# Director dealings as an investment style: a portfolio time series approach

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# Abstract

The Insider Trading Act of 1999 and JSE regulations require transparency in director dealings and as a result create an unprecedented dissemination of investment signals to the market. This research study used director dealing information and a portfolio time series approach that included the entire population of 13,840 JSE All Share Index (ALSI) director dealings during a 130-month period between 2002 and 2013. With the assistance of a style engine and through an experimental research approach, an optimal Buy and Sell investment style was established. The equal weighted ALSI provided a comparative benchmark.

Most studies on JSE director dealings, using an event study methodology, have not identified an investment style to be followed successfully during certain periods. The results have at best shown statistically significant, but economically insignificant, abnormal returns.

The results of this study were visually, statistically and economically significant in comparison. It was proven that outside investors should, rationally, acquire shares when directors acquire shares but they should, counter intuitively, purchase shares when directors sell shares. The optimal director dealing investment style for creating a director dealing Buy portfolio includes applying a holding period of four months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.0013% or more. The optimal director dealing investment style for creating a director dealing Sell portfolio includes applying a holding period of three months, a lookback period of three months and a minimum percentage of market capitalisation traded between 0.005% and 0.030%. The optimal director dealings Buy and Sell portfolios achieved a CAGR (Compound Annual Growth Rate) of 29.5% and 27.8% respectively. The comparative benchmark achieved a CAGR of 19.1% over the same relevant period.

# Keywords

1) **Portfolio time series** – the presentation of portfolio values over a relevant period of time (being 31 December 2002 to 20 September 2013).

2) **CAGR** – Compound Annual Growth Rate. It represents the constant steady growth rate at which the portfolio would have grown over the relevant period.

3) **Lookback period** – a specified historic period containing director dealings.

4) **Holding period** – a specified period to retain investment shares.

5) **Investment style** – an optimal investment technique obtained through an experimental research approach.

# 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.


_____                                    11 November 2013

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# Chapter 1: Introduction to the research problem

## 1.1  Research title

Director dealings as an investment style: a portfolio time series approach.

## 1.2  Purpose of the study

Directors as insiders hold superior and privileged non-public information about their companies' future prospects (the term "insider" is used interchangeably with "director" in this study). In a subdued economic climate it is difficult to realise the investment returns similar to the 2004-2007 share run up period and, despite existing legislation, insiders could feel tempted to exploit confidential information. Insiders often act with full consideration of the ethical or legal implications of their actions, but find ways of circumventing regulations or obscuring their behaviour. Insider trading is still believed to be one of the worst forms of white collar crimes as it is perpetrated by individuals in positions of trust against the very stakeholders who elected them into those respective positions. Abnormal returns can be used as an indicator of insider trading, but little research has been conducted into the topic of insider trading in South Africa. South Africa, like many other countries, considers insider trading to be a criminal act.

The Insider Trading Act came into effect in South Africa in 1999 and subsequently regulated the disclosure of director dealings. This research study is based on JSE data subsequent to the implementation and enforcement of the Insider Trading Act. This study, with the use of director dealing disclosures, aims to investigate whether an economically viable director dealings investment style can be established.

As little research has been done to date with respect to the effect of director dealings or insider trading on the JSE, this study will provide insights into a topic that is still highly contested and debated across the world. Another controversial

aspect relates to proponent and opponent schools of thought with respect to regulating insider trading and its effect on the efficient market hypothesis.

With respect to trading shares, timing is critical. In a study by Korczak, Korczak & Lasfer (2010), their results showed that insiders strategically timed their trading before news announcements and it was shown that the trading decisions were primarily driven by regulations and potential risks of lost reputation. It found that a larger fraction of good news, compared to bad news, is preceded by insider trading, and that the regulatory trading bans are well enforced and that insiders did not trade before earnings announcements to avoid drawing attention. It showed that insiders strategically chose the amount of shares bought prior to the announcement of good news, and increased their purchases as the price impact of the news went up, and the amount of shares purchased levelled off as the news became widespread. In the case of bad news, it found that insiders strategically chose to sell, and the likelihood of insider selling significantly decreased as the probability of positive news increased. All these findings support the arguments on incentives and disincentives that drive insider trading decisions shortly before news announcements.

The purpose of this research study was to investigate whether abnormal returns could be realised by creating a portfolio of directors' dealings based on an optimal investment style. The research was conducted on the top 160 companies listed on the main board of the Johannesburg Stock Exchange (JSE) All Share Index (ALSI) and is the first study to include the entire population of 13,840 director dealings over a 130-month period using a portfolio time series approach. Within the context of insiders, this study focuses on directors' behaviour. Sharenet data of director dealings was used to conduct the study.

## 1.3   Definition of the problem

**Research question 1**: Can a portfolio of director dealing share purchases outperform a benchmark?
**Research question 2**: Can a portfolio of director dealing share sales underperform a benchmark?

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## 1.4 Context and background to the study

One would expect directors to uphold their fiduciary duties and ethical responsibilities as a matter of priority. However, this is often not the case and as there are insufficient restrictive measures to curb insider trading, this makes it very difficult for the authorities to administer and prosecute any perpetrators. Generally, the returns seem to outweigh the risks, although van der Plas (2007) and Financial Services Board (2013a) indicated that the maximum penalty for insider trading comprises a R2 million fine, ten years' imprisonment, or both.

Chitimira (2008) went on to state that several cases had been abandoned due to the suspected incompetence of the officials of the courts with respect to matters that related to insider trading. Long delays and the never ending backlog in the courts had exacerbated the situation. Chitimira (2008) made recommendations aimed at resolving the insider trading problem and related prohibited practices. The researcher recommended the establishment of separate and specialist courts for insider trading manned by experts in the relevant fields. The purpose was to address the concerns that there are only a few cases that are successfully resolved.

Directors are often in breach of insider trading regulations, the Companies Act and/or corporate governance principles. In some countries the regulations prohibit insider trading whilst in others, such as Australia, directors are only required to report their trades within five business days to the market (Uylangco, Easton, & Faff, 2010).

JSE listed companies are vital agents of economic activity and their shareholders are key contributors of the wherewithal for investment activity. The investment decisions of the shareholders has an effect on the total investment made in the local economy, which in turn is an integral component of gross domestic product (GDP), and therefore impacts on the rate of economic expansion. The shares of listed companies, commonly referred to as stocks, represent the ownership of equity and includes all associated risks which the shareholders are aware of, but for this the shareholders expect a compensating return. Should the return on the

equity not compensate the owners for the risk they have borne, they may choose to commit their funds in other non-equity investments, which are commensurate with a fair level of risk. As such, shareholders in individual companies will at least expect their investment returns to exceed the return they could earn by investing in a diversified portfolio, which has a lower risk profile (Bodie, Kane, & Marcus, 2011).

With the relatively easy and cheap access to vast information on investing, the investors have a large number of equity investment strategies that they can adopt with an intention to enhance their portfolio returns. These strategies fall into two broad areas that are commonly referred to as index tracking and share picking. Index tracking involves mimicking of a share index on a stock exchange whereby the investors acquire all the listed companies that fall within the respective share index and this could be on an equal or unequal weighting. Share picking alternately, involves the selection and acquisition of specific shares based on the investor's expectations of future returns and the anticipated risks (Bodie, Kane, & Marcus, 2011).

The decision on whether to follow an index tracking or share picking strategy is predominantly dependent on the investor's view of the efficient markets hypothesis (EMH) which was developed by Fama (1965). The EMH is believed to occur in three forms as follows:

(a) Weak form – this form asserts that all information is already imputed in the share price and an investor cannot gain any advantage using trend analysis of historical price data to predict future prices. Past share data is publicly available and virtually costless to obtain. The weak form hypothesis suggests that if such data ever indicated reliable signals about future performance, then all investors would have already learned to exploit these signals. The result would inevitably demonstrate that investment trend signals have no value (for example a buy signal would result in an immediate price increase and therefore offer no benefit).

(b) Semi-strong form – in this form the hypothesis states that all publicly available information regarding the future of a company must be included

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already in the share price. Investors have access to the same public information and as they would have already learned to exploit any signals, there can be no competitive advantage for any individual investors.

(c) Strong form – in this form the hypothesis is extreme and states that current share prices reflect all information, including private information that is only known to insiders, and therefore no excess returns can be earned by anyone. This theory is unrealistic as it is widely known that insiders have access to information for a long enough period prior to it being made public, to enable them to profit from trading on that inside information (Bodie, Kane, & Marcus, 2011).

The key factor of index tracking is that, for a specified level of risk, investors are generally better off adopting a diversification strategy where they buy all shares included in the index, and thereby de-risk the concentration of specific underperforming shares. This theory suggests that in the long-term, a single investor cannot consistently outperform the market average. Conversely, the strategy behind share picking suggests that the individual investor can consistently outperform the market, and is therefore better off making individual share choices rather than diversifying completely. This research study aims to prove this theory of share picking as a superior investment style.

The insinuation of the various forms of market efficiency is that excess returns are not available for investors operating in a strong form environment, and therefore these investors should rather adopt an index tracking investment strategy. In the semi-strong form environment, only the inside investors who receive future performance information prior to the rest of the market may potentially earn excess returns. In the weak form scenario, it suggests that insiders with access to privileged future information can earn an excess return.

The efficient markets hypothesis also suggests that for all forms of EMH, the share picking strategy will always be an incorrect strategy for outsiders and they are generally wealthier adopting an index tracking strategy. If outside investors are to base their trading strategy on the assumption of efficient markets, they

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should first understand what lies behind the EMH. Bird, He, Thosar & Woolley (2004) state the assumptions of market efficiency as follows:

    (a) Information costlessly flows to the market;

    (b) Market participants utilise the information to identify temporary mispricing and then trade in the market with the objective of maximising their wealth; and

    (c) Market imperfections that prevent investors from exploiting any identified mispricing do not exist.

Conversely, another school of thought suggests that the assumptions behind the EMH do not hold, and that an investor can consistently earn excess returns by employing strategies that exploit market imperfections. One of the widely known theories is value investing that believes that markets often misprice the value of equities, thereby creating opportunities for those who can identify the mispricing (Bodie, Kane, & Marcus, 2011).

Similar to basic economic theory, the interface between demand and supply forces in the market determines the value of equities. For a share price to increase, the market needs to be in a state of disequilibrium where the demand exceeds the supply (more buyers than sellers), and vice versa for a share price to decline. Shareholders stand to benefit and enhance their wealth as the market moves towards a state of equilibrium.

## 1.5   Significance of the study

Studies have shown that directors of listed companies often invest in their own companies in a contrarian manner. This is done by purchasing shares when they are being sold by the general market and selling shares when they are being bought by the general market (Lakonishok & Lee, 2001; Jeng, Metrick & Zeckhauser, 2003; Jenter, 2005). If directors do earn excess returns, it would be worthwhile identifying if outsiders could also earn excess returns by mimicking director trades and more importantly, what approach should be followed.

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Nair (2008) used director dealings information between 1 April 2002 and 31 March 2008 for JSE listed companies and concluded that in the year following the trade, directors earned a statistically significant, but economically insignificant excess return of 0.31%. The study also showed that for a 252-day holding period, directors earned 0.33% and 0.29% from their purchases and sales transactions respectively. Despite investigating up to 252 days, a clear constraint with Nair's findings at these levels of returns is that investors would not benefit from mimicking directors' trades.

This research study contributes in several respects to the academic body as it provides an examination of the abnormal returns earned by adopting a unique trading style of buying or selling shares when directors report buying or selling activity in their own shares. By examining all 13,840 ALSI director dealings between the period 1 April 2002 to 20 September 2013, this research aimed to identify an economically plausible director dealing investment style by optimising a set of investment parameters that included the holding period, the lookback period and the minimum percentage of market capitalisation traded.

## 1.6   Structure of the research report

The structure of the rest of this research report is as follows:

- Chapter 2 reviews the relevant literature on insider trading regulations in South Africa followed by the relevant literature on director dealings.
- Chapter 3 stipulates the research hypotheses to be tested.
- Chapter 4 describes and justifies the research methodology applied to test the hypotheses in Chapter 3.
- Chapter 5 presents the results of the study.
- Chapter 6 provides a discussion and interpretation of the results shown in the previous chapter with reference to relevant literature.
- Chapter 7 presents a summary of the main findings and recommendations for possible future research.

# Chapter 2: Literature review

## 2.1 Introduction

This chapter sets the context of this research study by reviewing the relevant literature on insider trading which defines and highlights the main Insider Trading Act regulations and rules and regulations of the JSE. It presents a review of investment trading theories and strategies, director dealings findings and what it means to apply an investment style. The literature review also covers the potential reasons behind the returns that directors are able to generate from their trades.

## 2.2 Insider trading

It is important to understand the history and landscape of the Insider Trading Act and the JSE regulations as well as the impact these regulations have had on market efficiency and the behaviour of insider traders and external traders. The South African Insider Trading Act of 1998 brought greater transparency and efficiency to the stock market as it allowed insiders to legally trade in the shares of their listed companies.

### 2.2.1 What is an insider?

The Insider Trading Act (1998) and Financial Services Board (2013a) defines an insider as an individual who has obtained 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).

In the context of this research study, the term "insider" is used interchangeably with "director".

### 2.2.2  What is inside information?

Inside information means specific or precise information that has not been made public and which:
  (a) is obtained or learned as an insider; and

  (b)  if it were made public would be likely to have a material effect on the price or value of any security or financial instrument (Insider Trading Act, 1998; Financial Services Board, 2013a)

### 2.2.3  When is the information made public?

Information shall be regarded as having been made public in circumstances that 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;
  (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;
  (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 (Insider Trading Act, 1998; Financial Services Board, 2013a).

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 (Insider Trading Act, 1998; Financial Services Board, 2013a).

### 2.2.4  What is insider trading?

Insider trading occurs when 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;

(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; or

(c) discloses that information to another person.

Individuals who meet the above criteria shall be guilty of an insider trading offence unless it can be proven that he or she:

(a) believed, on reasonable grounds, that no person would deal in the securities or financial instruments as a result of such disclosure; or

(b) disclosed the inside information in the proper performance of the function of his or her employment, office or profession and at the same time disclosed that the information was inside information (Insider Trading Act, 1998; Financial Services Board, 2013a).

### 2.2.5  Why was the Insider Trading Act required?

Prior to 1999, only the Companies Act, 61 of 1973 contained the prohibitions on insider trading and this was administered by the Securities Regulation Panel (Financial Services Board, 2013b). The Companies Act only contained a criminal sanction which required guilt to be proven beyond a reasonable doubt.

As no statutory civil legal framework existed against insider trading during that period, South African law embodied a policy of deterring insider trading and compensating victims thereof, but nobody had ever been prosecuted, less convicted of this crime (Johannesburg Stock Exchange, 2013).

The ineffectiveness of the Companies Act and civil legal framework played a pivotal role in the creation of the Insider Trading Act. A task group chaired by former judge Mervyn King then proposed a new Act with stricter regulations. King's report recommended that insider trading be regulated outside the Companies Act and under a separate statute. The legislation proposed a regulator with investigative powers, including rights of attachment, removal of documents, interrogation, interdict and the power to institute derivative actions (Financial Services Board, 2013b).

The new Act was needed to bring South African legislation on insider trading in line with international developments and to deter insiders' temptations. This was required to enhance the perception of the South African markets' corporate governance, efficiency and attractiveness. The South African Insider Trading Act, 135 of 1998 came into operation on 17 January 1999 (Financial Services Board, 2013b).

## 2.2.6  Insider Trading Act authority and punishment

The Insider Trading Act's ambit covered all tradable instruments listed on the JSE and the Bond Exchange of South Africa (BESA), such as equities, bonds, futures, agricultural and equity derivatives. It also dealt with sensitive information such as policy decisions by regulators and government, which could affect the price of a traded instrument (Johannesburg Stock Exchange, 2013).

The introduction of the Insider Trading Act made it easier for criminal sanctions and remedial civil action to be laid against insider offenders, especially as the allegations only need to be proven on a balance of probabilities and not beyond reasonable doubt.

The FSB has been given the lead responsibility for enforcing the Insider Trading Act, which over and above the Financial Services Board Act, authorises the FSB to:
   (a) investigate any matter relating to insider trading;
   (b) impose the regulations of the Insider Trading Act;

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(c) summon any person who is believed to have any information on the subject of the investigation;

(d) interrogate any person under oath and examine or retain for examination any such evidence; and

(e) obtain a warrant to enter and search any premises for any evidence, which can then be retained for as long as required.

The FSB is allowed to issue a civil summons against offenders for up to three times the profit gained or the losses avoided (whether realised or not) due to the illegal insider trading. The Insider Trading Act permits a maximum penalty for illegal insider trading of a R2 million fine, ten years' imprisonment, or both (Financial Services Board, 2013a).

### 2.2.7 Rules and regulations of the JSE

Whilst the regulations on insider trading vary according to each stock exchange, the JSE only regards inside information as having been publicly disclosed once the announcement has been made on their Stock Exchange News Service (SENS). The JSE requires any director who trades in securities of their company (the issuer), to disclose the following to the issuer without delay and in any event by no later than 24 hours after dealing:

(a) the director's name;

(b) the name of the company of which he/she is a director;

(c) the date on which the transaction was done;

(d) the price, number, total value and class of securities concerned;

(e) in the event 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

The issuer must in turn announce such information without delay and in any event by no later than 24 hours after receipt of such information from the director concerned (Johannesburg Stock Exchange, 2013).

Directors need to be given clearance from the chairperson or another designated director before being allowed to deal in the securities of their company. A director cannot be given clearance to deal during a prohibited period which is a closed period during which there are matters that relate to unpublished price-sensitive information. This closed period is applicable whether a director has knowledge of such matters or not.

A closed period is referred to in the JSE Listings Requirements (Johannesburg Stock Exchange, 2013) 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 report (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 second 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." (p.16).

## 2.3   Market efficiency theory

The theory and evidence of the efficient market hypothesis is that financial markets process all relevant information about securities quickly and efficiently and the security price is inclusive of all the information that is available to investors about the security's value (Bodie et al., 2011; Nair, 2008).

This theory suggests that as new information about a security becomes available, its price quickly adjusts so that the security price is in accordance with the market's consensus of the security's value. This implies that there would never

be underpriced or overpriced securities in the market (Bodie, Kane, & Marcus, 2011).

Passive investment management relates to holding a diversified portfolio without spending resources on trying to improve the portfolio's performance through security analysis. Active investment management is the process of improving portfolio performance by identifying mispriced securities, or by timing certain categories of securities. If stock markets are efficient and securities prices always reflect all information, then this would mean that passive management is the logical choice, as opposed to wasting resources on an active management approach, which will always result in no further improvement in the portfolio performance. Dimson & Mussavian (2000) defined an efficient market as one in which trading on available information failed to provide an abnormal profit. This implies that in a highly efficient market, insiders who trade in their companies' shares should not realise any abnormal profit.

Conversely, it can be argued that if no one performed continuous security analysis, then security prices might shift away from their correct market value, and this would create an incentive for active management experts to participate. Therefore, in environments such as stock markets, which are highly competitive, it is believed that these markets will only reach near-efficiency and that profit opportunities will exist for active management experts (Bodie, Kane, & Marcus, 2011).

Similarly, trading is perceived by the market as being based on informed decisions. When directors trade they are generally assumed to be better informed about the company's future prospects based on their closeness to confidential internally available information. Fishman & Hagerty (1992) stated that insider trading overpowers information acquired by external investors and compromises the efficiency of the capital market.

Insiders of publicly listed entities include those employees, and the board of directors, who have access to more information about their company than do the external shareholders. Ojah, Muhanji & Myburg (2008) describe insider trading

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as "an illegal method that an information-privileged few uses to expropriate the wealth of many who lack access to the same level of information. Perhaps a more far-reaching consequence of insider trading is its erosion of social capital, which undermines contracts (particularly financial contracts), which in turn, renders financial markets inefficient with a concomitant less than efficient production in the economy" (p.2).

Ojah et al. (2008) concluded that the insider trading law has increased the awareness and hatred of insider trading as being criminal and illegal among market participants, and that listed companies in South Africa experienced statistically significant improvements in securities market efficiency and corporate governance during most of the five years after the initiation of the law (2000-2004). Ojah et al. (2008) also concluded that: "upon controlling for other determinants of cost of capital, effective initiation of the insider trading law still explained the reduction in the cost of equity by about 6% per annum. In fact, the mere initiation of the legislation does not reduce the cost of equity" (p.24), instead it occurs during the years of enforcement.

## 2.4   The mosaic theory

Analysts utilise their expertise to analyse, interpret information and then circulate this to their clients. In order to achieve great performance, these analysts have to make use of all the sources of information that they can access and then draw conclusions through deductive reasoning. It appears to be an accepted norm that during this deductive process, analysts may use material and immaterial public information and non-public immaterial information (The Investment Analysts Society of South Afrca, 2013).

The mosaic theory purports that an insightful analyst may adopt this approach and arrive at a conclusion that would appear to emanate from material non-public information. Therefore, the analyst's conclusion is a direct result of great analysis and not due to the use of inside information. As a legal safeguard, the analyst is still required to maintain records of all the sources of information and the stepwise

thought process that corroborates their deduced conclusion (The Investment Analysts Society of South Afrca, 2013).

## 2.5   Agency theory

The agency theory concentrates on the impact of insider trading on the company's level of market efficiency and corporate value. Insider trading worsens the conflict between insiders and shareholders and this results in an increase in agency costs. Agency costs is defined by Jensen & Meckling (1976) as the consulting expenses that are incured by a company to hire stock brokers and financial analysts in order to improve its market efficiency. Whilst there is an argument that insider trading that benefits the company or its shareholders is legitimate, if it were to result in an illegal benefit of control to the insiders at the expense of the shareholders then this would give rise to agency costs. Jensen & Meckling (1976) also stated that through the regulation of insider trading this would reduce any prejudice to the shareholders and consequently any conflict of interest between insiders and shareholders.

## 2.6   Dow theory

Bodie et al. (2011) refer to the Dow theory as the "grandfather of trend analysis" (p.422) which was named after its creator Charles Dow, who established The Wall Street Journal. This theory proposed three forces that are concurrently affecting stock prices:
  (a) The primary trends relate to the long term movement of prices, which lasts from several months to several years;
  (b) The secondary trends relate to short term movements of prices, which last from several weeks to several months; and
  (c) The tertiary trends relate to the intraday share price fluctuations.

The primary trend is typically upward and therefore has an upward effect on the long-term share price, whilst the secondary trends will affect short-term price fluctuations. The intraday trends are minor and have no long-term impact on the share price.

This research study aimed to investigate the primary and secondary share trends and to manipulate this information into an optimal director dealing investment style.

## 2.7 Related director dealing studies

Uylangco et al. (2010) found that directors appeared to act as typical investors do, by purchasing (selling) shares when the price was low (high). Directors did achieve abnormal returns through trading in shares of their own companies. Imitators adopting a strategy of purchasing (selling) when directors purchased (sold) shares were able to secure a small abnormal return. However, Uylangco et al. (2010) found it highly unlikely that the abnormal return could cover transaction costs and the buy/sell spread. An analysis of returns after directors traded, but before they announced the trade to the market, showed that they were making small but statistically significant returns that were not available to the market. An analysis of returns subsequent to the ASX (Australian Stock Exchange) reporting requirement and up to the day the trade is reported, showed that over this period the directors were making small, but statistically significant returns that should have been available to the market.

Uylangco et al. (2010) also established the extent of late reporting by Australian directors and the small but statistically significant disadvantage that this late reporting imposed on outside shareholders. Whilst this research study did not focus on the late reporting of directors, cognisance must be taken of the directors' conflict of self-interest and fiduciary duty and the ramifications of their personal motives to prejudice the market.

In a separate study, Nair (2008) stated that although there were differing results of studies on the JSE, this was consistent with international studies which sometimes contradicted the findings on whether directors did actually earn abnormal returns. The author went on to state that when directors sold shares it was not as credible as a buying signal, because directors often sold shares to free up cash and it might have been dependent on their personal needs. However, when directors purchased shares it must be because they expected to

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make a future profit. This would suggest that directors' share purchases act as a stronger signal to the market than when they sell shares in their company.

However, Mordant & Muller (2003) stated that outsiders may more readily follow directors' sales than their purchases, and by selling their shares they might depress the share prices. They also indicated that South African directors are better at bailing out of their shares before a poor financial performance than at investing in shares before a good financial performance. Similarly, Brown, Foo & Watson (2003) found that directors were able to achieve abnormal returns from sales of shares (particularly for resource companies) and thereby avoid future losses. It was also established that the directors' share purchases did not capture future abnormal price increases, nor was there any bias due to the size of the company or the size of trade (Brown et al. 2003).

Directors' purchases and sales of their company shares triggered significant immediate market reactions of 3.12% and −0.37%, respectively, which was measured over a 2-day window period starting from the announcement day (Fidrmuc, Goergen & Renneboog, 2006). This report went further to conclude that the lower market reaction to sales may have been due to the liquidity needs and that when several directors traded on the same day, the announcement reaction was stronger. As a result, it could be concluded that multiple trades gave more credibility to the signal conveyed to the market.

Lei & Wang (2012) demonstrated that insiders "behaved strategically in response to the time-variation in the amount of liquidity trading" (p.28-29). Therefore, their findings provided more depth to our understanding of the interactions between informed traders and liquidity traders. The study's primary focus was on insiders' trading patterns before corporate announcements and was also related to insider trading literature. It was stated that it was "natural to use insider trades in an empirical test of the strategic trading model because the actual trades of informed traders are rarely disclosed, nor are they explicitly observed in reality" (Lei & Wang, 2012, p.29). This study provided evidence that insiders time their trades before corporate announcements based on the amount of liquidity trading that is available to cover their trades.

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McInish, Frino & Sensenbrenner (2011) found that insiders are more likely to trade on high volume days as this acted as a camouflage to hide their trades. Insider trading raised the number of days with abnormally high trading volumes only slightly, which again indicated that insiders are avoiding attracting attention. No evidence was found that insider trading intensity increased on the insider trading day closest to the announcement day. The study found that the hypothesis that index returns for insider trading days and non-trading days were the same could not be rejected and this was consistent with insiders avoiding attention. For shares sold by insiders, the returns were higher for insider trading days than for non-insider trading days. Therefore, insiders were selling on days when the market was up, and which hid their trading. But for shares bought by insiders, the returns were significantly higher on insider trading days than on non-insider-trading days, which indicated that insiders may attract unwanted attention in this instance.

Another study has shown that additional insider trading may increase overall share price accuracy, however that benefit is outweighed by the empirical evidence indicating various disadvantages, including less market participation, increased cost of equity and increased market volatility (Prenticen & Donelson, 2010). This report went on to conclude that insider trading sent a signal that the market presented an uneven playing field and investors should either stay out of the stock market or pay less for the securities to protect themselves from the risk that insiders are taking advantage of them. It was stated that "the benefits of insider trading as a signalling device have been consistently overrated" (p.73).

Feng (2008) showed that insiders in repurchasing firms tended to decrease their selling activity and increase their buying activity before repurchase announcements. However, after the announcement the variance in insider trading activities between repurchasing firms and non-repurchasing firms was largely insignificant.

Another study in Australia by Chang & Chopra (2007) concluded that Australian directors' trades contained vital industry information and that an external imitator

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could experience positive results by investing in the relevant industry by following the same trading pattern as a director.

This literature review will assist in understanding the reasons why directors in South Africa can potentially achieve abnormal returns from trades in their own company's shares and based on the results of this study it could motivate for director dealings to become an investment style of choice by many investors.

## 2.8    Optimising an investment style

Whilst there are many differing views on the use of director dealings as an investment indicator, those studies that show support for its use provided little guidance on the optimal investment method and approach that should be followed. Muller & Ward (2013) used an improved methodology and data set and with the use of the style engine, they consistently found significant excess returns when varying momentum, earnings yield, dividend yield, price to book, cash-flow to price, liquidity, return on capital, return on equity and interest cover. They did not investigate director dealings as a variable. Muller & Ward's (2013) improved methodology and data set was used in this research study which investigated if imitating director dealings was a viable investment approach and more importantly, which of the selected parameters should be followed as an investment style in order to achieve the excess returns. In addition, this research study is believed to be the first to use all 13,840 JSE ALSI share director dealings from 1 April 2002 to 20 September 2013 in its testing sample.

## 2.9    Conclusion

There are many regulations in place to curb insider trading, however their effect is diluted due to the weak enforcement of these regulations, particularly in a jurisdiction such as South Africa.

Whilst the theory of the efficient market hypothesis is still postulated and supported by its proponents, the mere fact that market share prices are continuously being adjusted to cater for under or over pricing, contradicts this

theory. In addition, the fact that studies such as by Mordant & Muller (2003); Jenter (2005); Fidrmuc et al. (2006); Lakonishok & Lee (2001); Korczak et al. (2010) and Muller & Ward (2013) were able to prove abnormal profits, also contradicts this theory.

Various studies using an event study methodology have been conducted on JSE director dealings as an investment indicator. A common theme of the results amongst these studies is that they have at best shown statistically significant, but economically insignificant abnormal returns. An event study methodology is limited by the following inherent limitations:

(a) As the focus is on abnormal returns, very little about an investment strategy or style can be extracted from the analysis;

(b) The calculation is based only on individual share abnormal returns; and

(c) The inability to identify during which periods the investment strategy works or not.

The past research studies also covered varying and sometimes overlapping periods of time and so this research study aimed to address these various shortcomings. This study is the first to use a portfolio time series approach and all 13,840 JSE ALSI director dealings between 1 April 2002 and 20 September 2013. A comparative analysis with the equal weighted All Share Index demonstrates the level of outperformance, if any, by the calculated investment style.

# Chapter 3: Research hypotheses

The purpose of this research study is to determine whether or not there is a statistically significant outperformance by a portfolio of directors' share dealings against the benchmark, being the Equal Weighted All Share Index (EWALSI).

**Research question 1**:
Can a portfolio of director dealing share purchases outperform a benchmark?

**Research question 2**:
Can a portfolio of director dealing share sales underperform a benchmark?

## Hypothesis 1: Buy portfolio

Insiders are likely to buy shares when it is undervalued or there are promising prospects of future earnings. As such, directors send a positive signal to the market by purchasing shares in their company and one would expect the subsequent share price to increase. The null hypothesis states that the portfolio value of shares purchased by directors (PVBUY) is less than or equal to the portfolio value of the EWALSI over the relevant period ($t$). The alternate hypothesis states that the portfolio value of shares purchased by directors (PVBUY) is greater than the portfolio value of the EWALSI over the relevant period ($t$).

$H1_0$: $PVBUY_t \leq EWALSI_t$
$H1_A$: $PVBUY_t > EWALSI_t$

Where:
The term PVBUY refers to the Buy portfolio value which will be based on the optimal director dealing investment style.

The time period $t$ refers to the relevant period from 31 December 2002 to 20 September 2013.

## Hypothesis 2: Sell portfolio

Insiders are likely to sell shares when it is overvalued or there are declining prospects of future earnings. As such, directors send a negative signal to the market by selling shares in their company and one would expect the subsequent share price to decrease. The null hypothesis states that the portfolio value of shares sold by directors (PVSELL) is less than or equal to the portfolio value of the EWALSI over the relevant period ($t$). The alternate hypothesis states that the portfolio value of shares sold by directors (PVSELL) is greater than the portfolio value of the EWALSI over the relevant period ($t$).

$H2_0$: $PVSELL_t \leq EWALSI_t$
$H2_A$: $PVSELL_t > EWALSI_t$

Where:

The term PVSELL refers to the Sell portfolio value which will be based on the optimal director dealing investment style.

The time period $t$ refers to the relevant period from 31 December 2002 to 20 September 2013.

# Chapter 4: Research methodology

## 4.1    Introduction

The research methodology followed in this research study was a quantitative secondary data approach. Whilst most past studies on JSE insider trading have involved the use of an event study methodology (for example, Mordant & Muller (2003), van der Plas (2007), Nair (2008), Baty (2008) and Mokale (2010)), this methodology has shown inherent limitations including:

a) As the focus is on abnormal returns, very little about an investment strategy or style can be extracted from the analysis;

b) The calculation is based only on individual share abnormal returns; and

c) The inability to identify during which periods the investment strategy works or not.

The capital asset pricing model (CAPM) was considered, but was excluded due to recent findings, which related particularly to the unreliability of beta values and which created uncertainty over the use of this model (Strugnell, Gilbert & Kruger, 2011; van Rensburg & Robertson, 2003)).

As a result of these shortcomings, this research study was based on the portfolio time series methodology, which was applied by Muller & Ward (2012) using the 'style engine' and JSE data, and was therefore highly relevant. The author believes, to the best of his knowledge, that this is the first study to utilise a visual portfolio time series approach on JSE directors' dealings data and that this is the first study that aims to identify an optimal director dealing investment style.

## 4.2    Research design

A deductive research method using an experimental portfolio time series design was used in this research study (Saunders & Lewis, 2012). With the use of the style engine, this approach involved a visual time series comparison of the portfolios and supported an understanding of the differences between the

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portfolios' performance over time. The comparison was performed using portfolio values, which included a reinvestment of dividends. The testing of the hypotheses was performed by a quantitative method, which aimed to identify the level of statistical significance of the results.

The JSE data was obtained through personal communication, which involved meeting for many hours over several days with Mr Chris Muller, a highly acclaimed academic in this field. The data for the period from 1 April 2002 to 20 September 2013 was extracted with the assistance of the style engine and was based on director dealings and JSE share price data obtained from Sharenet and published financial statement data obtained from I-Net Bridge.

Whilst the population consisted of more than 350 companies listed on the JSE, the sample data used in this research study was based on the JSE All Share Index (ALSI) companies, which comprised of the top 160 listed companies on the main board of the JSE. The rationale for this selection was partly attributed to the percentage coverage as the ALSI comprised of the top 160 market capitalisation companies and represented some 99% of the total market capitalisation value of the JSE. In addition, those companies that are not part of the ALSI can be considered too small and too illiquid for most institutional investors (Muller & Ward, 2013). The illiquid nature of certain shares was considered unsuited to the experimental research design of this study and to short holding periods used in the testing.

All portfolios have therefore been created based on the director dealings data of the top 160 companies ranked by market capitalisation, after confirming that there were no missing variables in any of the top 160 sample companies. The data included new listings and delisted companies, as well as any changes in share prices due to share splits or consolidations, which have been retrospectively adjusted in the time series data (Muller & Ward, 2013). The entire population of 13,840 director dealings over the period from 1 April 2002 to 20 September 2013 was included in this research study. This included all purchase and sale transactions made by directors in their companies.

If a company in the sample sells off a subsidiary that subsequently became independently listed, the returns of the newly listed subsidiary were included with the returns of the original holding company for the remainder of the holding period. Thereafter the companies were treated as separate entities for portfolio rebalancing purposes.

As dividend income is considered a significant yield to investors, dividends were included in the calculation of share returns based on the dividend payouts as indicated by I-Net Bridge.

As the director dealing portfolios were created on an equal weighted basis, the EWALSI was used an appropriate and comparable benchmark. This would prevent any style bias from the market capitalisation or company size from affecting the results.

Before an analysis of the secondary data using a quantitative method was performed, cognisance was taken of the expected format of the outputs and results. The results of this research study was expected to embody three areas: the visual time series graphs, the monthly portfolio values and the compound annual growth rate (CAGR). The research design was chosen to obtain a comprehensive understanding of the impact of the variables on the results and to enhance the portfolio value and investment style into an optimal director dealing investment style.

### 4.2.1  Visual time series graphs

The time series research design was applied in a similar manner to that of Muller & Ward (2013), where it was proven that the visual and graphical method was extremely easy to understand, particularly when conducting portfolio performance comparisons using different investment styles. The time series graph was also beneficial in that it was able to demonstrate during which periods the investment style works and during which it did not work.

### 4.2.2 Monthly portfolio values

Daily share price and director dealings data for the period 1 April 2002 to 20 September 2013 was used in this research study. As the study required historical data, the first period to include a style portfolio was 31 December 2002 and represented a base value of 1. For purposes of manipulating parameters of the portfolio style, processing the data based on the parameters set and rebalancing the portfolio, this was performed on a monthly basis. Through the style engine, the last date of each month was selected as the date for rebalancing and recalculating portfolio values. The time series graph is a linear representation of these month-end portfolio values.

### 4.2.3 Compound annual growth rate (CAGR)

The compound annual growth rate is a useful overall metric to compare the performance of portfolios over the time series range. The CAGR should not be confused with the actual growth of a portfolio but can be defined (Guinan, 2009) as an imaginary number that specifies the constant steady growth rate at which the portfolio would have grown over the period being reviewed. The CAGR formula is provided in Equation 4-1 below.

**Equation 4-1**

$$CAGR = \left( \frac{Ending\ Value}{Beginning\ Value} \right)^{\left( \frac{1}{\#\ of\ years} \right)} - 1$$

## 4.3   Quantitative methods

It can be justified that as the entire population of all director dealings over the period 1 April 2002 to 20 September 2013 (which included 13,840 transactions) was included in the sample in this research study, no quantitative analysis was necessary to make statistical inferences from the sample used. Nevertheless, the following statistical methods were applied as confirmatory evidence to further support the results obtained.

### 4.3.1 Paired samples *t*-test

A paired samples *t*-test was initially applied, which is a hypothesis test for determining whether the population means of the optimal director dealing portfolio and the EWALSI benchmark are the same. Thus, each monthly portfolio value in the optimal director dealing portfolio is paired (matched) with a portfolio value from the EWALSI. The difference between each of these paired observations was calculated and then a paired samples *t*-test was calculated on these different scores via the formula in Equation 4-2 below (Salkind, 2010):

**Equation 4-2**

$$t = \frac{\overline{x}_d}{s_d / \sqrt{n_d}},$$

Where:
$\overline{x}_d$ is the sample mean difference value;
$s_d$ is the standard deviation of the sample difference values, and;
$n_d$ is the number of paired observations in the sample across the relevant period.

This *t* value can then be used to determine the likelihood that any difference between the two samples means is real versus being a result of chance.

A more precise indicator which was chosen in this research study was provided by the *p* value. The *p* value indicated the likelihood of obtaining the observed *t* value by chance (assuming the null hypothesis is true). If the *p* value was low, then the chance of having obtained the optimal Buy or Sell portfolio value just by chance is low and it can be concluded that the population means are likely unequal. The result of the test is described as statistically significant because it indicates that any difference between the sample means is real and not just a result of chance. Conversely, if the *p* value is high, then the likelihood of having obtained one's results just by chance is high, and it can be concluded that the population means might be equal (Salkind, 2010).

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Salkind (2010) stated that in many disciplines, a 5% cut-off was used to determine whether the *p* value was low or high and this implied a 95% level of confidence. For purposes of this research study a 5% level of significance was applied. This also implied a 95% level of confidence and that a Type I error may occur 5% of the time when the null hypothesis is true. The exact *p* value was computed by completing the paired *t*-test in a statistical program called SPSS.

However, subsequent to obtaining the results of the *t*-test, it was identified that the data was not normally distributed and that the use of a parametric test might be questionable. The more appropriate test to be used in this instance was the non-parametric Wilcoxon signed-rank test.

### 4.3.2  Wilcoxon signed-rank test

The Wilcoxon signed-rank test is a non-parametric test used to make inferences about the mean difference between two paired sample populations. This test keeps the Type I error rate at alpha regardless of the population shape. This is an important advantage over the parametric *t*-test which relies on the normality distribution assumption. The *z*-test approximation to the Wilcoxon signed-rank test is shown in Equation 4-3 (Salkind & Rasmussen, 2007):

**Equation 4-3**

$$z = \frac{T - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}.$$

Where:
*T* is the sum of the *R*+ ranks, and;
*n* is the number of nonzero differences.

Once a *z* has been calculated, the appropriate *p* value can be obtained and used as per Salkind's (2010) recommendations above.

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### 4.3.3 Bootstrapping

Bootstrapping was used as a confirmatory quantitative test in addition to the Wilcoxon signed-rank test. Bootstrapping can be regarded as a computer-based statistical method that was used to obtain precise measures of parameter estimates and its most common use is to compute standard errors and confidence intervals (Salkind, 2010).

Salkind (2010) stated that the bootstrap method is suitably general for it to be used in the portfolio time-series analysis, such as in this research study. Using the style engine, 100 random Buy portfolios were each created using the relevant period, ALSI shares and the average number of shares and holding period identified in the optimal director dealing Buy portfolio as preset parameters. Similarly, 100 random Sell portfolios were also created. The CAGRs of these 100 random Buy and Sell porfolios were compared to the CAGR of the optimal Buy and Sell director dealing style portfolios. This test was performed as a secondary measure to determine whether the CAGR of the optimal Buy and Sell director dealing style portfolios can be replicated and are not just a result of chance.

## 4.4   Style engine

To perform the analysis a style engine was created in Microsoft Excel, which used Visual Basic for Applications (VBA) code to extract and manipulate the data from the Microsoft Access database. The inputs were parameterised into the style engine in order to facilitate easy changes to the input variables and investment style. The input parameters included:

| a) Director share purchases | g) The holding period |
|---|---|
| b) Director share sales | h) The lookback period |
| c) Daily share values | i) The percentage of market capitalisation traded |
| d) End of month share values | j) EWALSI |
| e) Start date | k) Portfolio values |
| f) End date | l) CAGR |

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Utilising the data of the top 160 companies, a default Buy and Sell portfolio was created based on a default three-month holding period with monthly rebalancing and a three-month lookback period. As a three-month holding period was applied the style engine would know to split the portfolio into four ¼ investments that would each be invested during each of the first four consecutive months. Thereafter, a ¼ of the portfolio would be rebalanced on a monthly basis. Similarly, during the portfolio testing the style engine would assign the portfolio into one to twelve portions for a twelve- to one-month holding period respectively.

The lookback period related to all shares which were bought and sold by directors in the three months up to 31 December 2002, and these shares were then included in the Buy and Sell portfolios respectively and remained in the portfolio for a three-month period before being rebalanced.

The experimental research approach involved the following for both the Buy and Sell portfolios and in this order:
    (a) Firstly, identify the optimal holding period;
    (b) Secondly, identify the optimal lookback period;
    (c) Thirdly, identify the optimal minimum percentage of market capitalisation traded; and
    (d) Revert to step (a) to confirm that the optimal holding period still applies. If this holding period has changed then steps (b), (c) and then (a) again are to be re-performed until it is evident that the result is constant and in a 'closed loop'.

Costs relating to brokerage and transactional fees were initially excluded as these costs were envisaged to be approximately the same between the comparative investment style portfolios. Once the optimal director dealing style was identified, the fees were included as a sensitivity and to obtain a more realistic indication of the returns.

Price relative metrics have been included in the time series results by dividing the value of the Buy portfolio by the EWALSI and the Sell portfolio by the EWALSI on a monthly basis. A price relative was calculated for the quotient of the Buy

portfolio over the Sell portfolio. The price relative compared these respective portfolios against each other and its value was recognised as an excess return. Importantly, a positive gradient of the price relative line is indicative of outperformance and a negative gradient would indicate underperformance. The steepness of the gradient indicate the extent of over/under performance of the portfolio. Therefore, if the slope of the price relative line were flat at any point along the time series graph, then this would imply that there is no outperformance occurring between the respective portfolio and EWALSI or between the Buy and Sell portfolios themselves.

## 4.5    Unit of analysis

The unit of analysis was the monthly portfolio values based on the respective monthly closing share prices. These shares were included in the portfolio upon rebalancing and according to the parameterised portfolio style.

The CAGR was a useful overall metric to compare the performance of portfolios over the time series range.

## 4.6    Measurement

The key concepts to be measured include:
- Identifying directors who have traded in their company shares;
- Identifying director share acquisitions and date thereof;
- Identifying director share sales and date thereof;
- Identifying the percentage of market capitalization traded by a director;
- Portfolio CAGR and value movements; and
- JSE EWALSI CAGR.

## 4.7    Exclusion rules

No specific types of director dealing transactions were excluded from the population of 13,840 transactions. As the EWALSI included all director dealing transactions and was used as the benchmark in the Buy and Sell portfolios

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comparative analysis, the director dealing sample data needed to also include all director dealing transactions in order to be justifiably comparable.

Cognisance must be made of the fact that the optimal Buy and Sell portfolios were created using only ALSI shares, which included the market effects of all director dealing transactions. Similarly, no confounding events or factors were excluded from the original data, as their impact was included in the market effects on all the ALSI share prices, which in turn, equally affected the EWALSI benchmark portfolio and the director dealing portfolios created.

# Chapter 5: Results

## 5.1 Introduction

This chapter describes the research process followed during the experimental phase as well as the results obtained. The experimental testing commenced with a starting Buy portfolio and Sell portfolio, which included a three-month lookback period and a three-month holding period as default parameters. No limits were initially set with respect to the minimum percentage of market capitalisation traded, so all market capitalisation percentages of director dealings were initially included in the default portfolios. Whilst director dealings data existed from April 2002, the relevant period over which the experiment was performed ranged from 31 December 2002 to 20 September 2013. This was done in order to have an initial lookback period that included director dealings (i.e. from April 2002 to December 2002).

Based on these parameters Figure 1 depicts the CAGR returns of the Buy portfolio which equated to 23.5% and the Sell portfolio which equated 23.7%. The expectation is to buy or long shares that have been bought by directors in the lookback period and to sell or short shares that have been sold by directors in the lookback period. What is incredible about these initial results is that the Sell portfolio achieved a higher CAGR than the Buy portfolio and more so, that it followed a contrarian investment style. In other words, in order to achieve the 23.7% percent return on the Sell portfolio, an investor would need to buy those shares that had been sold by directors in the lookback period.

The EWALSI achieved a CAGR of 19.1% over the relevant period and was selected, as opposed to the All Share Index (ALSI), to exclude any style bias that the company market capitalisation or size might have on the results. The Buy relative to Sell line of -0.1%, which represents the performance of the Buy portfolio relative to the Sell portfolio, indicates that there is no outperformance by the Buy portfolio as one would have expected. The Buy relative to the EWALSI line represents the Buy portfolio relative to the EWALSI and shows that the value

of the Buy portfolio has consistently been greater than the EWALSI although it did come very close during the global financial crisis in June 2008 when this ratio reduced to 1.06.

**Figure 1: Returns on starting Buy and Sell director dealing portfolios**
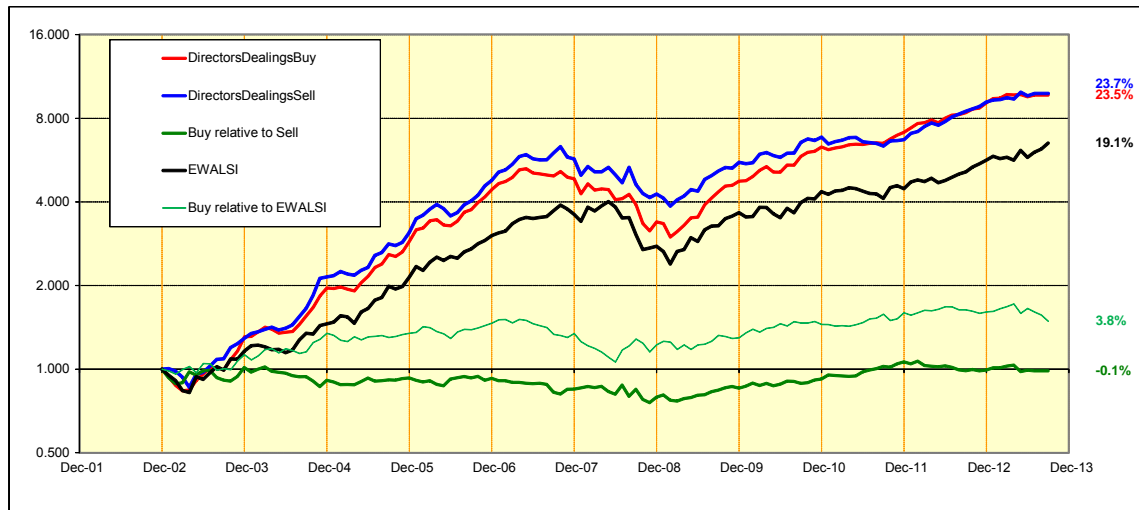


## 5.2 Hypothesis 1 results: Buy portfolio

The first step in the experimental process required an identification of the optimal holding period of the director acquired shares. Figure 2 shows the returns on individual monthly holding periods and that investors can maximise their return based on a holding period of the third month. However, as months one and two cannot be excluded (i.e. months one and two have to be passed in order to get to month three), a cumulative monthly return is the correct and accurate measure of calculating the optimal portfolio return and identifying the optimal holding period.

**Figure 2: Returns on individual monthly holding periods**
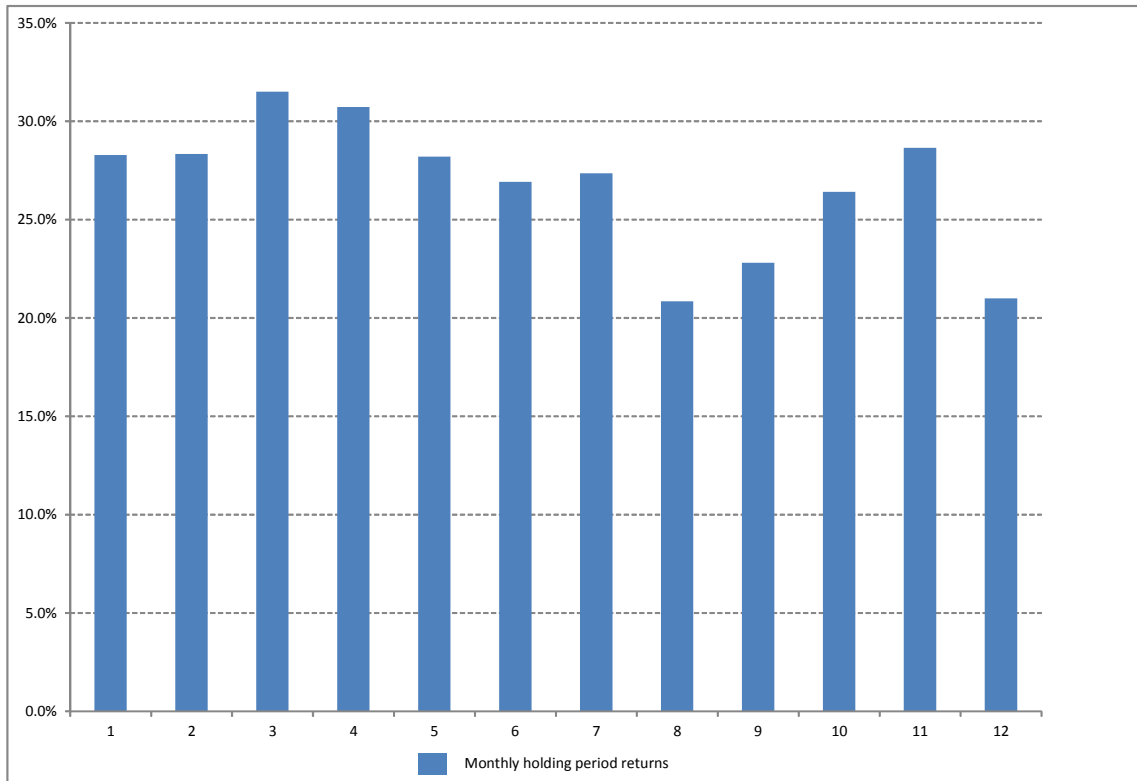


Figure 3 shows that the cumulative monthly returns are optimised at 29.7% based on a cumulative four-month holding period. This is the first variable that can be included in the optimal director dealing investment style for a Buy portfolio.

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**Figure 3: Cumulative returns on monthly holding periods**
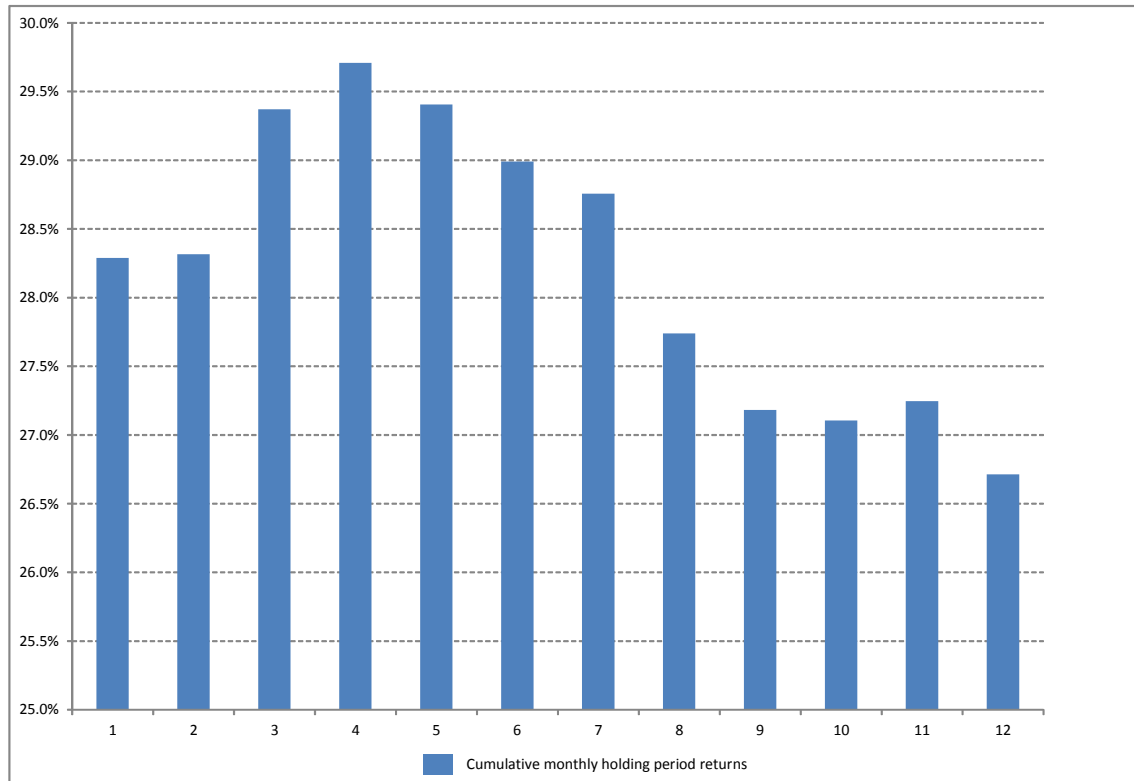


Similarly to the experimental approach for holding periods, the style engine recomputed the data based on varying the lookback periods, but keeping the holding period fixed at four months. Figure 4 shows that the portfolio returns are maximised if only those shares bought by directors in the second preceding month are included in the portfolio upon each rebalancing. As this approach might result in few or no shares being selected in certain periods, it is evident that a cumulative monthly return would be more appropriate as an investment style. A cumulative approach would also assist in creating a more diverse portfolio and thereby reduce the level of investment risk.

Concentration risk was evident in the results as can be seen in the excessively high return in month 10. Had an investment style of including just the shares bought in the 10th preceding lookback month and a four-month holding period been maintained over the relevant period, an investor could have achieved a return of 42.4%. Upon investigation, it was identified that this high return was largely attributed to the Hosken Consolidated Investments (HCI) share, which was suspended during mid-2003 on the JSE and became active again in

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September 2004. As director acquisitions also occurred in September 2004, the HCI share was included in the Buy portfolio before its share price grew significantly and thereby contributed to the high 10th month portfolio return.

**Figure 4: Returns on monthly lookback periods**
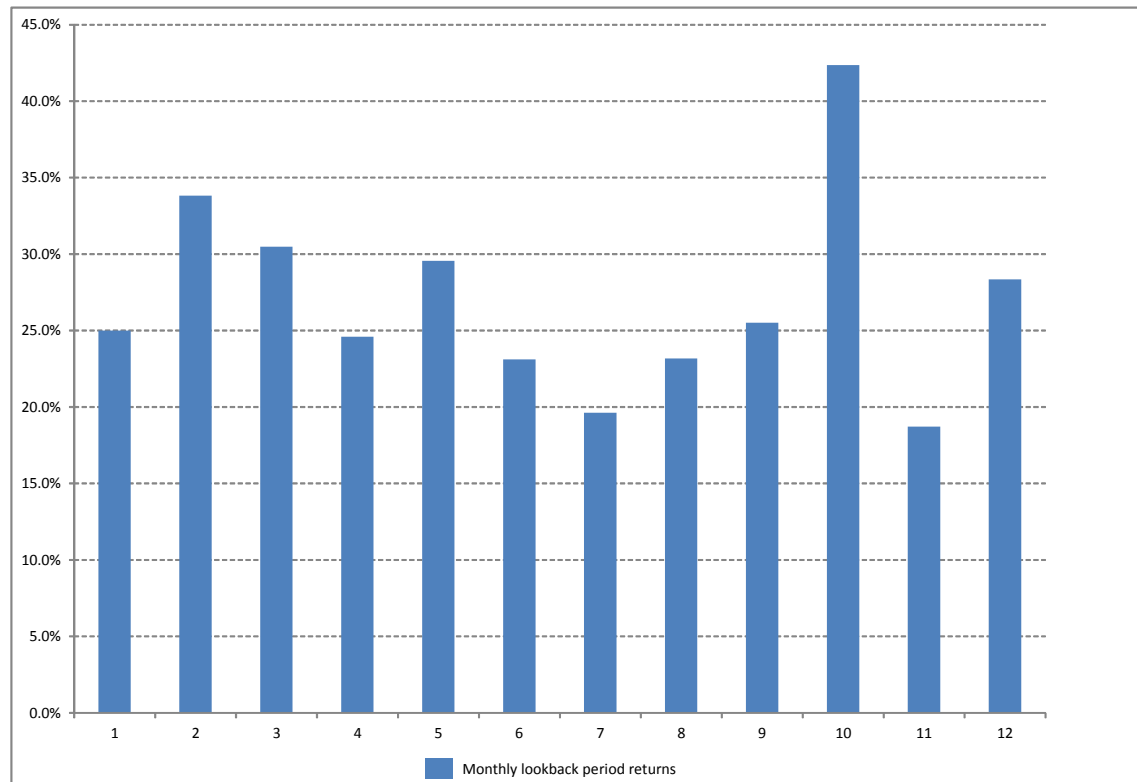


From the cumulative monthly returns shown in Figure 5, it is evident that the preceding three months of director shares bought needed to be included in the Buy portfolio in order to achieve the maximum return of 29.7%.

At this stage, the investment style for a Buy portfolio is to lookback three months and hold these shares for four months before rebalancing.

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**Figure 5: Cumulative returns on monthly lookback periods**
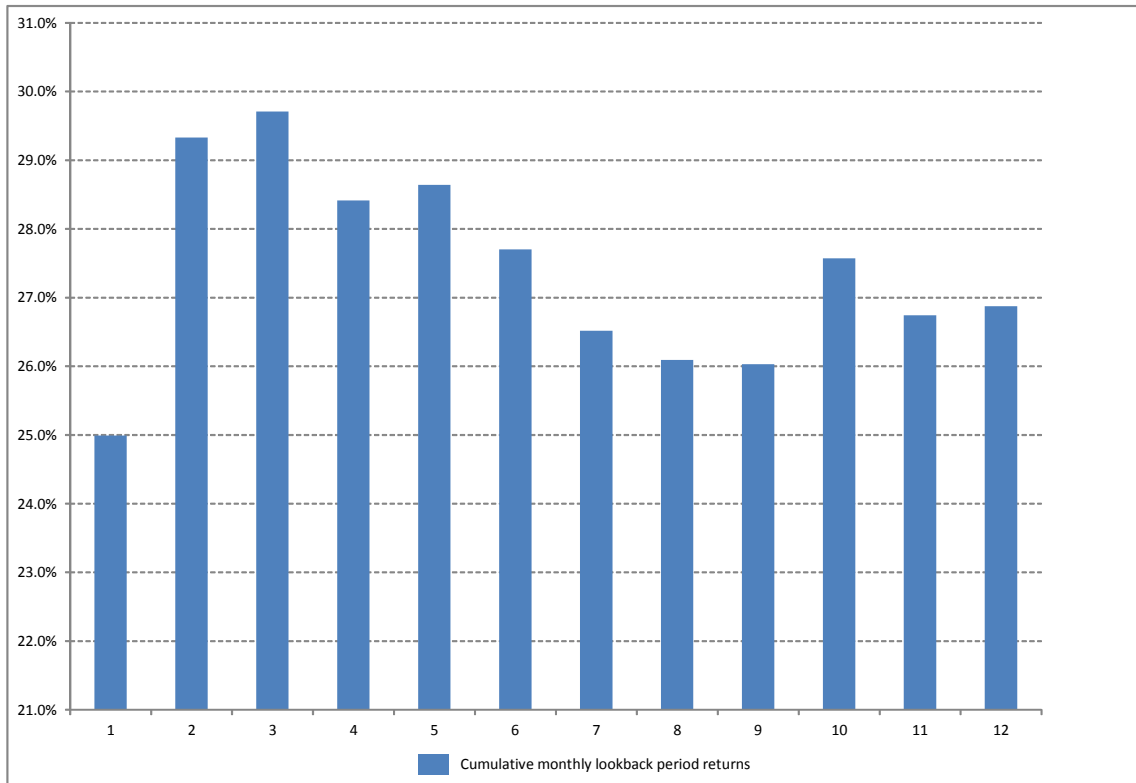


The third variable tested in the experimental approach related to the minimum percentage of market capitalisation traded by a director. The style engine recomputed the portfolio returns based on keeping the lookback period constant at three months, the holding period constant at four months and testing for the optimal minimum percentage of market capitalisation traded. The percentage traded was based on a cumulative percentage that was greater than, and equal to, a range of variables from 0.0001% to 0.0030%. These lower and upper limits were based on the market capitalisation percentages bought by directors during the relevant period and this ensured that all director dealings were included in the sample.

Figure 6 shows that portfolio returns for minimum percentage of market capitalisation traded peaks and maintains a sustainable return of almost 30% from a minimum percentage of market capitalisation traded of 0.0013% or more. A prudent decision was taken to not utilise 0.0011%, being the first and lowest minimum percentage of market capitalisation traded, but to rather use a sustainable minimum percentage of at least 0.0002% more. At this stage, the

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optimal director dealing investment style for a Buy portfolio includes a holding period of four months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.0013% or more.

The next stage of testing involved re-testing the holding period of four months. The style engine recomputed the data over the relevant period whilst keeping the lookback period and minimum percentage of market capitalisation traded constant at three months and 0.0013% respectively. The results proved that a four-month holding period still achieved the maximum portfolio return and it could be concluded that an optimal director dealing investment style for a Buy portfolio included a holding period of four months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.0013% or more. This optimal Buy portfolio (abbreviated to DirectorDealingsBuyL3H4P13) yielded a CAGR of 29.5% over the relevant period as reflected in Figure 12.

**Figure 6: Returns on cumulative market capitalisation % traded**



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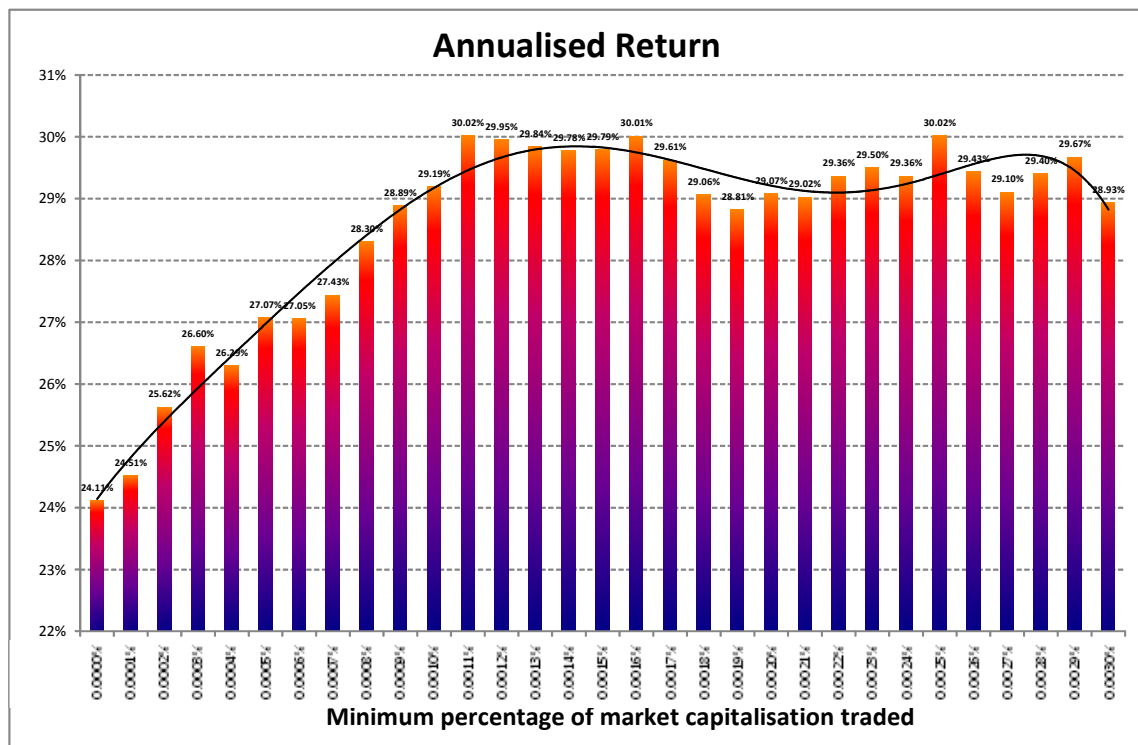
## 5.3 Hypothesis 2 results: Sell portfolio

The first step in the experimental process required an identification of the optimal holding period of the director sold shares. Figure 7 shows the returns on individual monthly holding periods and that investors can maximise their return based on a holding period of the third month. As previously mentioned, a cumulative monthly return is the correct and accurate measure of calculating the optimal portfolio return and identifying the optimal holding period.

**Figure 7: Returns on monthly holding periods**
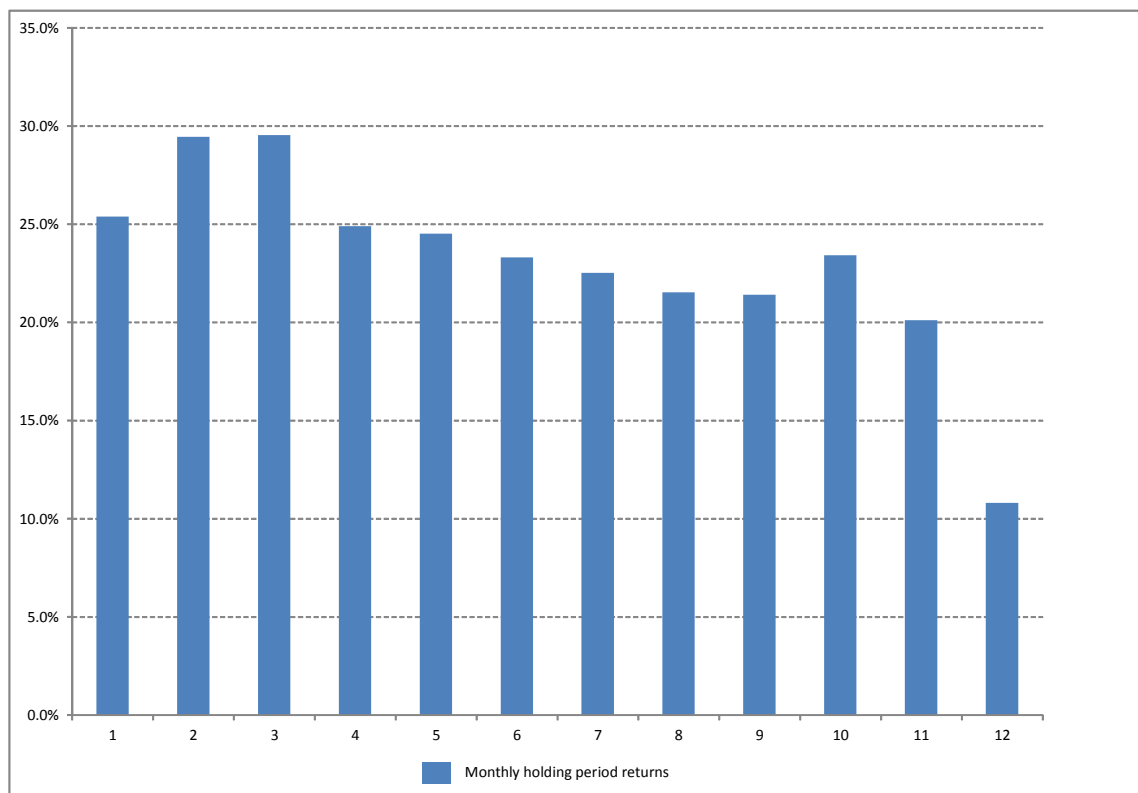


Figure 8 shows that a maximum performance of 28.1% can be achieved based on a cumulative three-month holding period. This is the first variable that can be included in the optimal director dealing investment style for a Sell portfolio.

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**Figure 8: Cumulative returns on monthly holding periods**
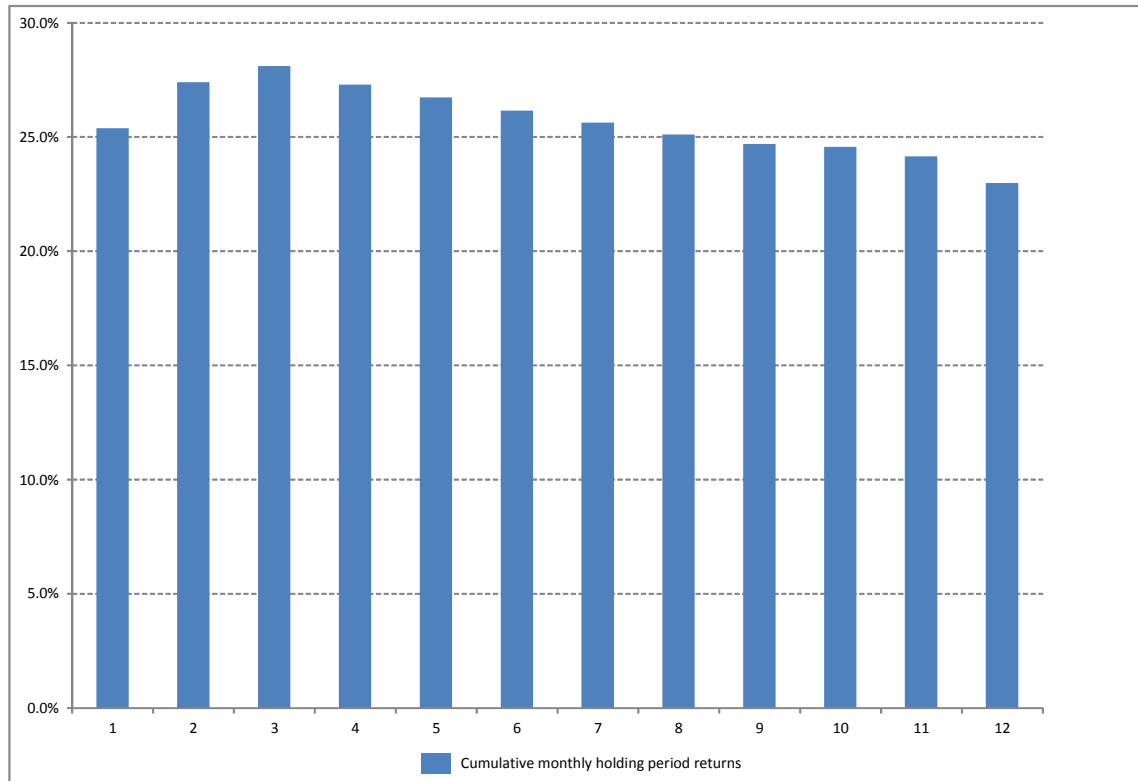


The style engine recomputed the data based on varying the lookback periods, but keeping the holding period fixed at three months. Figure 9 shows that the portfolio returns are maximised if only those shares bought by directors in the second preceding month are included in the portfolio upon each rebalancing. As previously mentioned, this approach might result in few or no shares selected in certain periods, so it is evident that a cumulative monthly return would be more appropriate as an investment style. A cumulative approach would also assist in creating a more diverse portfolio and thereby reduce the level of investment risk.

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**Figure 9: Returns on monthly lookback periods**
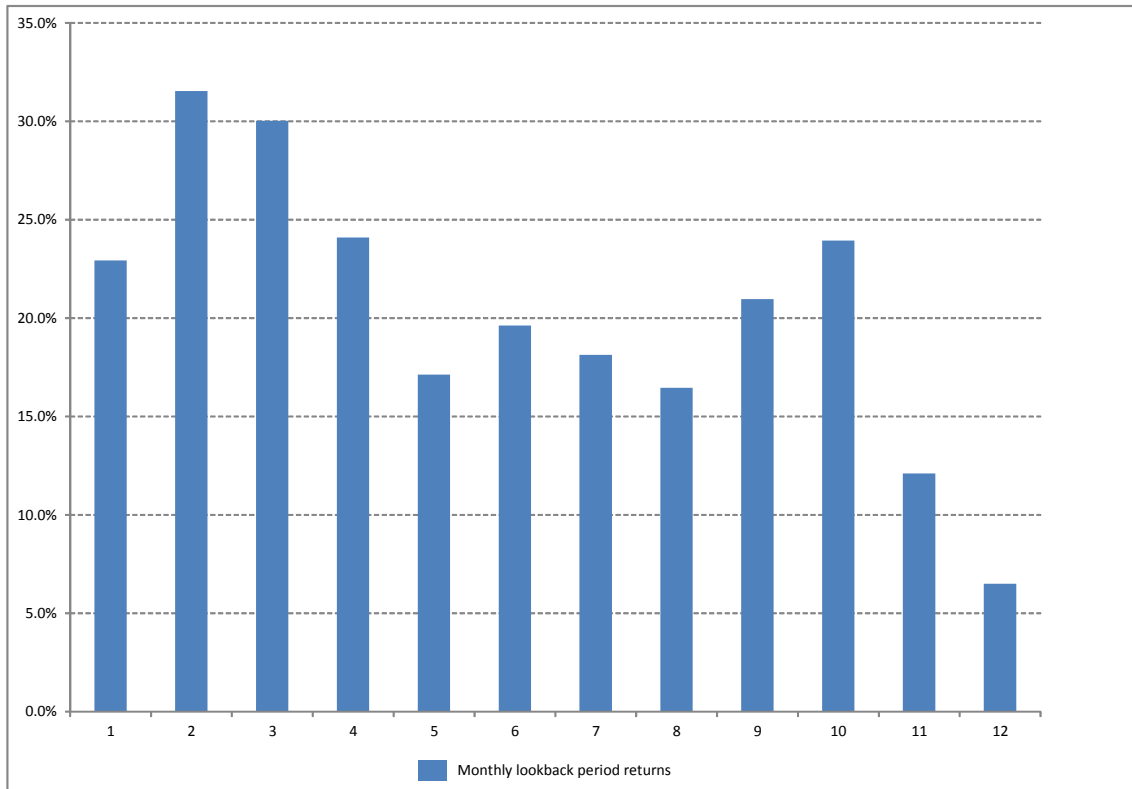


From the cumulative monthly returns shown in Figure 10, it is evident that the preceding three months of director shares sold needed to be included in the Sell portfolio in order to achieve the maximum return of 28.1%.

At this stage, the investment style for a Sell portfolio is to lookback three months and hold these shares for three months before rebalancing.

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**Figure 10: Cumulative returns on monthly lookback periods**
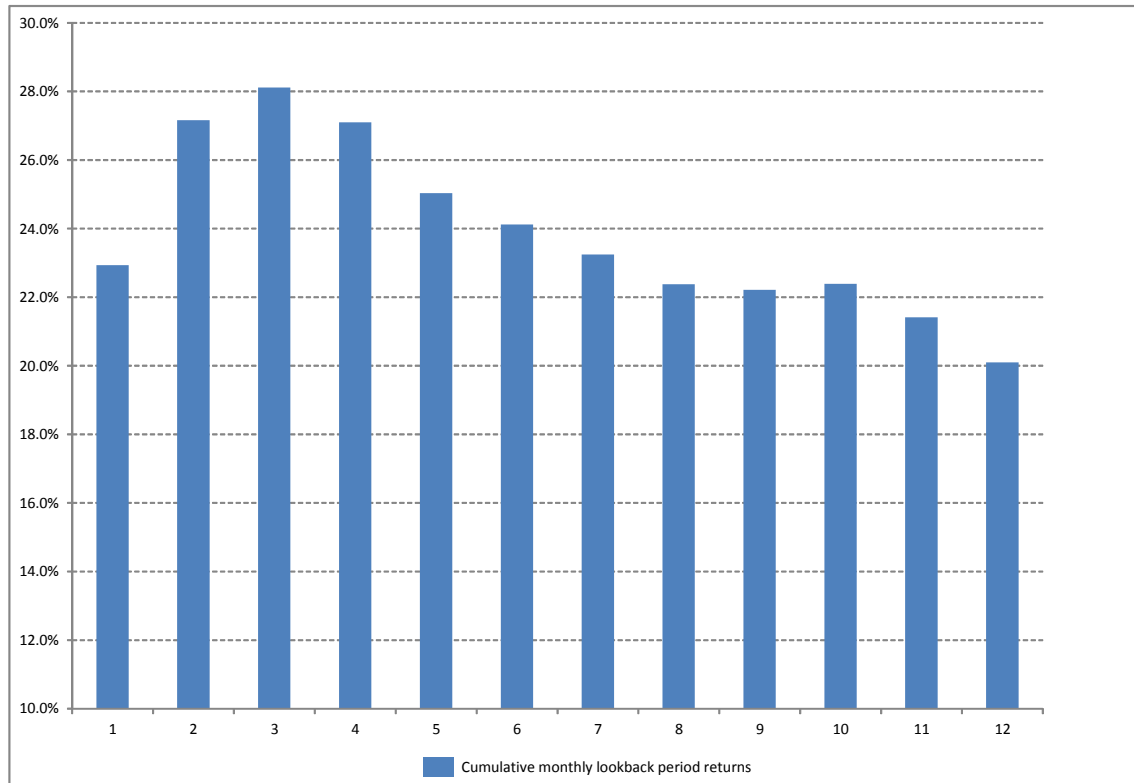


Cumulative monthly lookback period returns

The third variable tested in the experimental approach related to the minimum percentage of market capitalisation traded by a director. The style engine recomputed the portfolio returns based on keeping the lookback period constant at three months, the holding period constant at three months and testing for the optimal minimum percentage of market capitalisation traded. The percentage was based on a cumulative percentage that was greater than, and equal to, a range of discreet variables from 0.0001% to 0.0030%. The range was extended beyond 0.0030% by doubling the percentage until it reached 3.84%. These lower and upper limits were based on the market capitalisation percentages sold by directors during the relevant period and this ensured that all director dealings were included in the sample.

Figure 11 shows that portfolio returns for market capitalisation percentages peaks and maintains a return of almost 28% from a minimum percentage of market capitalisation traded of 0.005% or more. A prudent decision was taken to not utilise 0.003%, being the first and lowest minimum percentage of market capitalisation traded, but to rather use a sustainable minimum percentage of at

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least 0.002% more. At this stage, the optimal director dealing investment style for a Sell portfolio includes a holding period of three months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.005%.

The next stage of testing involved re-testing the holding period of three months. The style engine recomputed the data over the relevant period whilst keeping the lookback period and minimum percentage of market capitalisation traded constant at three months and 0.005% respectively. The results proved that a three-month holding period still achieved the maximum portfolio return and so it could be concluded that an optimal director dealing investment style for a Sell portfolio included a holding period of three months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.005% or more. This optimal Sell portfolio (abbreviated to DirectorDealingsSellL3H3P5) yielded a CAGR of 27.8% over the relevant period as reflected in Figure 12.

**Figure 11: Returns on cumulative market capitalisation % traded**
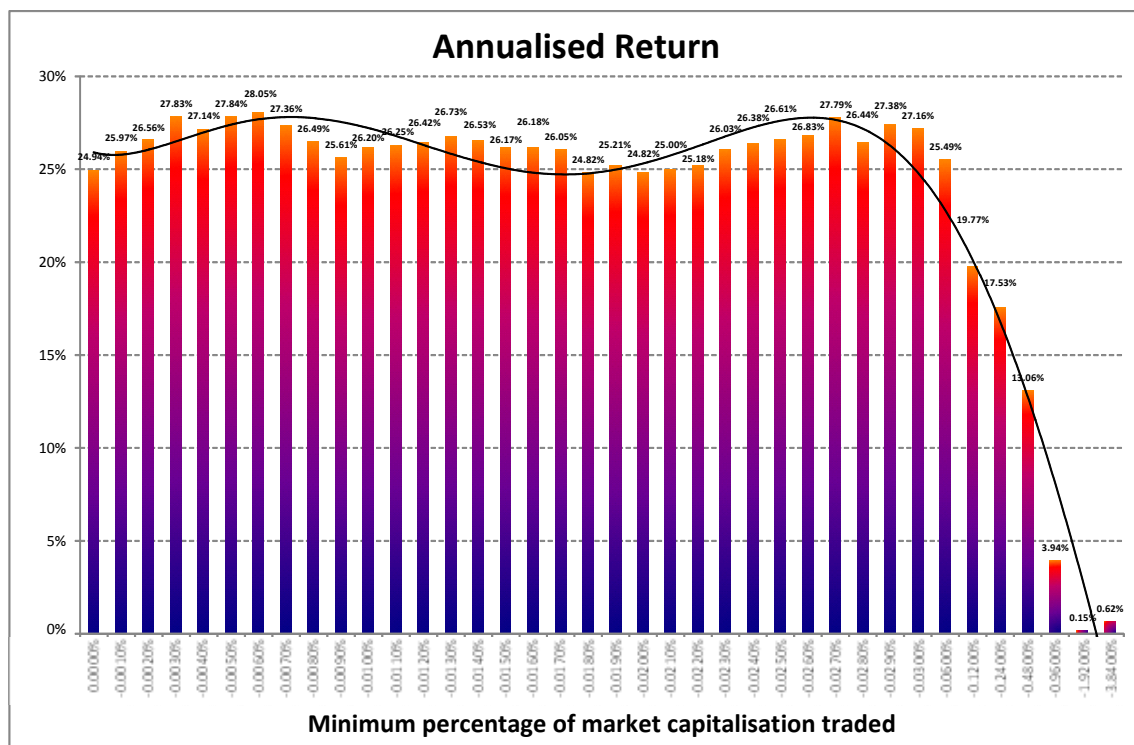


Figure 12 shows the maximum CAGR that could have been earned on a director dealing Buy and Sell portfolio, had the optimal director dealing investment style

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been adopted. The Buy portfolio and Sell portfolio included an average of 13 shares and nine shares respectively over the 130 months of the relevant period. The DirectorDealingsBuyL3H4P13 portfolio and DirectorDealingsSellL3H3P5 portfolio achieved a CAGR of 29.5% and 27.8% respectively over the relevant period.

Of particular interest is the steep gradient of the Sell relative to EWALSI line over the period from mid-2008 to early 2009. This period coincides with the global financial crisis and the slope of the graph suggests that the greatest portfolio profits can be earned by following the optimal director dealing Sell portfolio style during an economic downturn. On closer inspection of the portfolio values between July 2008 and January 2009, it shows the optimal Buy portfolio decreased by 15% whereas the optimal Sell portfolio increased by 12%.

**Figure 12: Returns on Buy and Sell director dealing portfolios (excluding fees)**
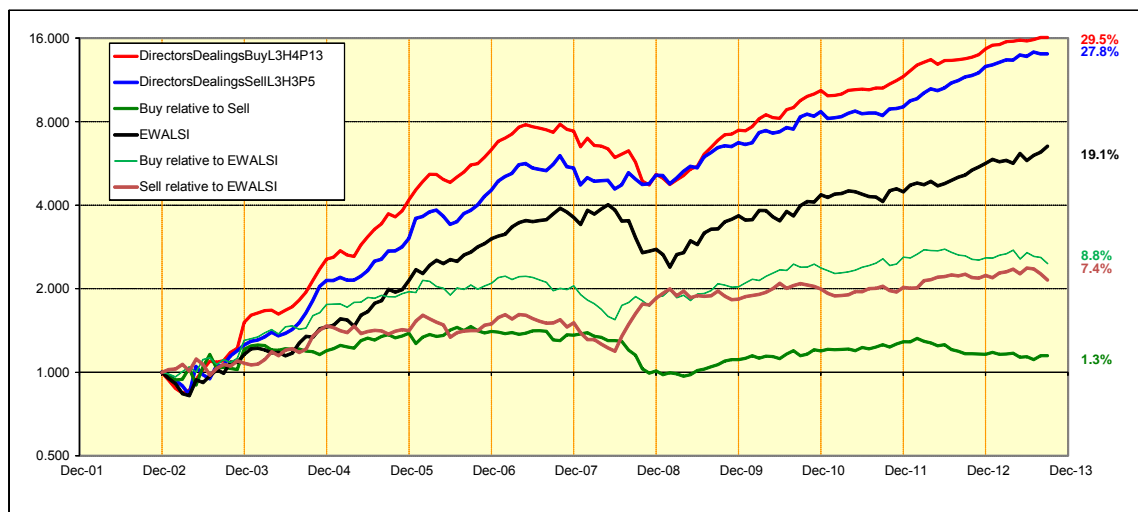


Figure 13 shows a sensitivity analysis of the portfolios' performances with the inclusion of portfolio transactional fees at 0.1%. Cognisance must be taken that as the Buy portfolio has a longer holding period than the Sell portfolio, it will therefore incur lower fees than the Sell portfolio. With the inclusion of fees at 0.1%, the Buy and Sell portfolios achieve a CAGR of 27.7% and 25.4% respectively, and which still outperformed the EWALSI.

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**Figure 13: Returns on Buy and Sell director dealing portfolios (including fees at 0.1%)**
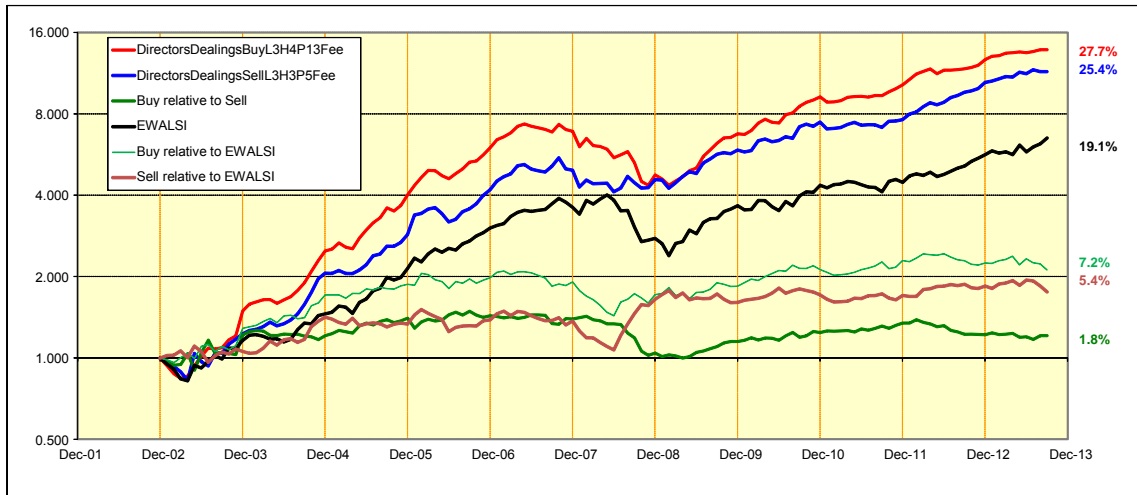


Figure 14 shows a sensitivity analysis of the portfolios' performances with the inclusion of portfolio transactional fees at 0.5%. Both portfolios still outperformed the EWALSI although there was a temporary period during the global financial crisis (February 2008 – July 2008) when the EWALSI achieved a greater portfolio value than the optimal director dealings Sell portfolio.

**Figure 14: Returns on Buy and Sell director dealing portfolios (including fees at 0.5%)**
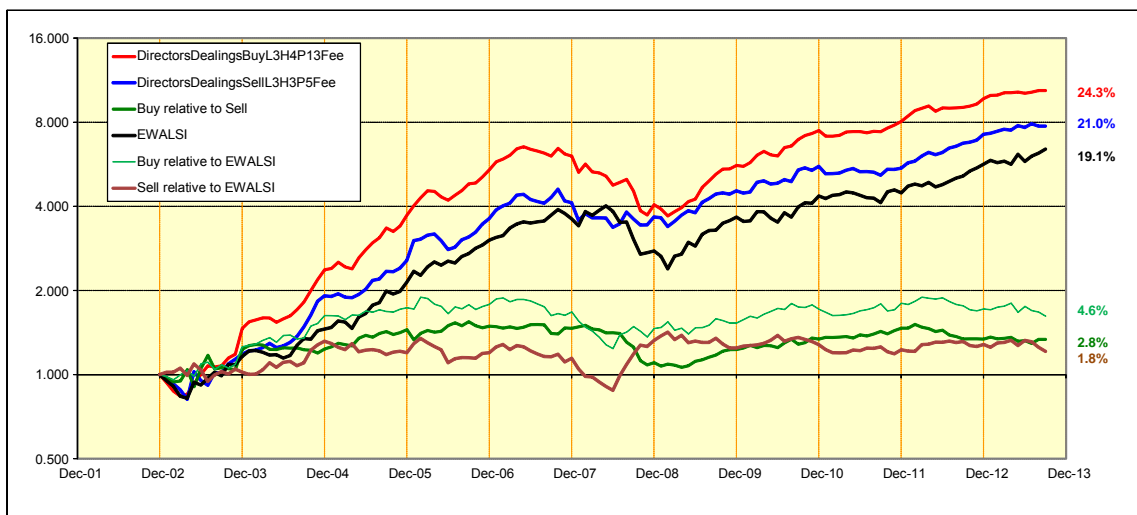


## 5.4 Quantitative tests

### 5.4.1 Paired samples *t*-test

A parametric paired samples *t*-test was first performed on the monthly portfolio values of the EWALSI and the DirectorDealingsBuyL3H4P13 portfolio, and the

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monthly portfolio values of the EWALSI and the DirectorDealingsSellL3H3P5 portfolio across the relevant period.

This data was computed in SPSS, a statistical software package, and these statistical results are shown in Table 1, Table 2 and Table 3 below.

Table 1 shows that there was a strong correlation between the DirectorDealingsBuyL3H4P13 portfolio and the EWALSI as well as the DirectorDealingsSellL3H3P5 portfolio and the EWALSI. This correlation can be expected as the shares in these director dealing portfolios were selected from and are common to the ALSI.

**Table 1: Paired samples correlations**

**Paired Samples Correlations**

|  |  | N | Correlation | Significance |
|---|---|---|---|---|
| Pair 1 | Buy&EWALSI | 130 | .982 | .000 |
| Pair 2 | Sell&EWALSI | 130 | .972 | .000 |

Table 2 shows the descriptive statistics results.

**Table 2: Paired samples statistics**

**Paired Samples Statistics**

|  |  | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Buy | 7.1635 | 130 | 4.43785 | .38922 |
|  | EWALSI | 3.1702 | 130 | 1.47172 | .12908 |
| Pair 2 | Sell | 5.7945 | 130 | 3.69620 | .32418 |
|  | EWALSI | 3.1702 | 130 | 1.47172 | .12908 |

Table 3 showed that the results of the paired samples *t*-test provided a level of significance of 0.000 on both the optimal Buy portfolio to the EWALSI and the optimal Sell portfolio to the EWALSI. However, upon further investigation it was identified that the data was not normally distributed and that the statistical results of a parametric paired samples *t*-test would be questionable. As a result a more appropriate non-parametric Wilcoxon signed-rank test for paired samples was computed in SPSS and its results are shown in 5.4.2 below.

**Table 3: Paired samples *t*-test**

| | | Paired Differences | | | | | t | df | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Buy-EWALSI | 3.99331 | 3.00566 | .26361 | 3.47174 | 4.51487 | 15.148 | 129 | .000 |
| Pair 2 | Sell-EWALSI | 2.62438 | 2.29186 | .20101 | 2.22668 | 3.02209 | 13.056 | 129 | .000 |

*(Table header: Paired Samples Test)*

### 5.4.2 Wilcoxon signed-rank test

The second and more appropriate quantitative test computed in SPSS was the Wilcoxon signed-rank test. The results of the ranks are shown in Table 4.

**Table 4: Wilcoxon signed-rank test ranks**

**Ranks**

| | | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| EWALSI-Buy | Negative Ranks | 72[a] | 69.04 | 4971.00 |
| | Positive Ranks | 57[b] | 59.89 | 3414.00 |
| | Ties | 0[c] | | |
| | Total | 129 | | |
| EWALSI-Sell | Negative Ranks | 75[d] | 65.40 | 4905.00 |
| | Positive Ranks | 54[e] | 64.44 | 3480.00 |
| | Ties | 0[f] | | |
| | Total | 129 | | |

a. EWALSI < Buy

b. EWALSI > Buy

c. EWALSI = Buy

d. EWALSI < Sell

e. EWALSI > Sell

f. EWALSI = Sell

Table 5 shows the test statistics of the Wilcoxon signed-rank test. As both the hypotheses being tested are 1-tailed tests, the 2-tailed significance values in Table 5 can be halved. Therefore, the relevant *p* value of the EWALSI-Buy test equates to 3.4% and the *p* value of the EWALSI-Sell test equates to 4.7%.

A Monte Carlo simulation, which provides an approximate permutation statistic based on a specific subset of all possible permutations, was also performed in

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SPSS. The *p* value of the EWALSI-Buy test equates to 3.1% and the *p* value of the EWALSI-Sell test equates to 4.4% and these results substantiate the similar *p* values obtained in the Wilcoxon signed-rank test.

**Table 5: Wilcoxon signed-rank test statistics**

**Test Statistics[a,c]**

| | | | | EWALSI-Buy | EWALSI-Sell |
|---|---|---|---|---|---|
| Z | | | | -1.830[b] | -1.675[b] |
| Significance (2-tailed) | | | | .067 | .094 |
| Monte Carlo Significance (2-tailed) | Significance | | | .064 | .091 |
| | 95% Confidence Interval | | Lower Bound | .059 | .085 |
| | | | Upper Bound | .068 | .097 |
| Monte Carlo Significance (1-tailed) | Significance | | | .031 | .044 |
| | 95% Confidence Interval | | Lower Bound | .027 | .040 |
| | | | Upper Bound | .034 | .048 |

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on 10000 sampled tables with starting seed 2000000.

### 5.4.3  Bootstrapping

The style engine was used to create 100 random Buy portfolios, which were based on the ALSI share data over the relevant period and included a holding period of four months and 13 shares in each portfolio (this was equal to the holding period and average number of shares in the DirectorDealingsBuyL3H4P13 portfolio). Figure 15 shows the distribution of these 100 random portfolios, with three portfolios achieving a maximum CAGR of 23.75% over the relevant period, and whilst the mode of 20.25% was achieved by 20 different portfolios.

**Figure 15: Buy Bootstrap sample of 100 random portfolios**
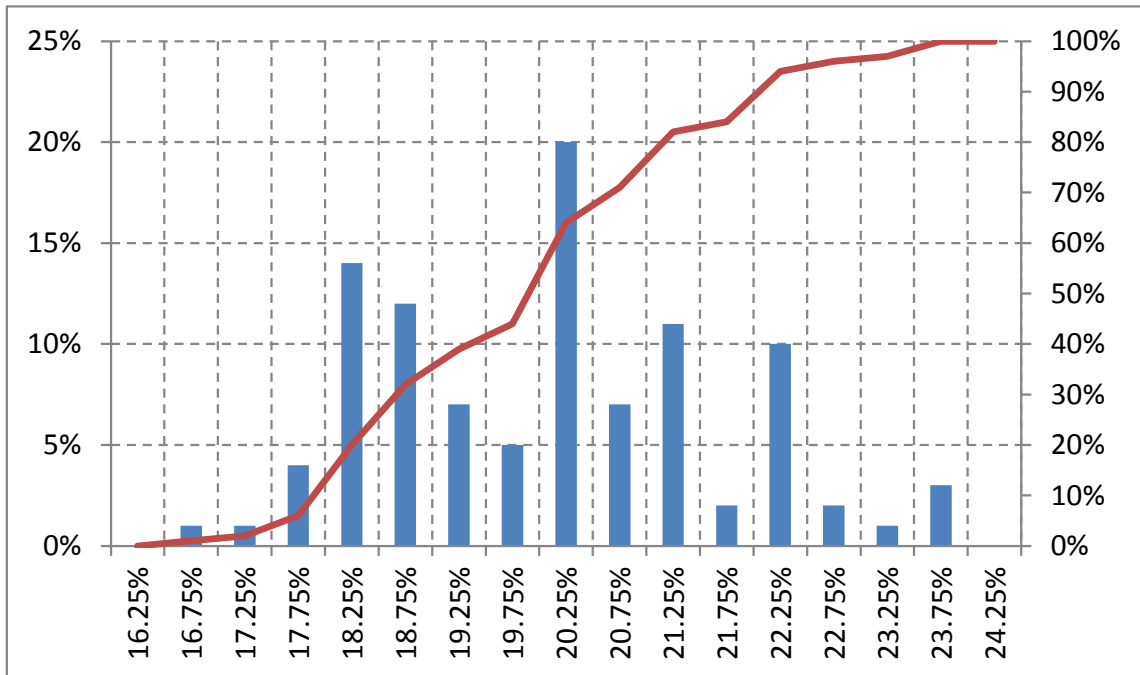


The style engine was used to create 100 random Sell portfolios, which were based on the ALSI share data over the relevant period and included a holding period of three months and nine shares in each portfolio (this was equal to the holding period and average number of shares in the DirectorDealingsSellL3H3P5 portfolio). Figure 16 shows the distribution of these 100 random portfolios, with only one portfolio achieving a maximum CAGR of 25.25% over the relevant period and the mode of 20.75% was achieved by 18 different portfolios.

**Figure 16: Sell Bootstrap sample of 100 random portfolios**
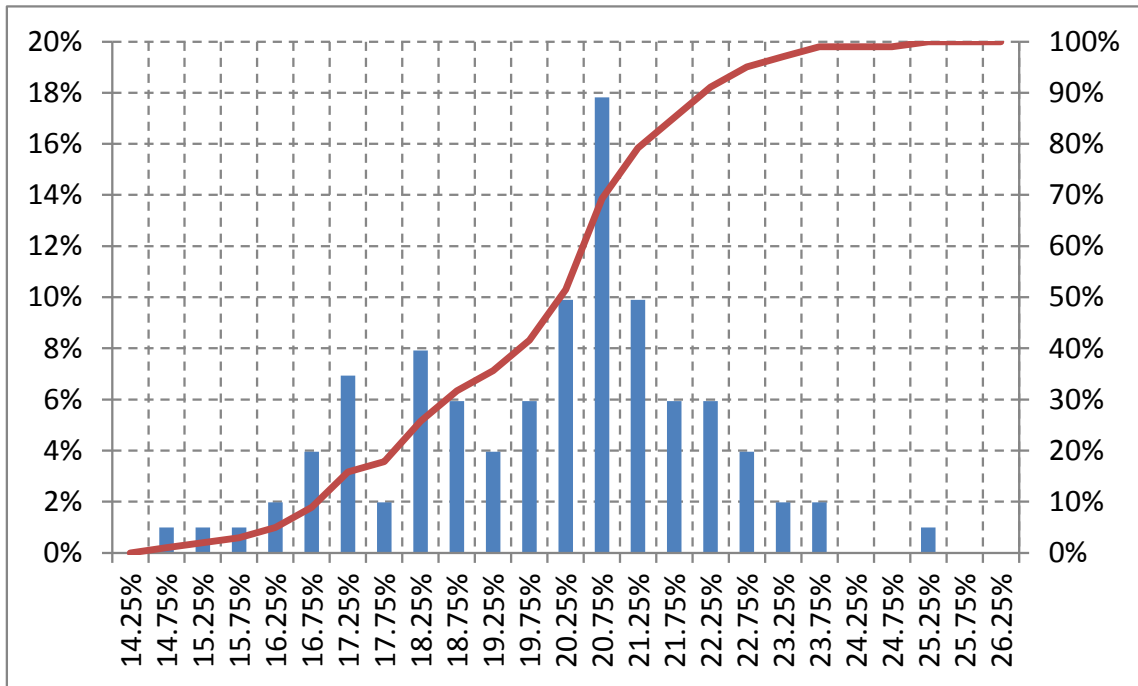
# Chapter 6: Discussion of results

## 6.1    Hypothesis 1: Buy portfolio

Figure 6 illustrates the performance spread of director dealing Buy portfolios based on the range of minimum percentage of market capitalisation traded over the relevant period. As can be seen from this figure a sustainable CAGR of almost 30% is achieved from a minimum percentage of market capitalisation traded of 0.0013% or more. The minimum percentage of market capitalisation traded ranged up to 0.0030%, at which point the portfolio provided a CAGR of 28.93%. The average CAGR of the 18 portfolios with a minimum percentage of market capitalisation traded from 0.0013% to 0.0030% was 29.43% over the relevant period. In comparison to the EWALSI benchmark, most investors would be satisfied with the outperformance provided by any of these 18 portfolios. Whilst studies by Chang & Chopra (2007) have proven positive returns based on a general industry type investment style, the results of this research offer greater value by optimising the holding period, lookback period and minimum percentage of market capitalisation traded.

Figure 12 shows the optimal DirectorDealingsBuyL3H4P13 portfolio, which achieved a CAGR of 29.5% over the relevant period. Stated differently, this portfolio has shown cumulative growth of 1,656% over the 130 months of the relevant period. In comparison, the EWALSI benchmark achieved a CAGR of 19.1% over the relevant period whilst the cumulative growth of its portfolio value equated to 652%. These comparative results visually prove the extent of the outperformance by the DirectorDealingsBuyL3H4P13 portfolio over the EWALSI across the relevant period. The use of a portfolio time series approach has proven overwhelming results (Muller & Ward, 2013) and more so if compared to Nair's (2008) use of an event study model over 252 days which showed a statistically significant, but economically insignificant excess return of 0.33% from director dealing purchases. Mokale (2010) also demonstrated an economically insignificant 0.72% on director dealing purchases after five days. The ability to outperform to the extent in this research study demonstrates that there were

underpriced shares in the stock market and as such negates the theory of the efficient market hypothesis proposed by Fama (1965); Bodie et al. (2011) and Dimson & Mussavian (2000).

Instead, these results support the views of Korczak et al. (2010) and Lei & Wang (2012) who suggest that the directors' ability to strategically time the market is critical in achieving abnormal returns. Baty (2008) also found that director purchases demonstrated a positive average abnormal return for most of the event window period tested. By using an optimal holding period and lookback period this can now allow external investors to strategically time the market as well.

Lakonishok & Lee (2001), Jeng et al. (2003), Jenter (2005) and Mokale (2010) found that directors purchased shares in a contrarian approach by acquiring shares that recently underperformed, but the trend was expected to reverse and provide future benefit. It is evident from the optimal Buy investment style that directors are in a privileged position to identify the underperformance and under-pricing of their company shares and then fortuitously time the purchase of these shares in anticipation of a future market price correction. However, this is not the only investment style adopted by directors expanding their shareholding in a specific share.

Another important literature review by Uylangco et al. (2010) found that directors appeared to act as typical investors do, by purchasing shares when the price was low. They found that directors did achieve abnormal returns through trading in shares of their own companies and imitators adopting a strategy of purchasing when directors purchased shares were able to secure a small abnormal return. This return is also due to other third parties showing an increased confidence in the company's prospects and thereby buying the shares and causing the share price to subsequently spike. However, Uylangco et al. (2010) found it highly unlikely that the abnormal return could cover transaction costs and the buy/sell spread. In comparison, the results of this research study also achieved an abnormal return and it showed that imitators could adopt the optimal Buy investment style and earn a CAGR of up to 10.4% more than the EWALSI. This equates to a 55% increase on the EWALSI return. In addition, Figure 13 and

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Figure 14 prove that this investment style is able to cover transaction costs at 0.1% and 0.5% respectively and still outperform the EWALSI.

Whilst studies by Fidrmuc et al. (2006) have proven an immediate to short-term benefit from director dealings, the Buy relative to the EWALSI line on Figure 12 shows consistent growth across the entire relevant period, except during the 2008 calendar year, which coincided with the global financial crisis. It is evident that adopting a director dealing Buy investment style will not provide immunity against a global financial crisis, but interestingly the Buy relative to EWALSI line showed a decline from at least six months before the EWALSI began to decline. During this period, the DirectorDealingsBuyL3H4P13 portfolio was declining whilst the EWALSI continued to grow. Subsequently, the Buy relative to EWALSI line maintained an upward slope, indicating that the DirectorDealingsBuyL3H4P13 portfolio was growing at a faster rate than the EWALSI benchmark.

### 6.1.1 Validity of Hypothesis 1

The hypothesis being tested was to qualify if the portfolio value of director dealing purchases was statistically greater than the EWALSI benchmark over the relevant period.

$H1_0$: $PVBUY_t \le EWALSI_t$
$H1_A$: $PVBUY_t > EWALSI_t$

The null hypothesis states that the portfolio value of shares purchased by directors (PVBUY) is less than, or equal to, the portfolio value of the EWALSI over the relevant period ($t$). The alternate hypothesis states that the portfolio value of shares purchased by directors (PVBUY) is greater than the portfolio value of the EWALSI over the relevant period ($t$).

Section 4.3.1 indicated that a 5% level of significance was applied to the statistical testing of this hypothesis and this implied a 95% level of confidence. The Wilcoxon signed-rank test $p$ value on the DirectorDealingsBuyL3H4P13 portfolio equated to 3.4%, which is less than the 5% level of significance. This $p$ value was

supported by the Monte Carlo simulation results. Therefore, the null hypothesis was rejected at a 5% level of significance, and it can be postulated that the DirectorDealingsBuyL3H4P13 portfolio will statistically outperform the EWALSI.

Figure 15 shows the distribution of the 100 random bootstrapped portfolios, with three portfolios achieving a maximum CAGR of 23.75% over the relevant period, and whilst the mode of 20.25% was achieved by 20 different portfolios. These results support the $p$ value of 3.4% from the Wilcoxon signed-rank test and the claim of statistical outperformance by the Buy portfolio over the relevant period.

The key highlight of the results of Hypothesis 1 is that an optimal director dealing investment style has been established. The optimal director dealing investment style for creating a director dealing Buy portfolio includes applying a holding period of four months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.0013% or more.

## 6.2   Hypothesis 2: Sell portfolio

Figure 11 illustrates the performance spread of director dealing Sell portfolios based on the range of minimum percentage of market capitalisation traded over the relevant period. As can be seen from Figure 11, a sustainable CAGR of almost 28% is achieved from a minimum percentage of market capitalisation traded of 0.005% or more. The minimum percentage of market capitalisation traded ranged up to 3.84%, which portfolio provided a CAGR of 0.62% due to the scarce number of director sale transactions comprising 3.84% or more of a company's market capitalisation. Figure 11 shows that the CAGR of almost 28% is sustained between 0.005% and 0.030%. The average CAGR of the 26 portfolios with a minimum percentage of market capitalisation traded from 0.005% to 0.030% was 26.37% over the relevant period. In comparison to the EWALSI benchmark, most investors would be satisfied with the outperformance provided by any of these 26 portfolios.

Figure 12 shows the optimal DirectorDealingsSellL3H3P5 portfolio, which achieved a CAGR of 27.8% over the relevant period. Stated differently this

portfolio has shown cumulative growth of 1,402% over the 130 months of the relevant period. In comparison, the EWALSI benchmark achieved a CAGR of 19.1% over the relevant period whilst the cumulative growth of its portfolio value equated to 652%. These comparative results are visually proven in Figure 12, which illustrates the extent of the outperformance, by the DirectorDealingsSellL3H3P5 portfolio over the EWALSI across the relevant period. Interestingly, this investment style follows a counter intuitive approach of buying those shares that directors sold with an expectation of a future share price decline, and yet this portfolio is able to grow and more so to consistently outperform the EWALSI benchmark.

A logical explanation for this phenomenon is that directors are selling their shares for personal reasons such as monetisation or portfolio rebalancing and not due to non-public insider information that suggests a future share price decline. Another explanation is that directors, being rational investors, are trying to maximise their investment return by selling at what they believe to be the peak market price of their shares. However, directors are unknowingly selling their shares into a rising stock market. In fact, Figure 12 shows that the optimal Buy and Sell portfolios illustrate a consistent upward primary and secondary trend over most of the time series and this corresponds to the Dow theory (Bodie, Kane, & Marcus, 2011).

Mordant & Muller (2003) found that outsiders may more readily follow directors' sales than their purchases, and by selling their shares they might depress the share prices. The researcher found that South African directors are better at bailing out of their shares before a poor financial performance than at investing in shares before a good financial performance. Similarly, Brown et al. (2003) found that directors are able to achieve abnormal returns from sales of shares (particularly for resource companies) and thereby avoid future losses.

In comparison Nair (2008) and Mokale (2010) identified economically insignificant abnormal returns for director dealing sales of 0.29% after 252 days and 0.44% after 15 days respectively. Both researchers found that abnormal returns were lower for director dealing sales than for director dealing purchases.

Piotroski & Roulstone (2004) suggest that director dealings help to spread firm specific information more effectively than external analysts and that the informational content is superior for director purchases, as director sales could be due to personal reasons such as monetisation, portfolio rebalancing or diversification. This theory appears to support a rationale for the significant positive performance on the director dealings Sell investment style. The other logical explanation for this counter intuitive investment style of the DirectorDealingsSellL3H3P5 portfolio is that directors are selling their shares into a rising stock market. The directors appear to be unaware of this phenomenon, otherwise this would appear to be an irrational investment decision. This suggests that to a rational investor, the signal sent by director dealing sales is misleading.

Also interestingly, the Sell relative to EWALSI line on Figure 12 shows consistent growth across the entire relevant period, but it slopes downward during early-mid 2008 almost as a precursor to the global financial crisis. This is because the EWALSI portfolio continues to grow whilst the DirectorDealingsSellL3H3P5 portfolio value declined. As both the Buy relative to EWALSI and Sell relative to EWALSI lines exhibited continued decline for 6 months, this appears to be a common precursor sign of the looming global financial crisis and could be suggested as a possible recommendation for a future study.

From mid-2008, it is evident that the global financial crisis was taking effect as the EWALSI benchmark declined significantly, and yet the DirectorDealingsSellL3H3P5 portfolio value remained fairly constant. In fact, during the 12 months from 1 March 2008 to 28 February 2009, the optimal director dealings Buy portfolio decreased by 36%, the EWALSI decreased by 44% and the optimal director dealings Sell portfolio decreased by only 3%. This suggests that the DirectorDealingsSellL3H3P5 portfolio should be the investment style adopted during an economic downturn.

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### 6.2.1  Validity of Hypothesis 2

The hypothesis being tested was to qualify if the portfolio value of director dealing sales was statistically greater than the EWALSI benchmark over the relevant period.

$H2_0$: $PVSELL_t \leq EWALSI_t$

$H2_A$: $PVSELL_t > EWALSI_t$

The null hypothesis states that the portfolio value of shares sold by directors (PVSELL) is less than or equal to the portfolio value of the EWALSI over the relevant period ($_t$). The alternate hypothesis states that the portfolio value of shares sold by directors (PVSELL) is greater than the portfolio value of the EWALSI over the relevant period ($_t$).

Section 4.3.1 indicated that a 5% level of significance was applied to the statistical testing of this hypothesis and this implied a 95% level of confidence. The Wilcoxon signed-rank test $p$ value on the DirectorDealingsSellL3H3P5 portfolio equated to 4.7%, which is less than the 5% level of significance. This $p$ value was supported by the Monte Carlo simulation results. Therefore, the null hypothesis is rejected at a 5% level of significance, and it can be postulated that the DirectorDealingsSellL3H3P5 portfolio will statistically outperform the EWALSI over the relevant period.

Figure 15 shows the distribution of the 100 random bootstrapped portfolios, with two portfolios achieving a CAGR of 23.75% whilst one portfolio achieved 25.25% over the relevant period. The mode of 20.25% was achieved by 20 different portfolios. These results support the $p$ value of 4.7% from the Wilcoxon signed-rank test and the claim of statistical outperformance by the Sell portfolio.

The optimal director dealing investment style for creating a director dealing Sell portfolio includes applying a holding period of three months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.005% or more. However, the percentage traded should not exceed 0.030% in order to maintain significant outperformance.

## 6.3   Limitations of this research study

As the sample of director dealings Buy data included a maximum market capitalisation percentage of 0.0030%, this research was unable to identify the effect of acquiring market capitalisation percentages greater than 0.0030%.

The scope of this research included only director dealings of JSE ALSI shares over the period from 1 April 2002 to 20 September 2013, therefore the optimal investment style identified may not be applicable to other stock markets or share types. The results found in this research study are only relevant to the period from 1 April 2002 to 20 September 2013.

This research study and investment style focused on optimising the holding period, lookback period and the minimum percentage of market capitalisation traded. This study did not include other investment criteria such as the price to book ratios, price/earnings multiples and dividend yields.

# Chapter 7: Conclusion

## 7.1 Introduction

The purpose of this research study was to identify if an optimal director dealings investment style could be identified and if this investment style could yield returns greater than the EWALSI benchmark.

The investment style included optimising the holding period, lookback period and minimum percentage of market capitalisation traded parameters with the use of a style engine.

## 7.2 Summary of main findings

The results of this study were visually, statistically and economically significant. It was proven that outside investors should, rationally, purchase shares when directors bought shares but they should, counter intuitively, purchase shares when directors sold shares.

The optimal director dealing investment style for creating a director dealing Buy portfolio includes applying a holding period of four months, a lookback period of three months and a minimum percentage of market capitalisation traded of 0.0013% or more. Literature reviewed in support of this investment style showed that directors were acting as typical rational investors, who purchased shares when they were underperforming and underpriced, in anticipation for this trend to reverse. This would act as a strong Buy signal to the market, which in turn increases the market's expectation of the company's future prospects and causes the share price to spike.

The optimal director dealing investment style for creating a director dealing Sell portfolio includes applying a holding period of three months, a lookback period of three months and a minimum percentage of market capitalisation traded of

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0.005% or more. However, the percentage traded should not exceed 0.030% in order to maintain significant outperformance.

An important observation of the Sell investment style was this portfolio's ability to withstand the global financial crisis. This is evidenced by the 12 months from 1 March 2008 to 28 February 2009, when the optimal director dealings Buy portfolio decreased by 36%, the EWALSI decreased by 44% and the optimal director dealings Sell portfolio decreased by only 3%. To further support this postulation, it was identified that between July 2008 and January 2009, the optimal Buy portfolio decreased by 15% whereas the optimal Sell portfolio increased by 12%.

Literature reviewed in support of the Sell investment style suggested that directors sold their shares for a much wider spread of reasons than when directors purchased shares. These reasons included a need to rebalance a portfolio, portfolio diversification or monetisation and therefore provided a poor and misleading Sell signal to the market of future performance.

Overall, the portfolio time series showed that the director dealings Buy and Sell portfolios had achieved a CAGR of 29.5% and 27.8% respectively whilst the comparative EWALSI benchmark achieved a 19.1% CAGR. These results exclude transaction fees, but a sensitivity analysis with the inclusion of transaction fees at 0.10% and 0.50%, showed that the optimal director dealings Buy and Sell portfolios still outperformed the EWALSI benchmark.

## 7.3 Recommendations to stakeholders

Whilst many investors may already adopt an investment technique of mimicking director purchases, there is further benefits to be extracted by investing in a counter intuitive or contrarian manner for director sales.

The ability to maximise future returns will lie with the investors' approach to investing. It is recommended that the investment styles created and proposed in this research study be used in a methodical and objective manner. Rationality

and discretionary transactions bring other factors and biases that can adversely affect the portfolio performance.

## 7.4   Recommendations for future research

- This research study and investment style focused on the optimising the holding period, lookback period and the minimum percentage of market capitalisation traded. This study could be extended to include other investment criteria such as the price to book ratios, price/earnings multiples and dividend yields. Investigating industry specific investment decisions can also contribute to the findings of Chang & Chopra (2007).

- The scope of this research study was limited to the JSE ALSI. Similar portfolio time series studies based on other international stock markets could assist in affirming the Buy and Sell investment styles established in this research study.

- As elucidated in Chapter 6, a detailed study on whether optimal director dealing portfolios could be used as a precursor signal to an economic downturn could be of tremendous value. This study could be extended to identify an optimal investment style to be followed specifically during and after an economic downturn. It could also seek to establish if a Sell investment style would have consistently outperformed the EWALSI during historic economic downturns.

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# Appendices

(Note: an electronic copy of all data used in the study has been submitted)

## Appendix 1: Extract of director dealings data

| Date | Amount | Price | Note | Type | Firstname | Surname | DirectorType | Company | Sector | JSECode |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 Apr 2002 | 17,000.00 | 3,950.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 11 Apr 2002 | 10,000.00 | 3,950.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 16 Apr 2002 | 20,000.00 | 3,994.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 18 Apr 2002 | 1,500.00 | 4,000.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 19 Apr 2002 | 190.00 | 3,900.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 29 Apr 2002 | 5,000.00 | 4,000.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 03 May 2002 | 900.00 | 4,000.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 06 May 2002 | 1,000.00 | 4,099.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 09 May 2002 | 1,500.00 | 4,100.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 13 May 2002 | 1,400.00 | 4,200.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 21 May 2002 | 1,500.00 | 4,750.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 21 May 2002 | 40,800.00 | 805.00 | | Directly Beneficial | D G | MacLeod | Independent NonExecutive | Illov Sugar Ltd. | Food Producers | ILV |
| 21 May 2002 | 57,200.00 | 680.00 | | Directly Beneficial | D G | MacLeod | Independent NonExecutive | Illov Sugar Ltd. | Food Producers | ILV |
| 16 Aug 2002 | 55.00 | 847.00 | Unwinding of put option on collar | None | J R B | Phillimore | Independent NonExecutive | Lonmin plc | Mining | LON |
| 19 Aug 2002 | 900,000.00 | 900.00 | | Indirectly Non Beneficial | M | Lewis | NonExecutive | The Foschini Group Ltd. | General Retailers | TFG |
| 22 Aug 2002 | 121,214.00 | 130.00 | R Stassen | Indirectly Non Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 22 Aug 2002 | 202,023.00 | 130.00 | | Indirectly Non Beneficial | Andre P | du Plessis | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 23 Aug 2002 | 2,000.00 | 970.00 | Linked units offered and accepted in terms of | None | Paul Andreas | Theodosiou | Executive | Acucap Properties Ltd. | Real Estate Investment & Services | ACP |
| 23 Aug 2002 | 169,122.00 | 38.00 | | Directly Beneficial | W A R | Wenteler | NonExecutive | Winhold Ltd. | Support Services | WNH |
| 27 Aug 2002 | 19,400.00 | 150.00 | | Directly Beneficial | Arthur J | Aaron | NonExecutive | Transpaco Ltd. | General Industrials | TPC |
| 27 Aug 2002 | 256,045.00 | 49.00 | | Indirectly Non Beneficial | Malcolm | Macdonald | Independent NonExecutive | Gijima Group Ltd. | Software & Computer Services | GIJ |
| 28 Aug 2002 | -1,575,000.00 | 297.00 | Grant by Netcare of paid-up options in terms | Directly Beneficial | Richard H | Friedland | Executive | Netcare Ltd. | Health Care Equipment & Services | NTC |
| 28 Aug 2002 | 120,000.00 | 100.00 | Grant by Netcare of paid-up options in terms | Directly Beneficial | Richard H | Friedland | Executive | Netcare Ltd. | Health Care Equipment & Services | NTC |
| 28 Aug 2002 | 150,000.00 | 48.00 | | Indirectly Non Beneficial | Malcolm | Macdonald | Independent NonExecutive | Gijima Group Ltd. | Software & Computer Services | GIJ |
| 28 Aug 2002 | 1,680,000.00 | 62.00 | Grant by Netcare of paid-up options in terms | Directly Beneficial | Richard H | Friedland | Executive | Netcare Ltd. | Health Care Equipment & Services | NTC |
| 29 Aug 2002 | 5,000.00 | 150.00 | | Directly Beneficial | Phillip N | Abelheim | Executive | Transpaco Ltd. | General Industrials | TPC |
| 29 Aug 2002 | 10,000.00 | 22.00 | Award of shares from the Primeserv Group Ltd | Directly Beneficial | Merrick | Abel | Executive | Primeserv Group Ltd. | Support Services | PMV |
| 29 Aug 2002 | 25,000.00 | 970.00 | Linked units offered and accepted in terms of | None | Jonathan Henri | Rens | Executive | Acucap Properties Ltd. | Real Estate Investment & Services | ACP |
| 30 Aug 2002 | -2,040,000.00 | 140.00 | | Indirectly Non Beneficial | Periklis | Halamandaris (Jnr) | NonExecutive | Famous Brands Ltd. | Travel & Leisure | FBR |
| 30 Aug 2002 | -185,000.00 | 435.00 | Share appreciation rights (SARs) | Indirectly Beneficial | Simon N | Susman | NonExecutive | Woolworths Holdings Ltd. | General Retailers | WHL |
| 30 Aug 2002 | -43,300.00 | 765.00 | Subscription for shares | None | G J | Clark | Executive | Illov Sugar Ltd. | Food Producers | ILV |
| 30 Aug 2002 | -9,480.00 | 440.00 | Share appreciation rights (SARs) | Indirectly Beneficial | Simon N | Susman | NonExecutive | Woolworths Holdings Ltd. | General Retailers | WHL |
| 30 Aug 2002 | 2,658.00 | 150.00 | | Directly Beneficial | Arthur J | Aaron | NonExecutive | Transpaco Ltd. | General Industrials | TPC |
| 30 Aug 2002 | 2,659.00 | 150.00 | | Directly Beneficial | Phillip N | Abelheim | Executive | Transpaco Ltd. | General Industrials | TPC |
| 30 Aug 2002 | 84,000.00 | 55.00 | | Indirectly Non Beneficial | Malcolm | Macdonald | Independent NonExecutive | Gijima Group Ltd. | Software & Computer Services | GIJ |
| 30 Aug 2002 | 2,075,800.00 | 140.00 | Donation | Directly Beneficial | John L | Halamandres | NonExecutive | Famous Brands Ltd. | Travel & Leisure | FBR |
| 02 Sep 2002 | -186,172.00 | 447.00 | Single Stock Futures Contracts -- 10 000 contr | Indirectly Beneficial | David Chih-Hsin | Kan | Executive | Mustek Ltd. | Technology Hardware & Equipment | MST |
| 02 Sep 2002 | 100,000.00 | 445.00 | Shares delivered in terms of share option scher | Directly Beneficial | Hein | Engelbrecht | Executive | Mustek Ltd. | Technology Hardware & Equipment | MST |
| 03 Sep 2002 | -293,392.00 | 435.00 | Share appreciation rights (SARs) | Indirectly Beneficial | Simon N | Susman | NonExecutive | Woolworths Holdings Ltd. | General Retailers | WHL |
| 04 Sep 2002 | -202,500.00 | 440.00 | Share appreciation rights (SARs) | Indirectly Beneficial | Simon N | Susman | NonExecutive | Woolworths Holdings Ltd. | General Retailers | WHL |
| 04 Sep 2002 | 8,981.00 | 159.00 | | Directly Beneficial | Arthur J | Aaron | NonExecutive | Transpaco Ltd. | General Industrials | TPC |
| 04 Sep 2002 | 8,981.00 | 159.00 | | Directly Beneficial | Phillip N | Abelheim | Executive | Transpaco Ltd. | General Industrials | TPC |
| 09 Sep 2002 | 40,000.00 | 835.00 | donated 250 ordinary shares | Directly Beneficial | Myles J D | Ruck | Independent NonExecutive | Standard Bank Group Ltd. | Banks | SBK |
| 10 Sep 2002 | 33,300.00 | 17,389.00 | | Directly Beneficial | Patrice T | Motsepe | NonExecutive | Harmony Gold Mining Com | Mining | HAR |
| 10 Sep 2002 | 70,000.00 | 1,530.00 | Purchase of Datatec shares by a company in v | Indirectly Beneficial | Christopher S | Seabrooke | Independent NonExecutive | Massmart Holdings Ltd. | General Retailers | MSM |
| 10 Sep 2002 | 85,625.00 | 240.00 | Exercise and sale of share options in the mark | Directly Beneficial | Simon L | Crutchley | Executive | AVI Ltd. | Food Producers | AVI |
| 13 Sep 2002 | -5,600.00 | 790.00 | | Directly Beneficial | D P | Meintjes | Executive | Mediclinic International Ltd. | Health Care Equipment & Services | MDC |
| 13 Sep 2002 | -4,400.00 | 785.00 | | Directly Beneficial | D P | Meintjes | Executive | Mediclinic International Ltd. | Health Care Equipment & Services | MDC |
| 16 Sep 2002 | 11,000.00 | 1,920.00 | | Directly Beneficial | Sean David | Jagoe | Independent NonExecutive | Reunert Ltd. | Electronic & Electrical Equipment | RLO |
| 20 Sep 2002 | 50,000.00 | 958.00 | | Indirectly Beneficial | Patrick M | Goss | Lead Independent Non-execu | RMB Holdings Ltd. | Banks | RMH |
| 20 Sep 2002 | 800,000.00 | 366.00 | Exercised options | None | Michael S | Mark | Executive | Truworths International Ltd. | General Retailers | TRU |
| 25 Sep 2002 | 50,000.00 | 950.00 | | Indirectly Beneficial | Patrick M | Goss | Lead Independent Non-execu | RMB Holdings Ltd. | Banks | RMH |
| 25 Sep 2002 | 530,000.00 | 548.00 | | Indirectly Beneficial | Jens P | Montanana | Executive | Datatec Ltd. | Software & Computer Services | DTC |
| 26 Sep 2002 | -45,181.00 | 825.00 | Donation | Indirectly Beneficial | Neville S | Koopowitz | Executive | Discovery Ltd. | Life Insurance | DSY |
| 26 Sep 2002 | 183,800.00 | 20.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 26 Sep 2002 | 440,000.00 | 533.00 | | Indirectly Non Beneficial | Jens P | Montanana | Executive | Datatec Ltd. | Software & Computer Services | DTC |
| 26 Sep 2002 | 1,000,000.00 | 270.00 | 640ssf | Directly Beneficial | Christoffel H | Wiese | Executive | Tradehold Ltd. | Real Estate Investment & Services | TDH |
| 27 Sep 2002 | -12,500,000.00 | 40.00 | | Directly Beneficial | Nikitas Ghikas | Vontas | Executive | Bonatla Property Holdings | Real Estate Investment & Services | BNT |
| 27 Sep 2002 | -3,336,000.00 | 40.00 | | Directly Beneficial | Nikitas Ghikas | Vontas | Executive | Bonatla Property Holdings | Real Estate Investment & Services | BNT |
| 27 Sep 2002 | -50,000.00 | 825.00 | Donation | Indirectly Beneficial | Neville S | Koopowitz | Executive | Discovery Ltd. | Life Insurance | DSY |
| 27 Sep 2002 | -4,819.00 | 825.00 | Donation | Indirectly Beneficial | Neville S | Koopowitz | Executive | Discovery Ltd. | Life Insurance | DSY |
| 27 Sep 2002 | 275,000.00 | 540.00 | | Indirectly Beneficial | Jens P | Montanana | Executive | Datatec Ltd. | Software & Computer Services | DTC |
| 27 Sep 2002 | 12,756,774.00 | 800.00 | | Directly Beneficial | Claas Edmund | Daun | Independent NonExecutive | Steinhoff International Holdi | Household Goods & Home Constru | SHF |
| 30 Sep 2002 | 88,500.00 | 20.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 01 Oct 2002 | 176.00 | 15.00 | | Directly Beneficial | Ilze | Bosch | Executive | Southern Electricity Compa | Venture Capital | SLO |
| 01 Oct 2002 | 186.00 | 13.00 | | Directly Beneficial | Ilze | Bosch | Executive | Southern Electricity Compa | Venture Capital | SLO |
| 01 Oct 2002 | 656.00 | 791.00 | Subscribed for ordinary shares,pursuant to a s | Directly Beneficial | Robert J | Margetts | NonExecutive | Anglo American plc | Mining | AGL |
| 03 Oct 2002 | -270,836.00 | 1,510.00 | ale of a portion of Mr Lamberti''s holdings | Directly Beneficial | Mark James | Lamberti | Independent NonExecutive | Massmart Holdings Ltd. | General Retailers | MSM |
| 04 Oct 2002 | 65,360.00 | 22.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 06 Oct 2002 | 54,697.00 | 16.00 | Award of shares from the Primeserv Group Ltd | Directly Beneficial | Merrick | Abel | Executive | Primeserv Group Ltd. | Support Services | PMV |
| 07 Oct 2002 | -65,500.00 | 25.00 | Delivery of deferred share options already decla | Directly Beneficial | Tiffany | Dunsdon | Executive | Adapt IT Holdings Ltd. | Software & Computer Services | ADI |
| 07 Oct 2002 | 2,361.00 | 165.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 07 Oct 2002 | 65,500.00 | 11.00 | Delivery of deferred share options already decla | Directly Beneficial | Tiffany | Dunsdon | Executive | Adapt IT Holdings Ltd. | Software & Computer Services | ADI |
| 08 Oct 2002 | 57.00 | 165.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 08 Oct 2002 | 362.00 | 170.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 08 Oct 2002 | 3,063.00 | 175.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 08 Oct 2002 | 20,000.00 | 22.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 08 Oct 2002 | 70,000.00 | 22.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 10 Oct 2002 | 17,000.00 | 155.00 | | Directly Beneficial | Arthur J | Aaron | NonExecutive | Transpaco Ltd. | General Industrials | TPC |
| 11 Oct 2002 | 1,696.00 | 170.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 14 Oct 2002 | 337.00 | 175.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 14 Oct 2002 | 20,000.00 | 180.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 15 Oct 2002 | 1,000.00 | 24.00 | | Indirectly Beneficial | Stuart Robin | Aberdein | Executive | Digicore Holdings Ltd. | Electronic & Electrical Equipment | DGC |
| 15 Oct 2002 | 2,000.00 | 179.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 15 Oct 2002 | 8,441.00 | 180.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 15 Oct 2002 | 29,559.00 | 185.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 17 Oct 2002 | -17,525.00 | 2,300.00 | Exercise of share options | Directly Beneficial | Craig G | Venter | Executive | Allied Technologies Ltd. | Mobile Telecommunications | ALT |
| 17 Oct 2002 | -6,760.00 | 1,600.00 | | Indirectly Non Beneficial | Michael J | Rubin | Independent NonExecutive | Massmart Holdings Ltd. | General Retailers | MSM |
| 17 Oct 2002 | 116.00 | 160.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 17 Oct 2002 | 17,525.00 | 553.00 | Exercise of share options | Directly Beneficial | Craig G | Venter | Executive | Allied Technologies Ltd. | Mobile Telecommunications | ALT |
| 18 Oct 2002 | -24,475.00 | 2,300.00 | Exercise of share options | Directly Beneficial | Craig G | Venter | Executive | Allied Technologies Ltd. | Mobile Telecommunications | ALT |
| 18 Oct 2002 | 24,475.00 | 553.00 | Exercise of share options | Directly Beneficial | Craig G | Venter | Executive | Allied Technologies Ltd. | Mobile Telecommunications | ALT |
| 18 Oct 2002 | 380,682.00 | 491.00 | The shares were acquired as a result of the unl | Indirectly Non Beneficial | Johannes F | Mouton | NonExecutive | PSG Group Ltd. | Financial Services | PSG |
| 22 Oct 2002 | -5,100.00 | 4,950.00 | | Indirectly Non Beneficial | Giovanni A M | Ravazzotti | Executive | Italtile Ltd. | General Retailers | ITE |
| 22 Oct 2002 | 5,000.00 | 185.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 23 Oct 2002 | -675,000.00 | 325.00 | exercise of options | Directly Beneficial | Vivian Wade | Bartlett | Independent NonExecutive | FirstRand Ltd. | Banks | FSR |
| 24 Oct 2002 | 101,820.00 | 185.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |
| 25 Oct 2002 | 315,377.00 | 25.00 | Delivery of deferred share options already decla | Directly Beneficial | Tiffany | Dunsdon | Executive | Adapt IT Holdings Ltd. | Software & Computer Services | ADI |
| 28 Oct 2002 | 140,000.00 | 272.00 | 640ssf | Directly Beneficial | Christoffel H | Wiese | Executive | Tradehold Ltd. | Real Estate Investment & Services | TDH |
| 29 Oct 2002 | 9,608.00 | 267.00 | 640ssf | Directly Beneficial | Christoffel H | Wiese | Executive | Tradehold Ltd. | Real Estate Investment & Services | TDH |
| 30 Oct 2002 | 177,000.00 | -2.00 | 12 to 14 cps | Directly Beneficial | Ashley | Tugendhaft | NonExecutive | Pinnacle Technology Holdin | Technology Hardware & Equipment | PNC |
| 31 Oct 2002 | 15,000.00 | 612.00 | Call | Indirectly Beneficial | Ian M | Groves | Lead Independent Non-execu | Grindrod Ltd. | Industrial Transportation | GND |
| 31 Oct 2002 | 210,996.00 | 170.00 | R Stassen | Indirectly Beneficial | Riaan | Stassen | Executive | Capitec Bank Holdings Ltd. | Banks | CPI |