MUTUAL PLC
BVT	BIDVEST LTD ORD	PIK	PIK N PAY STORES LTD
DDT	DIMENSION DATA HLDGS PLC	PWK	PIK N PAY HOLDINGS LTD
DRD	DRDGOLD LTD	REM	REMGRO LTD
DST	DISTELL GROUP LTD	RLO	REUNERT ORD
DSY	DISCOVERY HOLDINGS LTD	RMH	RMB HOLDINGS LTD
DTC	DATATEC LTD	SAP	SAPPI LTD
EXX	EXXARO RESOURCES LTD	SBK	STANDARD BANK GROUP LTD
FOS	FOSCHINI LTD ORD	SHF	STEINHOFF INTERNTL HLDGS
FSR	FIRSTRAND LTD	SHP	SHOPRITE HLDGS LTD ORD
GFI	GOLD FIELDS LTD	SLM	SANLAM LTD
GRT	GROWTHPOINT PROP LTD	SNT	SANTAM LTD
HAR	HARMONY G M CO LTD	SOL	SASOL LTD
HCI	HOSKEN CONS INVEST LTD	SUI	SUN INTERNATIONAL LTD
HVL	HIVELD STEEL AND VANADUM	TBS	TIGER BRANDS LTD ORD
ILV	ILLOVO SUGAR LTD	TON	TONGAAT HULETT LTD
IMP	IMPALA PLATINUM HLGS LD	TRE	TRENCOR LTD
INL	INVESTEC LTD	TRU	TRUWORTHS INTERNATIONAL
IPL	IMPERIAL HOLDINGS LTD	WHL	WOOLWORTHS HOLDINGS LTD

## Appendix 2 – Beta value of companies analysed

KEY	Company Name	20020102	20030102	20040102	20050103	20060103	20070102	20080102
ABL	AFRICAN BANK INVESTMENTS	1.34698	1.17709	0.64826	0.43308	0.51074	0.70836	0.68009
ACL	ARCELORMITTAL SA LTD	0.72004	0.68167	1.15802	0.64676	0.46215	1.09893	1.22093
AEG	AVENG LTD	0.60498	0.59744	0.48877	0.43639	0.28974	0.54921	0.60713
AFE	A E C I LTD ORD	0.77249	0.80914	0.76177	0.67099	0.62351	0.63522	0.65802
AFX	AFRICAN OXYGEN LTD ORD	0.70462	0.70705	0.68484	0.54588	0.48956	0.60767	0.52487
AGL	ANGLO AMERICAN PLC	0.98268	0.94018	1.39607	1.53341	1.55124	1.32795	1.36
ALT	ALLIED TECHNOLOGIES	0.85021	0.87249	0.37759	0.62924	0.5659	0.66746	0.4834
AMS	ANGLO PLATINUM LTD	0.49666	0.52135	1.44187	1.69141	1.71483	1.55881	1.68893
ANG	ANGLOGOLD ASHANTI LTD	0.58645	0.45106	0.77935	0.94211	1.02339	1.24706	1.15282
APN	ASPEN PHARMACARE HLDGS.	1.04467	1.15068	0.90585	0.28192	0.30637	0.37753	0.44847
ARI	AFRICAN RAINBOW MINERALS	0.71467	0.58609	0.70589	0.76762	1.02352	1.37465	1.60643
ASA	ABSA GROUP LIMITED	1.23757	1.2126	0.67775	0.65189	0.53286	0.6817	0.60483
ASR	ASSORE LTD	0.22515	0.17018	0.02381	-0.01233	0.01868	0.10638	0.1117
ATN	ALLIED ELECTRONICS CORP	0.85974	0.87241	0.56101	0.48684	0.39946	0.56558	0.59785
AVI	AVI LTD	0.67305	0.55754	0.23818	0.51997	0.45792	0.71149	0.83365
BAW	BARLOWORLD LTD	1.20439	1.1973	0.83817	0.5911	0.53057	0.73458	0.69287
BEL	BELL EQUIPMENT LTD	0.49607	0.49833	0.83123	0.71844	0.47716	0.37093	0.46572
BIL	BHP BILLITON PLC	0.86127	0.87124	1.28746	1.10296	1.12047	1.17576	1.37645
BVT	BIDVEST LTD ORD	0.82158	0.86243	0.68204	0.47649	0.38761	0.51996	0.4992
DDT	DIMENSION DATA HLDGS PLC	1.19551	1.40261	1.95629	2.37817	2.52116	2.28415	1.55776
DRD	DRDGOLD LTD	0.33873	0.20855	0.60899	1.30428	1.3848	1.73772	1.81084
DST	DISTELL GROUP LTD	0.46727	0.51197	0.62389	0.41507	0.38561	0.66233	0.53605
DSY	DISCOVERY HOLDINGS LTD	0.17315	0.25999	0.3579	0.56423	0.57248	0.80795	0.72852
DTC	DATATEC LTD	1.72115	1.91205	2.39985	2.45181	2.44155	1.94501	1.34397
EXX	EXXARO RESOURCES LTD	1.0265	1.33978	1.26917	1.39504	1.29296	1.32315	1.34462
FOS	FOSCHINI LTD ORD	1.06996	0.97778	0.66755	0.50405	0.41945	0.62009	0.64404
FSR	FIRSTSTRAND LTD	1.21885	1.23815	0.54274	0.55826	0.58422	0.68888	0.6035
GFI	GOLD FIELDS LTD	0.61187	0.67016	1.37109	1.27065	1.37202	1.66527	1.66207
GRT	GROWTHPOINT PROP LTD	0.21467	0.20526	-0.00602	0.2456	0.30532	0.3717	0.38368
HAR	HARMONY G M CO LTD	0.78545	0.69	1.23799	1.30233	1.46654	1.97984	2.09282
HCI	HOSKEN CONS INVEST LTD	0.94927	0.89968	0.26592	1.06326	0.86366	1.01797	0.81668
HVL	HIVELD STEEL AND VANADIUM	1.10595	1.0705	0.86487	1.01364	1.03989	1.00887	1.07595
ILV	ILLOVO SUGAR LTD	0.81815	0.83714	0.78862	0.71768	0.66315	0.54478	0.74251
IMP	IMPALA PLATINUM HLGS LD	0.84429	0.80151	1.60582	1.69854	1.66571	1.36185	1.55697
INL	INVESTEC LTD	1.0067	1.08265	0.86055	0.95018	1.00104	1.02217	1.0454
IPL	IMPERIAL HOLDINGS LTD	0.78408	0.78162	0.5671	0.57101	0.44356	0.61981	0.5621
JDG	JD GROUP LTD	0.91729	0.86447	0.52196	0.44391	0.33185	0.44486	0.47492
LGL	LIBERTY GROUP LTD	0.64287	0.60606	0.27255	0.50754	0.39454	0.6129	0.5232
MAF	MUTUAL AND FEDERAL INS	0.78841	0.7822	0.47803	0.40143	0.32464	0.49855	0.3518
MDC	MEDI-CLINIC CORP LTD ORD	0.91748	0.84457	0.28768	0.36838	0.24373	0.39524	0.47495



MET	METROPOLITAN HLDGS LTD	1.07677	1.22243	1.02158	0.57284	0.46489	0.61569	0.58681
MPC	MR PRICE GROUP LTD	0.90683	0.86352	1.01394	0.48297	0.43546	0.73596	0.78329
MRF	MERAFE RESOURCES LTD	0.34363	0.35757	0.60383	0.7403	0.67983	0.41911	0.78709
MSM	MASSMART HOLDINGS LTD	0.16957	0.30275	0.44996	0.20037	0.19401	0.40162	0.60379
MTN	MTN GROUP LTD	1.61151	1.62621	1.06266	0.73088	0.80728	0.80246	0.7203
MUR	MURRAY AND ROBERTS H ORD	0.60848	0.60829	0.62315	0.32373	0.10426	0.4641	0.49172
MVL	MVELAPHANDA RESOURCES LD	0.60985	0.5696	0.57453	0.71407	0.91381	1.22079	1.40322
NCL	NEW CLICKS HLDGS LTD	1.06295	1.03021	0.59963	0.45755	0.41069	0.60798	0.65897
NED	NEDBANK GROUP LTD	1.01034	1.03282	0.61163	0.46209	0.45823	0.50416	0.45315
NHM	NORTHAM PLATINUM LTD	0.39311	0.31634	1.68625	1.70452	1.55509	1.30071	1.45856
NPK	NAMPAK LTD ORD	1.22122	1.18299	0.58729	0.32485	0.29867	0.52251	0.60758
NPN	NASPERS LTD -N-	1.31859	1.31298	1.26225	1.31614	1.32502	1.14414	1.0292
NTC	NETCARE LIMITED	1.37988	1.35983	0.83995	0.52808	0.5038	0.62487	0.5428
OML	OLD MUTUAL PLC	0.7763	0.79936	0.78421	0.72726	0.72029	0.85286	0.85303
PIK	PIK N PAY STORES LTD	0.90006	0.89851	0.37902	0.21869	0.22475	0.38886	0.3214
PWK	PIK N PAY HOLDINGS LTD	0.94422	0.91372	0.45572	0.23537	0.27211	0.52688	0.50864
REM	REMGRO LTD	0.18158	0.26841	0.3263	0.41347	0.44715	0.53635	0.49247
RLO	REUNERT ORD	1.15974	1.07629	0.59442	0.72154	0.58302	0.67865	0.65088
RMH	RMB HOLDINGS LTD	1.23411	1.29903	0.6848	0.55215	0.53971	0.5907	0.51195
SAP	SAPPI LTD	1.2409	1.30953	1.38385	1.05498	0.83639	0.85026	0.89868
SBK	STANDARD BANK GROUP LTD	1.21782	1.30835	0.7454	0.58313	0.48515	0.59746	0.53299
SHF	STEINHOFF INTERNTL HLDGS	0.38838	0.43059	0.73421	0.95535	0.93855	1.17073	1.12721
SHP	SHOPRITE HLDGS LTD ORD	0.72485	0.75203	0.27645	0.38433	0.38497	0.73687	0.71086
SLM	SANLAM LTD	0.61172	0.60014	0.62052	0.70154	0.68144	0.87355	0.78212
SNT	SANTAM LTD	0.89536	0.91054	0.62477	0.53536	0.57304	0.75064	0.76244
SOL	SASOL LTD	1.19427	1.28511	1.1018	0.64514	0.76204	0.97865	0.9616
SUI	SUN INTERNATIONAL LTD	0.80035	0.71862	0.65633	0.83034	0.74989	0.64171	0.64881
TBS	TIGER BRANDS LTD ORD	0.5733	0.55777	0.37419	0.44393	0.46785	0.70255	0.73771
TON	TONGAAT HULETT LTD	0.89813	0.86006	0.69775	0.66542	0.58635	0.96774	1.0375
TRE	TRENCOR LTD	0.75062	0.79453	0.96437	1.30647	0.72881	0.58801	0.37262
TRU	TRUWORTHS INTERNATIONAL	1.08699	1.02531	0.55149	0.55952	0.47283	0.70829	0.75336
WHL	WOOLWORTHS HOLDINGS LTD	0.90398	0.86886	0.61677	0.7044	0.51758	0.60828	0.69938

### Appendix 3 – Buy CAARs and Hypothesis testing

Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
1	0.16%	Accept	0.32%	Accept	-0.31%	Accept	0.11%	Accept
2	0.41%	Reject	0.47%	Reject	0.28%	Accept	-0.88%	Accept
3	0.28%	Reject	0.49%	Reject	-0.26%	Accept	-1.12%	Accept
4	0.25%	Reject	0.60%	Reject	-0.72%	Accept	-1.48%	Accept
5	0.33%	Reject	0.68%	Reject	-0.74%	Accept	0.58%	Accept
6	0.32%	Reject	0.69%	Reject	-0.87%	Accept	1.28%	Reject
7	0.40%	Reject	0.84%	Reject	-0.96%	Accept	0.46%	Accept
8	0.29%	Reject	0.62%	Reject	-0.78%	Accept	0.97%	Reject
9	0.30%	Reject	0.53%	Reject	-0.58%	Accept	3.04%	Reject
10	0.28%	Reject	0.53%	Reject	-0.66%	Accept	3.17%	Reject
11	0.17%	Accept	0.31%	Accept	-0.58%	Accept	6.49%	Reject
12	0.38%	Reject	0.45%	Reject	-0.05%	Accept	4.95%	Accept
13	0.30%	Reject	0.34%	Reject	-0.12%	Accept	5.69%	Reject
14	0.38%	Reject	0.49%	Reject	-0.23%	Accept	6.17%	Reject
15	0.39%	Reject	0.46%	Reject	-0.08%	Accept	5.67%	Reject
16	0.40%	Reject	0.55%	Reject	-0.32%	Accept	5.88%	Reject
17	0.71%	Reject	0.79%	Reject	-0.01%	Accept	9.91%	Reject
18	0.93%	Reject	1.01%	Reject	0.10%	Accept	11.93%	Reject
19	0.94%	Reject	0.98%	Reject	0.08%	Reject	14.93%	Reject
20	0.95%	Reject	1.08%	Reject	-0.17%	Accept	14.38%	Reject
21	1.09%	Reject	1.30%	Reject	-0.26%	Accept	14.03%	Reject
22	1.00%	Reject	1.14%	Reject	-0.13%	Accept	14.11%	Reject
23	1.14%	Reject	1.28%	Reject	0.05%	Accept	13.54%	Reject
24	1.00%	Reject	1.22%	Reject	-0.32%	Accept	13.66%	Reject
25	0.98%	Reject	1.12%	Reject	-0.11%	Accept	13.55%	Reject
26	0.75%	Reject	0.72%	Reject	0.13%	Accept	13.60%	Reject
27	0.94%	Reject	0.88%	Reject	0.35%	Reject	15.88%	Reject
28	1.11%	Reject	1.12%	Reject	0.39%	Reject	14.57%	Reject
29	1.19%	Reject	1.17%	Reject	0.56%	Reject	14.47%	Reject
30	0.96%	Reject	1.08%	Reject	-0.01%	Accept	13.43%	Reject
31	1.00%	Reject	1.17%	Reject	-0.07%	Accept	12.57%	Reject
32	0.94%	Reject	1.12%	Reject	-0.14%	Accept	12.17%	Reject
33	0.91%	Reject	1.10%	Reject	-0.02%	Accept	9.02%	Accept
34	0.88%	Reject	0.99%	Reject	0.27%	Accept	7.65%	Reject
35	0.75%	Reject	0.90%	Reject	0.01%	Accept	7.76%	Reject
36	0.97%	Reject	1.17%	Reject	0.15%	Accept	7.01%	Reject
37	0.80%	Reject	0.98%	Reject	-0.08%	Accept	8.78%	Reject
38	0.76%	Reject	0.90%	Reject	0.05%	Accept	7.83%	Reject
39	0.84%	Reject	0.94%	Reject	0.13%	Reject	9.34%	Reject
40	0.94%	Reject	1.08%	Reject	0.22%	Reject	7.65%	Reject





Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
41	0.87%	Reject	0.95%	Reject	0.37%	Reject	6.90%	Reject
42	0.83%	Reject	0.92%	Reject	0.25%	Reject	7.87%	Reject
43	0.80%	Reject	0.78%	Reject	0.55%	Reject	8.43%	Reject
44	0.93%	Reject	0.95%	Reject	0.57%	Reject	7.91%	Reject
45	1.02%	Reject	1.19%	Reject	0.24%	Accept	8.02%	Reject
46	1.23%	Reject	1.31%	Reject	0.71%	Reject	7.94%	Reject
47	1.23%	Reject	1.33%	Reject	0.67%	Reject	7.42%	Reject
48	1.36%	Reject	1.40%	Reject	0.92%	Reject	8.70%	Reject
49	1.45%	Reject	1.45%	Reject	1.13%	Reject	8.94%	Reject
50	1.46%	Reject	1.41%	Reject	1.17%	Reject	11.10%	Reject
51	1.45%	Reject	1.31%	Reject	1.29%	Reject	13.39%	Reject
52	1.50%	Reject	1.39%	Reject	1.12%	Reject	16.09%	Reject
53	1.56%	Reject	1.49%	Reject	1.11%	Reject	14.72%	Reject
54	1.58%	Reject	1.48%	Reject	0.95%	Reject	20.33%	Reject
55	1.45%	Reject	1.41%	Reject	0.62%	Reject	20.05%	Reject
56	1.52%	Reject	1.42%	Reject	0.78%	Reject	22.31%	Reject
57	1.73%	Reject	1.54%	Reject	1.18%	Reject	23.61%	Reject
58	1.55%	Reject	1.36%	Reject	1.00%	Reject	23.31%	Reject
59	1.61%	Reject	1.37%	Reject	1.26%	Reject	22.72%	Reject
60	1.75%	Reject	1.54%	Reject	1.26%	Reject	23.21%	Reject
61	1.78%	Reject	1.59%	Reject	1.45%	Reject	19.68%	Reject
62	1.66%	Reject	1.52%	Reject	1.22%	Reject	18.90%	Reject
63	1.64%	Reject	1.48%	Reject	1.31%	Reject	18.38%	Reject
64	1.62%	Reject	1.48%	Reject	1.22%	Reject	18.02%	Reject
65	1.45%	Reject	1.28%	Reject	1.08%	Reject	18.59%	Reject
66	1.40%	Reject	1.20%	Reject	1.12%	Reject	19.04%	Reject
67	1.41%	Reject	1.10%	Reject	1.36%	Reject	20.93%	Reject
68	1.34%	Reject	1.05%	Reject	1.19%	Reject	21.23%	Reject
69	1.40%	Reject	1.07%	Reject	1.21%	Reject	24.34%	Reject
70	1.56%	Reject	1.25%	Reject	1.37%	Reject	23.60%	Reject
71	1.34%	Reject	1.03%	Reject	1.06%	Reject	24.64%	Reject
72	1.05%	Reject	0.80%	Reject	0.57%	Accept	24.82%	Reject
73	1.16%	Reject	0.86%	Reject	0.77%	Reject	25.45%	Reject
74	1.14%	Reject	0.88%	Reject	0.72%	Reject	24.55%	Reject
75	1.17%	Reject	0.89%	Reject	0.74%	Reject	25.69%	Reject
76	1.26%	Reject	0.99%	Reject	0.79%	Reject	25.56%	Reject
77	1.51%	Reject	1.27%	Reject	0.98%	Reject	26.20%	Reject
78	1.47%	Reject	1.34%	Reject	0.57%	Accept	26.04%	Reject
79	1.63%	Reject	1.61%	Reject	0.52%	Reject	24.97%	Reject
80	1.60%	Reject	1.58%	Reject	0.46%	Reject	25.48%	Reject



Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
81	1.65%	Reject	1.75%	Reject	0.21%	Accept	24.67%	Reject
82	1.66%	Reject	1.76%	Reject	0.24%	Reject	24.39%	Reject
83	1.70%	Reject	1.87%	Reject	0.08%	Accept	24.53%	Reject
84	1.77%	Reject	1.82%	Reject	0.47%	Accept	25.01%	Reject
85	1.72%	Reject	1.87%	Reject	0.12%	Accept	25.31%	Reject
86	1.58%	Reject	1.73%	Reject	0.04%	Accept	23.83%	Reject
87	1.65%	Reject	1.71%	Reject	0.33%	Accept	24.58%	Reject
88	1.57%	Reject	1.75%	Reject	-0.04%	Accept	23.58%	Reject
89	1.41%	Reject	1.58%	Reject	-0.22%	Accept	24.56%	Reject
90	1.43%	Reject	1.66%	Reject	-0.33%	Accept	24.26%	Reject
91	1.44%	Reject	1.83%	Reject	-0.78%	Accept	23.75%	Reject
92	1.33%	Reject	1.70%	Reject	-0.82%	Accept	23.09%	Reject
93	1.31%	Reject	1.64%	Reject	-0.72%	Accept	22.69%	Reject
94	1.26%	Reject	1.62%	Reject	-0.79%	Accept	22.15%	Reject
95	1.17%	Reject	1.60%	Reject	-0.99%	Accept	19.70%	Reject
96	1.31%	Reject	1.87%	Reject	-1.24%	Accept	20.52%	Reject
97	1.26%	Reject	1.78%	Reject	-1.36%	Accept	23.28%	Reject
98	1.29%	Reject	1.77%	Reject	-1.19%	Accept	22.97%	Reject
99	1.15%	Reject	1.59%	Reject	-1.26%	Accept	24.02%	Reject
100	1.05%	Reject	1.62%	Reject	-1.70%	Accept	23.30%	Reject
101	0.95%	Reject	1.58%	Reject	-1.97%	Accept	23.27%	Reject
102	0.86%	Reject	1.51%	Reject	-2.02%	Accept	21.60%	Reject
103	0.74%	Reject	1.45%	Reject	-2.32%	Accept	21.51%	Reject
104	0.80%	Reject	1.60%	Reject	-2.55%	Accept	21.74%	Reject
105	0.76%	Reject	1.58%	Reject	-2.68%	Accept	22.05%	Reject
106	0.89%	Reject	1.84%	Reject	-2.95%	Accept	22.74%	Reject
107	0.89%	Reject	1.86%	Reject	-2.94%	Accept	21.41%	Reject
108	0.98%	Reject	1.90%	Reject	-2.83%	Accept	24.09%	Reject
109	1.01%	Reject	1.87%	Reject	-2.55%	Accept	22.37%	Reject
110	0.97%	Reject	1.80%	Reject	-2.55%	Accept	23.59%	Reject
111	1.01%	Reject	1.85%	Reject	-2.54%	Accept	23.60%	Reject
112	0.85%	Reject	1.69%	Reject	-2.68%	Accept	23.05%	Reject
113	0.82%	Reject	1.53%	Reject	-2.35%	Accept	23.46%	Reject
114	0.66%	Reject	1.47%	Reject	-2.75%	Accept	22.24%	Reject
115	0.62%	Reject	1.50%	Reject	-2.91%	Accept	20.73%	Reject
116	0.42%	Reject	1.35%	Reject	-3.22%	Accept	20.50%	Reject
117	0.70%	Reject	1.76%	Reject	-3.29%	Accept	20.45%	Reject
118	0.73%	Reject	1.75%	Reject	-3.18%	Accept	20.87%	Reject
119	0.72%	Reject	1.74%	Reject	-3.23%	Accept	21.78%	Reject
120	0.84%	Reject	1.93%	Reject	-3.28%	Accept	20.91%	Reject



Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
121	0.82%	Reject	2.03%	Reject	-3.54%	Accept	19.69%	Reject
122	0.97%	Reject	2.26%	Reject	-3.57%	Accept	19.61%	Reject
123	0.87%	Reject	2.40%	Reject	-4.31%	Accept	17.84%	Reject
124	0.87%	Reject	2.44%	Reject	-4.33%	Accept	16.18%	Reject
125	0.55%	Reject	2.19%	Reject	-4.84%	Accept	16.55%	Reject
126	0.46%	Reject	2.10%	Reject	-5.07%	Accept	18.25%	Reject
127	0.50%	Reject	2.23%	Reject	-5.35%	Accept	19.82%	Reject
128	0.62%	Reject	2.40%	Reject	-5.38%	Accept	20.19%	Reject
129	0.57%	Reject	2.39%	Reject	-5.66%	Accept	21.66%	Reject
130	0.42%	Reject	2.21%	Reject	-5.77%	Accept	22.48%	Reject
131	0.16%	Accept	1.74%	Reject	-5.62%	Accept	24.91%	Reject
132	-0.03%	Accept	1.53%	Reject	-5.74%	Accept	24.21%	Reject
133	-0.09%	Accept	1.37%	Reject	-5.45%	Accept	23.35%	Reject
134	0.01%	Accept	1.47%	Reject	-5.46%	Accept	24.55%	Reject
135	0.11%	Accept	1.59%	Reject	-5.39%	Accept	24.48%	Reject
136	0.29%	Reject	1.69%	Reject	-5.03%	Accept	25.21%	Reject
137	0.10%	Accept	1.37%	Reject	-4.93%	Accept	26.55%	Reject
138	0.16%	Reject	1.41%	Reject	-4.91%	Accept	28.13%	Reject
139	0.06%	Accept	1.30%	Reject	-5.05%	Accept	28.63%	Reject
140	-0.01%	Accept	1.25%	Reject	-5.20%	Accept	28.92%	Reject
141	-0.15%	Accept	1.23%	Reject	-5.69%	Accept	29.36%	Reject
142	-0.45%	Accept	0.98%	Reject	-6.11%	Accept	28.91%	Reject
143	-0.41%	Accept	1.16%	Reject	-6.46%	Accept	28.35%	Reject
144	-0.31%	Accept	1.27%	Reject	-6.35%	Accept	28.16%	Reject
145	-0.46%	Accept	1.22%	Reject	-6.70%	Accept	26.32%	Reject
146	-0.59%	Accept	1.11%	Reject	-6.90%	Accept	26.11%	Reject
147	-0.84%	Accept	0.80%	Reject	-6.97%	Accept	26.24%	Reject
148	-0.72%	Accept	1.01%	Reject	-7.03%	Accept	25.06%	Reject
149	-1.01%	Accept	0.69%	Reject	-7.24%	Accept	25.26%	Reject
150	-0.85%	Accept	0.88%	Reject	-7.15%	Accept	24.94%	Reject
151	-0.69%	Accept	1.09%	Reject	-7.18%	Accept	25.77%	Reject
152	-0.65%	Accept	1.13%	Reject	-7.08%	Accept	24.70%	Reject
153	-0.69%	Accept	1.12%	Reject	-7.19%	Accept	24.55%	Reject
154	-0.88%	Accept	0.94%	Reject	-7.31%	Accept	23.43%	Reject
155	-0.83%	Accept	0.91%	Reject	-7.14%	Accept	24.60%	Reject
156	-0.89%	Accept	0.84%	Reject	-7.17%	Accept	24.81%	Reject
157	-0.85%	Accept	0.81%	Reject	-7.02%	Accept	26.40%	Reject
158	-0.73%	Accept	0.87%	Reject	-6.66%	Accept	25.55%	Reject
159	-0.35%	Accept	1.30%	Reject	-6.43%	Accept	26.08%	Reject
160	-0.25%	Accept	1.38%	Reject	-6.22%	Accept	25.53%	Reject



Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
161	-0.39%	Accept	1.24%	Reject	-6.43%	Accept	26.21%	Reject
162	-0.53%	Accept	1.06%	Reject	-6.50%	Accept	26.72%	Reject
163	-0.67%	Accept	0.87%	Reject	-6.53%	Accept	27.56%	Reject
164	-0.66%	Accept	0.84%	Reject	-6.50%	Accept	29.49%	Reject
165	-0.84%	Accept	0.69%	Reject	-6.70%	Accept	27.72%	Reject
166	-0.95%	Accept	0.67%	Reject	-7.05%	Accept	27.57%	Reject
167	-1.22%	Accept	0.39%	Reject	-7.36%	Accept	28.88%	Reject
168	-1.20%	Accept	0.40%	Reject	-7.31%	Accept	28.33%	Reject
169	-1.17%	Accept	0.34%	Reject	-7.08%	Accept	29.83%	Reject
170	-1.04%	Accept	0.49%	Reject	-7.05%	Accept	30.55%	Reject
171	-1.06%	Accept	0.42%	Reject	-6.84%	Accept	28.95%	Reject
172	-0.99%	Accept	0.65%	Reject	-7.12%	Accept	26.58%	Reject
173	-1.10%	Accept	0.49%	Reject	-7.00%	Accept	24.49%	Reject
174	-1.05%	Accept	0.46%	Reject	-6.84%	Accept	27.67%	Reject
175	-1.15%	Accept	0.30%	Reject	-6.67%	Accept	25.91%	Reject
176	-0.83%	Accept	0.66%	Reject	-6.63%	Accept	28.89%	Reject
177	-0.81%	Accept	0.57%	Reject	-6.29%	Accept	28.71%	Reject
178	-0.63%	Accept	0.73%	Reject	-6.13%	Accept	32.31%	Reject
179	-0.59%	Accept	0.73%	Reject	-6.09%	Accept	34.09%	Reject
180	-0.55%	Accept	0.76%	Reject	-5.89%	Accept	31.43%	Reject
181	-0.81%	Accept	0.52%	Reject	-6.28%	Accept	32.39%	Reject
182	-0.85%	Accept	0.38%	Reject	-5.92%	Accept	31.20%	Reject
183	-0.89%	Accept	0.19%	Accept	-5.44%	Accept	30.34%	Reject
184	-0.81%	Accept	0.29%	Reject	-5.44%	Accept	30.26%	Reject
185	-0.87%	Accept	0.32%	Reject	-5.68%	Accept	28.81%	Reject
186	-0.89%	Accept	0.13%	Accept	-5.18%	Accept	29.15%	Reject
187	-0.76%	Accept	0.25%	Reject	-5.01%	Accept	29.14%	Reject
188	-0.62%	Accept	0.40%	Reject	-4.82%	Accept	27.79%	Reject
189	-0.63%	Accept	0.48%	Reject	-4.99%	Accept	25.54%	Reject
190	-0.74%	Accept	0.32%	Reject	-4.95%	Accept	25.26%	Reject
191	-0.88%	Accept	0.22%	Reject	-5.16%	Accept	23.80%	Reject
192	-0.71%	Accept	0.32%	Reject	-4.82%	Accept	24.72%	Reject
193	-0.57%	Accept	0.51%	Reject	-4.75%	Accept	23.44%	Reject
194	-0.54%	Accept	0.65%	Reject	-5.09%	Accept	23.90%	Reject
195	-0.62%	Accept	0.70%	Reject	-5.51%	Accept	22.63%	Reject
196	-0.56%	Accept	0.73%	Reject	-5.25%	Accept	21.13%	Reject
197	-0.58%	Accept	0.81%	Reject	-5.57%	Accept	21.23%	Reject
198	-0.78%	Accept	0.74%	Reject	-6.04%	Accept	17.98%	Reject
199	-0.70%	Accept	0.76%	Reject	-5.81%	Accept	18.66%	Reject
200	-0.57%	Accept	0.88%	Reject	-5.65%	Accept	19.12%	Reject



Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
201	-0.58%	Accept	0.86%	Reject	-5.71%	Accept	20.94%	Reject
202	-0.58%	Accept	0.91%	Reject	-5.70%	Accept	17.87%	Reject
203	-0.42%	Accept	0.92%	Reject	-5.08%	Accept	18.36%	Reject
204	-0.29%	Accept	1.14%	Reject	-5.16%	Accept	16.71%	Reject
205	-0.22%	Accept	1.18%	Reject	-4.93%	Accept	15.78%	Reject
206	-0.17%	Accept	1.25%	Reject	-4.89%	Accept	15.04%	Reject
207	-0.17%	Accept	1.33%	Reject	-5.20%	Accept	15.90%	Reject
208	-0.46%	Accept	1.13%	Reject	-5.78%	Accept	15.70%	Reject
209	-0.49%	Accept	1.17%	Reject	-6.04%	Accept	15.28%	Reject
210	-0.38%	Accept	1.37%	Reject	-6.23%	Accept	15.13%	Reject
211	-0.36%	Accept	1.38%	Reject	-6.06%	Accept	13.44%	Reject
212	-0.41%	Accept	1.39%	Reject	-6.29%	Accept	12.94%	Reject
213	-0.29%	Accept	1.58%	Reject	-6.39%	Accept	12.69%	Reject
214	-0.41%	Accept	1.55%	Reject	-6.63%	Accept	10.79%	Reject
215	-0.53%	Accept	1.42%	Reject	-6.84%	Accept	12.02%	Reject
216	-0.49%	Accept	1.42%	Reject	-6.69%	Accept	12.44%	Reject
217	-0.65%	Accept	1.37%	Reject	-7.21%	Accept	12.52%	Reject
218	-0.45%	Accept	1.65%	Reject	-7.24%	Accept	11.72%	Reject
219	-0.15%	Accept	1.93%	Reject	-7.06%	Accept	15.96%	Reject
220	-0.29%	Accept	1.82%	Reject	-7.29%	Accept	15.43%	Reject
221	-0.34%	Accept	1.76%	Reject	-7.22%	Accept	14.17%	Reject
222	-0.15%	Accept	1.95%	Reject	-7.02%	Accept	14.54%	Reject
223	-0.04%	Accept	2.13%	Reject	-7.15%	Accept	15.03%	Reject
224	-0.02%	Accept	2.19%	Reject	-7.28%	Accept	15.28%	Reject
225	-0.11%	Accept	2.18%	Reject	-7.70%	Accept	17.10%	Reject
226	-0.02%	Accept	2.30%	Reject	-7.72%	Accept	16.84%	Reject
227	0.13%	Accept	2.43%	Reject	-7.58%	Accept	18.17%	Reject
228	-0.02%	Accept	2.23%	Reject	-7.50%	Accept	16.57%	Reject
229	0.02%	Accept	2.18%	Reject	-7.13%	Accept	16.05%	Reject
230	-0.18%	Accept	1.95%	Reject	-7.20%	Accept	15.51%	Reject
231	-0.30%	Accept	1.88%	Reject	-7.54%	Accept	15.86%	Reject
232	-0.33%	Accept	1.72%	Reject	-7.11%	Accept	15.56%	Reject
233	-0.11%	Accept	1.95%	Reject	-6.95%	Accept	15.93%	Reject
234	-0.29%	Accept	1.78%	Reject	-7.04%	Accept	13.74%	Reject
235	-0.39%	Accept	1.62%	Reject	-6.92%	Accept	13.08%	Reject
236	-0.48%	Accept	1.53%	Reject	-7.01%	Accept	12.85%	Reject
237	-0.37%	Accept	1.58%	Reject	-6.60%	Accept	11.05%	Reject
238	-0.30%	Accept	1.76%	Reject	-6.80%	Accept	9.23%	Reject
239	-0.35%	Accept	1.67%	Reject	-6.64%	Accept	7.19%	Reject
240	-0.32%	Accept	1.59%	Reject	-6.33%	Accept	8.15%	Reject



Day	All Buys		Single Buys		Multiple Buys		Net Buys	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
241	-0.25%	Accept	1.75%	Reject	-6.56%	Accept	9.19%	Reject
242	-0.15%	Accept	1.91%	Reject	-6.64%	Accept	9.01%	Reject
243	-0.16%	Accept	1.83%	Reject	-6.50%	Accept	10.21%	Reject
244	-0.18%	Accept	1.98%	Reject	-6.89%	Accept	7.91%	Reject
245	-0.36%	Accept	1.74%	Reject	-7.06%	Accept	10.71%	Reject
246	-0.19%	Accept	1.95%	Reject	-6.92%	Accept	9.55%	Reject
247	-0.09%	Accept	1.87%	Reject	-6.41%	Accept	11.57%	Reject
248	0.17%	Accept	2.01%	Reject	-5.83%	Accept	12.94%	Reject
249	-0.01%	Accept	1.87%	Reject	-6.04%	Accept	11.27%	Reject
250	0.22%	Accept	2.10%	Reject	-5.84%	Accept	11.69%	Reject
251	0.29%	Reject	2.14%	Reject	-5.73%	Accept	12.80%	Reject
252	0.33%	Reject	2.18%	Reject	-5.70%	Accept	12.94%	Reject

### Appendix 4 – Sell CAARs and Hypothesis testing

Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
1	-0.05%	Accept	-0.07%	Accept	0.00%	Accept	0.19%	Accept
2	-0.14%	Accept	-0.19%	Accept	0.05%	Accept	-0.78%	Accept
3	-0.09%	Accept	-0.18%	Accept	0.14%	Accept	0.57%	Accept
4	-0.03%	Accept	-0.06%	Accept	0.05%	Accept	0.58%	Reject
5	-0.11%	Accept	-0.10%	Accept	-0.15%	Accept	0.40%	Accept
6	-0.16%	Accept	-0.20%	Accept	-0.07%	Accept	0.08%	Accept
7	-0.21%	Accept	-0.25%	Accept	-0.08%	Accept	0.42%	Reject
8	-0.24%	Accept	-0.29%	Accept	-0.10%	Accept	-0.43%	Accept
9	-0.24%	Accept	-0.20%	Accept	-0.36%	Accept	-0.62%	Accept
10	-0.31%	Accept	-0.17%	Accept	-0.75%	Accept	-1.11%	Accept
11	-0.23%	Accept	-0.12%	Accept	-0.62%	Accept	-0.55%	Accept
12	-0.19%	Accept	-0.06%	Accept	-0.58%	Accept	-0.76%	Accept
13	-0.14%	Accept	-0.02%	Accept	-0.50%	Accept	-1.04%	Accept
14	-0.14%	Accept	-0.04%	Accept	-0.47%	Accept	-0.99%	Accept
15	-0.25%	Accept	-0.06%	Accept	-0.84%	Accept	-0.51%	Accept
16	-0.16%	Accept	0.02%	Accept	-0.77%	Accept	-0.03%	Accept
17	-0.19%	Accept	0.00%	Accept	-0.81%	Accept	-0.25%	Accept
18	-0.18%	Accept	0.00%	Accept	-0.77%	Accept	-0.44%	Accept
19	-0.21%	Accept	-0.04%	Accept	-0.74%	Accept	-1.40%	Accept
20	-0.40%	Accept	-0.15%	Accept	-1.18%	Accept	-1.35%	Accept
21	-0.20%	Accept	0.04%	Accept	-1.02%	Accept	0.31%	Accept



Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
22	-0.16%	Accept	0.10%	Reject	-1.00%	Accept	-0.34%	Accept
23	-0.11%	Accept	0.11%	Reject	-0.86%	Accept	0.01%	Accept
24	-0.18%	Accept	0.10%	Reject	-1.10%	Accept	-0.74%	Accept
25	-0.14%	Accept	0.11%	Reject	-0.91%	Accept	-1.34%	Accept
26	-0.15%	Accept	0.09%	Reject	-0.94%	Accept	-0.35%	Accept
27	-0.14%	Accept	0.12%	Reject	-0.99%	Accept	-1.13%	Accept
28	-0.26%	Accept	0.14%	Reject	-1.52%	Accept	-2.16%	Accept
29	-0.26%	Accept	0.17%	Reject	-1.63%	Accept	-1.80%	Accept
30	-0.27%	Accept	0.20%	Reject	-1.74%	Accept	-2.01%	Accept
31	-0.21%	Accept	0.26%	Reject	-1.66%	Accept	-2.56%	Accept
32	-0.31%	Accept	0.21%	Reject	-1.90%	Accept	-3.87%	Accept
33	-0.32%	Accept	0.22%	Reject	-2.01%	Accept	-3.60%	Accept
34	-0.29%	Accept	0.25%	Reject	-1.93%	Accept	-3.58%	Accept
35	-0.27%	Accept	0.28%	Reject	-1.96%	Accept	-3.16%	Accept
36	-0.17%	Accept	0.42%	Reject	-2.01%	Accept	-2.74%	Accept
37	-0.21%	Accept	0.39%	Reject	-2.03%	Accept	-3.18%	Accept
38	-0.18%	Accept	0.42%	Reject	-2.02%	Accept	-2.43%	Accept
39	-0.21%	Accept	0.38%	Reject	-2.06%	Accept	-2.55%	Accept
40	-0.18%	Accept	0.41%	Reject	-1.99%	Accept	-3.34%	Accept
41	-0.18%	Accept	0.42%	Reject	-2.00%	Accept	-3.63%	Accept
42	-0.10%	Accept	0.46%	Reject	-1.80%	Accept	-3.63%	Accept
43	-0.06%	Accept	0.51%	Reject	-1.78%	Accept	-4.12%	Accept
44	-0.01%	Accept	0.55%	Reject	-1.72%	Accept	-3.50%	Accept
45	-0.09%	Accept	0.48%	Reject	-1.81%	Accept	-3.54%	Accept
46	-0.13%	Accept	0.44%	Reject	-1.86%	Accept	-3.30%	Accept
47	-0.08%	Accept	0.49%	Reject	-1.85%	Accept	-3.11%	Accept
48	0.03%	Accept	0.68%	Reject	-1.99%	Accept	-1.80%	Accept
49	0.10%	Accept	0.73%	Reject	-1.87%	Accept	-1.50%	Accept
50	0.09%	Reject	0.71%	Reject	-1.85%	Accept	-1.27%	Accept
51	0.07%	Reject	0.73%	Reject	-2.02%	Accept	-1.15%	Accept
52	0.10%	Reject	0.74%	Reject	-1.91%	Accept	-0.45%	Accept
53	-0.02%	Accept	0.60%	Reject	-1.98%	Accept	-1.39%	Accept
54	0.01%	Accept	0.61%	Reject	-1.87%	Accept	-1.41%	Accept



Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
55	-0.05%	Accept	0.52%	Reject	-1.81%	Accept	-1.54%	Accept
56	-0.18%	Accept	0.39%	Reject	-1.99%	Accept	-0.51%	Accept
57	-0.10%	Accept	0.46%	Reject	-1.88%	Accept	0.31%	Accept
58	-0.05%	Accept	0.46%	Reject	-1.69%	Accept	-0.14%	Accept
59	-0.03%	Accept	0.50%	Reject	-1.72%	Accept	-1.13%	Accept
60	-0.02%	Accept	0.52%	Reject	-1.71%	Accept	-1.21%	Accept
61	-0.05%	Accept	0.48%	Reject	-1.74%	Accept	0.46%	Accept
62	0.08%	Accept	0.63%	Reject	-1.64%	Accept	-0.97%	Accept
63	0.19%	Reject	0.73%	Reject	-1.51%	Accept	-0.93%	Accept
64	0.19%	Reject	0.73%	Reject	-1.52%	Accept	-0.20%	Accept
65	0.15%	Reject	0.66%	Reject	-1.52%	Accept	1.14%	Accept
66	0.20%	Reject	0.75%	Reject	-1.59%	Accept	0.67%	Accept
67	0.33%	Reject	0.89%	Reject	-1.40%	Accept	-2.23%	Accept
68	0.35%	Reject	0.90%	Reject	-1.33%	Accept	-2.22%	Accept
69	0.47%	Reject	1.05%	Reject	-1.34%	Accept	-1.33%	Accept
70	0.50%	Reject	1.11%	Reject	-1.36%	Accept	-1.97%	Accept
71	0.55%	Reject	1.12%	Reject	-1.24%	Accept	-1.67%	Accept
72	0.45%	Reject	1.03%	Reject	-1.33%	Accept	-2.51%	Accept
73	0.45%	Reject	1.00%	Reject	-1.28%	Accept	-0.12%	Accept
74	0.40%	Reject	0.97%	Reject	-1.47%	Accept	1.22%	Accept
75	0.33%	Reject	0.92%	Reject	-1.48%	Accept	-1.86%	Accept
76	0.25%	Reject	0.82%	Reject	-1.47%	Accept	-2.74%	Accept
77	0.29%	Reject	0.88%	Reject	-1.47%	Accept	-4.09%	Accept
78	0.35%	Reject	0.93%	Reject	-1.40%	Accept	-4.21%	Accept
79	0.34%	Reject	0.87%	Reject	-1.29%	Accept	-3.44%	Accept
80	0.34%	Reject	0.91%	Reject	-1.36%	Accept	-5.02%	Accept
81	0.28%	Reject	0.83%	Reject	-1.34%	Accept	-4.57%	Accept
82	0.22%	Reject	0.77%	Reject	-1.38%	Accept	-5.89%	Accept
83	0.10%	Accept	0.64%	Reject	-1.48%	Accept	-6.87%	Accept
84	0.01%	Accept	0.62%	Reject	-1.72%	Accept	-8.18%	Accept
85	-0.01%	Accept	0.60%	Reject	-1.70%	Accept	-10.25%	Accept
86	0.06%	Accept	0.70%	Reject	-1.74%	Accept	-10.27%	Accept
87	0.05%	Reject	0.66%	Reject	-1.62%	Accept	-11.34%	Accept



Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
88	0.05%	Reject	0.64%	Reject	-1.57%	Accept	-11.11%	Accept
89	0.06%	Reject	0.62%	Reject	-1.47%	Accept	-11.78%	Accept
90	0.04%	Reject	0.65%	Reject	-1.58%	Accept	-13.52%	Accept
91	0.08%	Reject	0.74%	Reject	-1.71%	Accept	-13.59%	Accept
92	0.08%	Reject	0.76%	Reject	-1.77%	Accept	-13.35%	Accept
93	0.15%	Reject	0.85%	Reject	-1.72%	Accept	-15.24%	Accept
94	0.16%	Reject	0.85%	Reject	-1.70%	Accept	-13.86%	Accept
95	0.22%	Reject	0.92%	Reject	-1.64%	Accept	-14.06%	Accept
96	0.23%	Reject	0.98%	Reject	-1.81%	Accept	-13.69%	Accept
97	0.18%	Reject	0.95%	Reject	-1.93%	Accept	-14.57%	Accept
98	0.13%	Reject	0.95%	Reject	-2.13%	Accept	-15.56%	Accept
99	0.20%	Reject	1.08%	Reject	-2.23%	Accept	-16.45%	Accept
100	0.19%	Reject	1.02%	Reject	-2.08%	Accept	-15.18%	Accept
101	0.16%	Reject	0.94%	Reject	-1.94%	Accept	-16.58%	Accept
102	0.12%	Reject	0.93%	Reject	-2.06%	Accept	-15.52%	Accept
103	0.18%	Reject	1.00%	Reject	-2.07%	Accept	-15.89%	Accept
104	0.22%	Reject	1.06%	Reject	-2.06%	Accept	-15.56%	Accept
105	0.19%	Reject	1.07%	Reject	-2.23%	Accept	-16.04%	Accept
106	0.22%	Reject	1.17%	Reject	-2.38%	Accept	-16.55%	Accept
107	0.25%	Reject	1.13%	Reject	-2.14%	Accept	-16.88%	Accept
108	0.25%	Reject	1.09%	Reject	-2.01%	Accept	-17.75%	Accept
109	0.28%	Reject	1.14%	Reject	-2.00%	Accept	-19.17%	Accept
110	0.40%	Reject	1.23%	Reject	-1.81%	Accept	-18.69%	Accept
111	0.47%	Reject	1.28%	Reject	-1.69%	Accept	-18.02%	Accept
112	0.53%	Reject	1.40%	Reject	-1.81%	Accept	-16.49%	Accept
113	0.56%	Reject	1.44%	Reject	-1.82%	Accept	-16.90%	Accept
114	0.60%	Reject	1.48%	Reject	-1.76%	Accept	-16.65%	Accept
115	0.55%	Reject	1.41%	Reject	-1.80%	Accept	-16.47%	Accept
116	0.44%	Reject	1.33%	Reject	-1.96%	Accept	-17.72%	Accept
117	0.47%	Reject	1.35%	Reject	-1.92%	Accept	-17.40%	Accept
118	0.40%	Reject	1.27%	Reject	-1.96%	Accept	-16.25%	Accept
119	0.39%	Reject	1.24%	Reject	-1.95%	Accept	-16.35%	Accept
120	0.40%	Reject	1.24%	Reject	-1.91%	Accept	-15.42%	Accept



Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
121	0.36%	Reject	1.29%	Reject	-2.22%	Accept	-15.39%	Accept
122	0.42%	Reject	1.42%	Reject	-2.42%	Accept	-14.40%	Accept
123	0.50%	Reject	1.49%	Reject	-2.28%	Accept	-14.31%	Accept
124	0.49%	Reject	1.51%	Reject	-2.38%	Accept	-15.12%	Accept
125	0.55%	Reject	1.56%	Reject	-2.22%	Accept	-16.96%	Accept
126	0.47%	Reject	1.41%	Reject	-2.09%	Accept	-16.78%	Accept
127	0.61%	Reject	1.52%	Reject	-1.93%	Accept	-16.09%	Accept
128	0.66%	Reject	1.54%	Reject	-1.78%	Accept	-15.33%	Accept
129	0.61%	Reject	1.52%	Reject	-1.92%	Accept	-14.74%	Accept
130	0.57%	Reject	1.51%	Reject	-2.05%	Accept	-14.75%	Accept
131	0.53%	Reject	1.46%	Reject	-2.07%	Accept	-14.80%	Accept
132	0.39%	Reject	1.32%	Reject	-2.22%	Accept	-14.56%	Accept
133	0.40%	Reject	1.38%	Reject	-2.30%	Accept	-16.16%	Accept
134	0.43%	Reject	1.42%	Reject	-2.33%	Accept	-16.09%	Accept
135	0.37%	Reject	1.33%	Reject	-2.26%	Accept	-16.19%	Accept
136	0.40%	Reject	1.38%	Reject	-2.32%	Accept	-16.39%	Accept
137	0.55%	Reject	1.55%	Reject	-2.22%	Accept	-16.31%	Accept
138	0.48%	Reject	1.45%	Reject	-2.20%	Accept	-15.64%	Accept
139	0.52%	Reject	1.46%	Reject	-2.11%	Accept	-14.40%	Accept
140	0.50%	Reject	1.47%	Reject	-2.25%	Accept	-13.76%	Accept
141	0.42%	Reject	1.44%	Reject	-2.46%	Accept	-14.93%	Accept
142	0.45%	Reject	1.51%	Reject	-2.55%	Accept	-14.78%	Accept
143	0.53%	Reject	1.57%	Reject	-2.44%	Accept	-13.66%	Accept
144	0.60%	Reject	1.63%	Reject	-2.32%	Accept	-14.63%	Accept
145	0.55%	Reject	1.64%	Reject	-2.55%	Accept	-14.85%	Accept
146	0.46%	Reject	1.61%	Reject	-2.78%	Accept	-15.87%	Accept
147	0.44%	Reject	1.64%	Reject	-2.99%	Accept	-15.90%	Accept
148	0.42%	Reject	1.64%	Reject	-3.06%	Accept	-15.92%	Accept
149	0.44%	Reject	1.65%	Reject	-3.00%	Accept	-15.10%	Accept
150	0.47%	Reject	1.66%	Reject	-2.96%	Accept	-13.49%	Accept
151	0.47%	Reject	1.60%	Reject	-2.75%	Accept	-13.77%	Accept
152	0.45%	Reject	1.55%	Reject	-2.67%	Accept	-14.45%	Accept
153	0.42%	Reject	1.52%	Reject	-2.68%	Accept	-15.26%	Accept

Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
154	0.46%	Reject	1.54%	Reject	-2.59%	Accept	-14.99%	Accept
155	0.49%	Reject	1.65%	Reject	-2.77%	Accept	-15.75%	Accept
156	0.51%	Reject	1.61%	Reject	-2.60%	Accept	-15.64%	Accept
157	0.60%	Reject	1.71%	Reject	-2.54%	Accept	-15.43%	Accept
158	0.59%	Reject	1.71%	Reject	-2.57%	Accept	-14.25%	Accept
159	0.54%	Reject	1.68%	Reject	-2.70%	Accept	-14.73%	Accept
160	0.57%	Reject	1.69%	Reject	-2.60%	Accept	-15.14%	Accept
161	0.62%	Reject	1.72%	Reject	-2.51%	Accept	-15.36%	Accept
162	0.62%	Reject	1.67%	Reject	-2.35%	Accept	-13.89%	Accept
163	0.64%	Reject	1.66%	Reject	-2.28%	Accept	-13.31%	Accept
164	0.58%	Reject	1.59%	Reject	-2.26%	Accept	-14.12%	Accept
165	0.66%	Reject	1.63%	Reject	-2.03%	Accept	-14.71%	Accept
166	0.69%	Reject	1.69%	Reject	-2.13%	Accept	-14.23%	Accept
167	0.74%	Reject	1.78%	Reject	-2.21%	Accept	-13.84%	Accept
168	0.78%	Reject	1.79%	Reject	-2.05%	Accept	-14.01%	Accept
169	0.72%	Reject	1.72%	Reject	-2.11%	Accept	-13.57%	Accept
170	0.73%	Reject	1.68%	Reject	-1.97%	Accept	-12.41%	Accept
171	0.69%	Reject	1.62%	Reject	-1.93%	Accept	-12.59%	Accept
172	0.72%	Reject	1.60%	Reject	-1.72%	Accept	-13.85%	Accept
173	0.71%	Reject	1.59%	Reject	-1.76%	Accept	-12.92%	Accept
174	0.63%	Reject	1.51%	Reject	-1.85%	Accept	-12.52%	Accept
175	0.62%	Reject	1.56%	Reject	-2.00%	Accept	-13.34%	Accept
176	0.49%	Reject	1.44%	Reject	-2.13%	Accept	-14.75%	Accept
177	0.57%	Reject	1.49%	Reject	-2.03%	Accept	-13.54%	Accept
178	0.39%	Reject	1.32%	Reject	-2.24%	Accept	-12.95%	Accept
179	0.35%	Reject	1.27%	Reject	-2.30%	Accept	-11.44%	Accept
180	0.25%	Reject	1.22%	Reject	-2.50%	Accept	-13.64%	Accept
181	0.19%	Reject	1.17%	Reject	-2.63%	Accept	-11.95%	Accept
182	0.23%	Reject	1.23%	Reject	-2.69%	Accept	-9.59%	Accept
183	0.21%	Reject	1.19%	Reject	-2.64%	Accept	-10.35%	Accept
184	0.15%	Reject	1.10%	Reject	-2.57%	Accept	-11.39%	Accept
185	0.26%	Reject	1.22%	Reject	-2.51%	Accept	-10.75%	Accept
186	0.24%	Reject	1.19%	Reject	-2.45%	Accept	-12.78%	Accept

Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
187	0.29%	Reject	1.20%	Reject	-2.28%	Accept	-12.90%	Accept
188	0.38%	Reject	1.30%	Reject	-2.16%	Accept	-14.51%	Accept
189	0.44%	Reject	1.34%	Reject	-2.05%	Accept	-14.32%	Accept
190	0.41%	Reject	1.31%	Reject	-2.11%	Accept	-14.47%	Accept
191	0.39%	Reject	1.27%	Reject	-2.02%	Accept	-14.85%	Accept
192	0.37%	Reject	1.24%	Reject	-2.00%	Accept	-16.11%	Accept
193	0.32%	Reject	1.17%	Reject	-1.92%	Accept	-17.60%	Accept
194	0.40%	Reject	1.27%	Reject	-1.88%	Accept	-18.47%	Accept
195	0.42%	Reject	1.27%	Reject	-1.80%	Accept	-19.21%	Accept
196	0.51%	Reject	1.35%	Reject	-1.68%	Accept	-18.56%	Accept
197	0.51%	Reject	1.33%	Reject	-1.61%	Accept	-18.63%	Accept
198	0.50%	Reject	1.31%	Reject	-1.57%	Accept	-19.77%	Accept
199	0.47%	Reject	1.32%	Reject	-1.74%	Accept	-19.72%	Accept
200	0.49%	Reject	1.35%	Reject	-1.71%	Accept	-19.76%	Accept
201	0.45%	Reject	1.31%	Reject	-1.74%	Accept	-20.41%	Accept
202	0.47%	Reject	1.36%	Reject	-1.80%	Accept	-21.23%	Accept
203	0.51%	Reject	1.46%	Reject	-1.90%	Accept	-22.55%	Accept
204	0.56%	Reject	1.57%	Reject	-2.07%	Accept	-22.53%	Accept
205	0.60%	Reject	1.60%	Reject	-2.03%	Accept	-21.54%	Accept
206	0.60%	Reject	1.57%	Reject	-1.94%	Accept	-20.86%	Accept
207	0.56%	Reject	1.51%	Reject	-1.90%	Accept	-21.87%	Accept
208	0.44%	Reject	1.37%	Reject	-1.95%	Accept	-22.59%	Accept
209	0.49%	Reject	1.39%	Reject	-1.82%	Accept	-21.12%	Accept
210	0.41%	Reject	1.37%	Reject	-2.11%	Accept	-21.71%	Accept
211	0.40%	Reject	1.39%	Reject	-2.21%	Accept	-21.58%	Accept
212	0.42%	Reject	1.49%	Reject	-2.44%	Accept	-21.10%	Accept
213	0.45%	Reject	1.57%	Reject	-2.54%	Accept	-20.95%	Accept
214	0.47%	Reject	1.59%	Reject	-2.55%	Accept	-20.54%	Accept
215	0.57%	Reject	1.70%	Reject	-2.45%	Accept	-21.72%	Accept
216	0.67%	Reject	1.74%	Reject	-2.15%	Accept	-22.24%	Accept
217	0.58%	Reject	1.60%	Reject	-2.10%	Accept	-21.50%	Accept
218	0.60%	Reject	1.62%	Reject	-2.12%	Accept	-20.99%	Accept
219	0.53%	Reject	1.54%	Reject	-2.14%	Accept	-20.80%	Accept



Day	All Sales		Single Sells		Multiple Sells		Net Sells	
	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject	CAAR	Accept / Reject
220	0.47%	Reject	1.49%	Reject	-2.30%	Accept	-18.47%	Accept
221	0.49%	Reject	1.50%	Reject	-2.25%	Accept	-19.38%	Accept
222	0.46%	Reject	1.49%	Reject	-2.33%	Accept	-19.69%	Accept
223	0.42%	Reject	1.46%	Reject	-2.39%	Accept	-20.71%	Accept
224	0.44%	Reject	1.52%	Reject	-2.47%	Accept	-21.41%	Accept
225	0.53%	Reject	1.62%	Reject	-2.35%	Accept	-22.65%	Accept
226	0.60%	Reject	1.70%	Reject	-2.32%	Accept	-22.07%	Accept
227	0.54%	Reject	1.67%	Reject	-2.51%	Accept	-21.17%	Accept
228	0.44%	Reject	1.55%	Reject	-2.62%	Accept	-19.77%	Accept
229	0.46%	Reject	1.61%	Reject	-2.71%	Accept	-20.14%	Accept
230	0.40%	Reject	1.53%	Reject	-2.72%	Accept	-20.12%	Accept
231	0.38%	Reject	1.47%	Reject	-2.57%	Accept	-21.84%	Accept
232	0.33%	Reject	1.44%	Reject	-2.64%	Accept	-22.94%	Accept
233	0.41%	Reject	1.51%	Reject	-2.52%	Accept	-23.75%	Accept
234	0.42%	Reject	1.49%	Reject	-2.37%	Accept	-24.51%	Accept
235	0.30%	Reject	1.40%	Reject	-2.63%	Accept	-23.79%	Accept
236	0.26%	Reject	1.36%	Reject	-2.66%	Accept	-23.80%	Accept
237	0.22%	Reject	1.30%	Reject	-2.62%	Accept	-24.72%	Accept
238	0.12%	Accept	1.26%	Reject	-2.90%	Accept	-23.72%	Accept
239	0.17%	Reject	1.29%	Reject	-2.83%	Accept	-24.44%	Accept
240	0.14%	Reject	1.26%	Reject	-2.82%	Accept	-24.93%	Accept
241	0.27%	Reject	1.41%	Reject	-2.73%	Accept	-25.42%	Accept
242	0.20%	Reject	1.39%	Reject	-2.94%	Accept	-27.08%	Accept
243	0.25%	Reject	1.41%	Reject	-2.82%	Accept	-27.12%	Accept
244	0.27%	Reject	1.48%	Reject	-2.94%	Accept	-25.95%	Accept
245	0.36%	Reject	1.58%	Reject	-2.91%	Accept	-24.41%	Accept
246	0.38%	Reject	1.64%	Reject	-3.01%	Accept	-25.52%	Accept
247	0.33%	Reject	1.59%	Reject	-3.06%	Accept	-26.11%	Accept
248	0.32%	Reject	1.57%	Reject	-3.04%	Accept	-25.74%	Accept
249	0.23%	Reject	1.49%	Reject	-3.17%	Accept	-25.83%	Accept
250	0.21%	Reject	1.47%	Reject	-3.20%	Accept	-25.29%	Accept
251	0.28%	Reject	1.59%	Reject	-3.29%	Accept	-24.97%	Accept
252	0.29%	Reject	1.61%	Reject	-3.32%	Accept	-24.82%	Accept