



**The impact of rights issues announcements on share price performance  
in South Africa.**

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## **Abstract**

Rights issues are an area of much interest and research globally. With the last significant local study on the topic conducted in 2005, this paper updates the findings based on more recent data. This is also the first study to explore the impact that the company's financial position has on the share price reaction to the announcement.

The study was conducted by analysing rights issue announcements occurring on the JSE between 1<sup>st</sup> January 2001 and 31<sup>st</sup> December 2010. 35 events were used in this study since they met the criteria for clean measurement. A standard event study methodology was used. Abnormal returns were measured through both the market model and control portfolio, with the Altman Z Score utilised as a measure of the issuers' financial position. Statistical analysis was conducted throughout to confirm significance.

Average Abnormal Returns of -2.33% and -3.30% were found on the day of the announcement, depending on the model used, and Cumulative Average Abnormal Returns (CAARs) for five days post the announcement were between -5% and -6%. Of most interest, share price reactions were found to differ, with statistical significance, according to the financial position of the issuer. Companies categorised as healthy recovered from the initial decline to a CAAR of less than -1% twenty days post the announcement. In contrast companies categorised as unhealthy and in the grey zone suffered CAARs after the same period of -9.17% and -8.06% respectively. The conclusion of the study is that the well-researched share price decline on the announcement of a rights issue persists, but that this reaction is significantly worse for companies in a poor financial position, as measured by their Altman Z Score.

## **Keywords**

Rights Issues, capital structure

## **Declaration**

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

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**PAUL JONATHAN MARK COTTERELL**

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Lastly but most importantly, glory and thanks to my Lord Jesus Christ who gives me life.

## **Dedication**

I dedicate this work to the memory of Lucy Cotterell, fondly remembered and missed by our family and her many friends around and about East London.

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## **1. DEFINITION OF PROBLEM AND PURPOSE**

### **1.1 Research Title**

The impact of rights issues announcements on share price performance in South Africa.

### **1.2 Introduction to Research**

The research analyses the share price performance of companies in the period immediately prior and post their announcing a rights issue. The document begins by outlining the research problem and motivation. A review of relevant literature follows, exploring the existing knowledge on share price performance around rights issues announcements. From this, hypotheses were developed and the methodology provided. Results are then detailed, discussed and conclusions drawn.

### **1.3 Research Problem and Purpose**

Rights issues have been the subject of much research by academics and practitioners for over two decades (Bayless & Jay, 2008, p. 291). Many aspects of share price performance are commonly accepted, such as general declines in share price on the announcement date observed in many studies, from older studies conducted in South Africa (Bhana, 1999, p. 35) to recent studies conducted in China (Shahid, Xinping, Mahmood, & Usman, 2010, p. 166).

While such broad principles around share price performance are accepted, we find differences across markets as well as over different time periods. The difference between markets is well illustrated by comparing the average 3% decline in US markets around announcement date (Eckbo, Masulis, & Norli, 2000, p. 38) to the various price movements around different announcements in the Chinese market (Shahid, Xinping, Mahmood, & Usman, 2010, p. 166). These differences are partly attributable to differences in regulatory frameworks (Shahid, Xinping, Mahmood, & Usman, 2010, p. 166), and shall be further expanded upon in the

literature review. This example illustrates the importance for studies within specific markets, such as the JSE as the population for this research.

Differences are also identified during different time periods. South African studies over different time periods have produced different results, with a study over 1980 – 1995 (Bhana, 1999) showing different average movements to a study conducted from 1989 to 2002 (Pascoe, Ward, & MacKenzie, 2005, p. 18). The last significant study found on the South African market was conducted on market data the most recent of which is 9 years old (Pascoe, Ward, & MacKenzie, 2005). The global financial crisis, which occurred subsequent to that study and during the period which this research covers, gave further cause for this study.

The last purpose of the research was in-line with the time period covering the global financial crisis, considering the influence of a firms' financial position on the price reaction to a rights issue announcement. This has not previously been studied on the JSE, and is a specific area not given much attention in international studies on rights issues. A number of studies have investigated the influences of such factors, including governance (Dbouk & Ismail, 2010), economic factors (Pascoe, Ward, & MacKenzie, 2005) and disclosure (Jo & Kim, 2008), demonstrating the academic interest of specific factors.

The research conducted thus contributes to the existing knowledge on rights issues through analysis specific to the JSE, over a more recent time period, and considering the issuers' financial position as described.

In addition to academic interest, the study may find interest amongst private and professional investors, as well as to the boards of public companies who may consider using rights issues to raise equity.

#### **1.4 Research Context: The JSE**

The research was conducted on companies listed on the Johannesburg Stock Exchange (“JSE”).

The JSE is Africa’s largest exchange and amongst the top ten in the world measured by its market capitalization of \$182 billion (ADVFN, 2011). This is notable given South Africa’s classification as an emerging market (MSCI, 2011).

South Africa’s financial market sophistication in the global competitiveness report reflects positively on the JSE. The country scores 2<sup>nd</sup> in the world for the regulation of securities exchanges, 4<sup>th</sup> for financing through local equity market and 6<sup>th</sup> for financial market sophistication (World Economic Forum, 2009, p. 238).

The size of the JSE and the high-regard in which it is held internationally make it an appropriate market for research, and give significance to the findings.

#### **1.5 Research Motivation**

The topic was inspired through a discussion with Mr Andy Russell of Nvest Securities in East London. He is an experienced and highly-respected stock-broker and investor. On discussing rights issues, he noted the typical negative market reaction to the announcement which has been confirmed by the literature described above and in the literature review. He pondered, however, as to a bit more insight into this and the influences.

This motivated a review of existing research on rights issues, which found a gap in local research as described in the research purpose.

#### **1.6 Research Objectives**

The research had three objectives:

1. To extract relevant existing theory on rights issues and their impact on share price performance.

2. To quantify the impacts of rights issues announcements on share price performance of companies listed on the JSE from January 2001 to December 2010.
3. To explore whether the financial position of the issuer influences the impact quantified in terms of the second objective.

## 2. THEORY AND LITERATURE REVIEW

### 2.1 Introduction to Rights Issues

The primary process through which new shares of listed companies in South Africa are issued as a means to raise equity is a rights issue, the focus of this research. Rights issues give existing shareholders the option of purchasing new shares, normally issued at a discount to the prevailing market price (Lambrechts & Mostert, 1980, p. 25) to encourage participation in the capital raising over purchasing shares in the market. Critically, existing shareholders of the company benefit from a pre-emptive right to participate in the new issue in proportion to their shareholding, providing the opportunity of avoiding a dilution in their proportionate ownership in the company (Shahid, Xinping, Mahmood, & Usman, 2010, p. 163). This opportunity is particularly material in the event of a significant discount on the new shares being issued, as existing shareholders would otherwise be unable to mitigate the negative effect of such an issue. This preference for rights issues is evidenced in reality, by way of example, The Distribution and Warehousing Network Ltd's capital raising in 2009. Initial cautionary announcements outlined the requirements for additional funding with preliminary results, and that they were pursuing the funding by way of a convertible debt instrument. The further announcement on 21<sup>st</sup> October 2009 is telling, "Subsequent to the publication of above cautionary announcement, numerous Dawn shareholders notified the company that they would wish to participate in a capital raising programme initiated by the company. Consequently Dawn has withdrawn from pursuing the convertible bond transaction and will be launching a rights offer to its shareholders" (Distribution and Warehousing Network Limited, 2009). Shareholders may also sell their rights should they not wish to purchase the additional shares.

Another means of raising equity through issuing new shares is through public offerings, also referred to as seasoned equity offerings ("SEOs"), with new shares being offered to the public,

while in private placements, shares are offered to institutions or high-net worth individuals (Shahid, Xinping, Mahmood, & Usman, 2010, p. 163). The focus of the research will be specifically rights issues, but for literature review purposes this will broadly encompass the other forms of issuing new shares discussed, with terminology being used interchangeably. Comprehensive literature already exists on rights issues (Bayless & Jay, 2008, p. 291), which shall be explored as the basis of this study.

## **2.2 Introduction to Capital Structures**

Underlying the decision for a firm to perform a rights issue is its capital structure. A firm chooses to finance its operations through a balance of equity and debt, resulting in its financial leverage, and early theory argues that this is normally done with a target ratio of debt to equity in mind, as well as a target level of short-term debt to long-term (Marsh, 1982, p. 122).

A primary benefit of debt in this trade-off decision is the tax-deductibility of interest (Fama & French, 2005, pp. 549-550), the importance of which has been stressed and widely accepted for some time (Marsh, 1982, p. 122). The primary negatives of debt are potential bankruptcy (Fama & French, 2005, pp. 549-550) and financial distress, with higher levels of equity financing reducing this risk (Marsh, 1982, p. 122). In this model, the tax rate will therefore be greatly influential in setting target capital structure, but more important will be the probability of financial distress, giving a reasonable expectation that companies with higher operating risk should use less debt in their capital structure (Marsh, 1982, p. 122).

Much research has been dedicated to the search for the optimal trade-off between debt and equity (Myers & Lakshmi, 1999, p. 220). Firms are found to give cognisance to the factors described as well as company size and asset composition in choosing their target debt levels (Marsh, 1982, p. 142). In practice, financial leverage fluctuates, varying from the target level

as the business operates, and in which circumstances the firm should be issuing equity when debt is above its target, and the opposite when debt is below the target.

If a firm intends to reduce its leverage by adding equity to its capital structure, it can do so through foregoing the payment of dividends, or through the issue of new shares, which are restrained due to transaction costs (Marsh, 1982, p. 122).

### **2.3 Drivers of Financing Decisions and Market Timing**

Myers and Lakshmi argue that while the simple trade-off model described is supported by literature, it is secondary in explanatory power and that the choice of debt or equity will rather follow from an imbalance between internal cash flows, net of dividends, and investment opportunities (Myers & Lakshmi, 1999, p. 221). They show that changes in capital structure are driven by the need for external funds, rather than attempts to achieve a target (Myers & Lakshmi, 1999, p. 221). Myers pecking order model thus offers a model of the expected order in which firms will fund operations, with preference firstly to retained earnings, followed by safe debt, risky debt, and outside equity as a last resort due to transaction costs (Fama & French, 2005, p. 550). This would suggest that rights issues will seldom take place.

The pecking order model was however discredited by, amongst others, Fama and French who found empirical evidence that firm financing decisions did not follow the pecking order sequence (Fama & French, 2005, pp. 550-551). Specifically, firms were found both to issue and retire equity more frequently than the model suggests (Fama & French, 2005, pp. 550-551). They find that both the trade-off model and pecking order model are problematically flawed, but that both offer elements of truth and that the two should be considered jointly (Fama & French, 2005, pp. 580-581).

An aspect of the Myers-Majluf (1984) pecking order which has further relevance particularly in the case of rights issues is that of asymmetric information. Firm management will tend to

increase debt when the business outlook is favourable, and conversely will prefer equity when the outlook is less favourable (Myers & Lakshmi, 1999, p. 225). Indeed, Baker and Wurgler found that a better predictor of a firm choosing rights issues to raise finance is found in “equity market timing”, the practice of issuing shares at high prices and repurchasing shares at low prices (Baker & Wurgler, 2002, p. 1). Four sets of empirical evidence support the argument for equity market timing. Firstly, studies show that firms prefer to issue equity when market values are high relative to book value and historical share prices, with the contrary also true that firms tend to repurchase shares when market values are low (Baker & Wurgler, 2002, p. 1). Secondly, analysis of long-run stock returns shows equity issued when the cost of equity is relatively low and repurchase shares when the cost of equity is relatively high (Baker & Wurgler, 2002, p. 2). Thirdly, studies into analysts forecasts shows firms issuing equity when the market is “rather too enthusiastic about earnings forecasts” (Baker & Wurgler, 2002, p. 2). Lastly, and most telling, is that CFO’s surveyed anonymously admit to placing great importance on stock prices in financing decisions, amongst the most important of factors considered (Baker & Wurgler, 2002, p. 2).

Market timing is therefore a strongly supported reality, but far better executed by firms with low financial leverage than by those with high financial leverage (Baker & Wurgler, 2002, p. 29). This stands to reason, as firms with low leverage have the luxury of raising equity at their convenience, where firms with high leverage may often have to raise funding by necessity, which would typically occur during periods of negative market sentiment.

Baker and Wurgler conclude that capital structure is the outcome of the cumulative effects of past attempts to time the equity market, rather than any targeted optimum structure.

## 2.4 Market Timing and Rights Issues

In the specific instance of rights issues, the correlation to market-timing is again shown to exist (DeAngelo, DeAngelo, & Stultz, 2010, p. 293). In addition, firm life cycle is found to have a high correlation to the probability of a firm conducting a right issue, with a 9% probability in the first year of listing compared to a 2.5% probability for firms listed for a more than a year (DeAngelo, DeAngelo, & Stultz, 2010, p. 293). The life cycle stage was found in fact to be a more significant predictor than market-timing opportunities, with firms listed for one year and poor market-timing opportunities 71% more likely to conduct a seasoned-equity offering than firms listed for 20 years with excellent market timing opportunities (DeAngelo, DeAngelo, & Stultz, 2010, p. 293).

A recent study found however that these relationships are indeed correlations, rather than explanatory of a firm's choice to raise funds through a rights issue. DeAngelo, DeAngelo and Stultz raised the question of the proverbial "Dogs that did not bark" when they should bark, in the form of companies positioned to issue equity in terms of theory, but that do not do so (DeAngelo, DeAngelo, & Stultz, 2010, p. 276). A flaw in market-timing analysis is its focus on firms that do issue equity, rather than considering all firms with additional cash requirements, a majority of whom do not issue equity despite favourable market-timing conditions (DeAngelo, DeAngelo, & Stultz, 2010, p. 294).

It was found rather that firms issuing equity did so by necessity to meet their cash requirements, this being the real driver of the decision (DeAngelo, DeAngelo, & Stultz, 2010, p. 294). The study found that 62.6% of issuers in their sample would run out of cash or have to alter their business had they not issued additional equity, and 81.1% would have had subnormal cash balances in the year of issue (DeAngelo, DeAngelo, & Stultz, 2010, p. 294).

Many issuers did increase capital expenditures following the SEO, but even had it not, 40.3% of the issuers would have still run out of cash in the year following the SEO (DeAngelo, DeAngelo,

& Stultz, 2010, p. 294). As most firms do increase capital expenditures following a rights issue, it can be inferred that this is a secondary motive after short-term cash requirements.

## **2.5 Market Reactions to Rights Issues and Post-Issue Performance**

While market-timing is shown to be secondary as a motive for firms conducting rights issues, evidence is clear that the practice does exist, shown in strong rises in share prices in the period prior to the issue (Levis, 1995, p. 125). This and the other theory presented provide a strong base for the long-held perception of the announcement of a rights issue as a negative signal amongst investors (Asquith & Mullins, 1986, p. 61).

Bhana identifies several factors giving further substance to the negative reaction. Asymmetric information (Bhana, 1999, p. 33), with managers closer to the business than outside investors, sends a negative signal of company performance, potentially deeper than market timing. Managerial incentives, following the dilution of their equity (Bhana, 1999, p. 33), may discourage performance. Lastly, Bhana notes the rights issue leads to a less tax-efficient capital structure (Bhana, 1999, p. 33).

In-line with the negative market signal described, declines in share prices around the announcement of a rights issue have been quantified. In South Africa, Bhana found an average decline of 3.51% over the two-day announcement period from a sample on the JSE spanning 1980 – 1995 (Bhana, 1999, pp. 35-37). Similarly, Pascoe, Ward & MacKenzie's study on JSE data from 1989 to 2002 found a statistically significant 3.8% decline in share prices over the event window (Pascoe, Ward, & MacKenzie, 2005, p. 26). A negative 3% reaction has been measured during the two-day announcement period on the NYSE/Amex (Eckbo, Masulis, & Norli, 2000, p. 38). These declines in share price translate to an average 20% of the proceeds being raised through the issue (Eckbo, Masulis, & Norli, 2000, p. 38), detracting from the purpose of reducing debt to equity at market prices.

In the longer-term, under-performance post a rights issue is equally evident and is well-documented (Dbouk & Ismail, 2010, p. 159). A measure over 5 years post-issue shows significantly weaker performance amongst issuers relative to comparable firms that did not issue equity (Bayless & Jay, 2008, p. 309).

## **2.6 Factors Influencing Performance of Issuing Companies**

A number of company specific and external factors have been shown to influence the performance of firms raising equity through rights issues.

A company specific measure found to have a direct impact on post-issue performance is governance (Dbouk & Ismail, 2010, p. 157). It was found that firms with higher standards of governance, particularly with regards to management accountability, conduct rights issues less frequently (Dbouk & Ismail, 2010, p. 175). When they do conduct rights issues, their post-issue performance is significantly better in the long-term, with the performance gap widening notably in the first and second years post-issue (Dbouk & Ismail, 2010, p. 175). The finding is intuitive in that the measure of governance revolved around managers acting in the best interests of shareholders, which should always lead to superior performance.

Similarly, a study was done into the complex issues of ethics and disclosure on post-issue performance, measured through business ethics, accounting and finance (Jo & Kim, 2008, p. 872). The study found that firms with extensive disclosure significantly outperformed firms with less disclosure, despite them managing their earnings (Jo & Kim, 2008, p. 872). The conclusion drawn is that greater disclosure reduces information asymmetry, thereby reducing agency costs of the separation of ownership and control, and reduces the underperformance post a rights issue (Jo & Kim, 2008, pp. 872, 875).

A South African study, moving away from the firm-specific factors to external, examined the relationships to economic factors including interest rate, stock market performance, economic

growth, business cycle, business confidence and time (Pascoe, Ward, & MacKenzie, 2005, pp. 25-26). Not all factors were found to show correlation, but, most interestingly, a negative correlation was found to share market performance, with the negative reaction to a rights issue announcement greater for a company that had stronger pre-announcement performance (Pascoe, Ward, & MacKenzie, 2005, p. 26). Also surprising was the negative correlation to interest rate levels, possibly attributed to firms being rewarded for choosing to raise equity when the cost of debt was high (Pascoe, Ward, & MacKenzie, 2005, pp. 25-26). Economic growth was found to have a positive correlation, with less of a negative share price reaction associated with higher economic growth (Pascoe, Ward, & MacKenzie, 2005, p. 26).

Another external factor is the regulatory framework of the market, with security exchanges globally differing in their rules around rights issues. Unlike the United States and many western markets, China has several announcement dates for each rights issue, including the board of directors meeting date, the shareholders meeting date, regulatory approval date, and the date of announcement to the public (Shahid, Xinping, Mahmood, & Usman, 2010, p. 166). The study finds price reactions to each of the dates, and illustrates the importance of studies specific to different markets, in this instance, the JSE.

Issues of leverage and financial distress also have significant influence and shall be elaborated on below.

## **2.7 Rights Issues by Companies in Financial Distress**

Raising equity through rights issues has been shown to be a financing decision made most often out of necessity for cash flow requirements. A firm would thus principally raise equity through a rights issue to reduce unacceptably high financial leverage; alternatively, the firm may raise equity for purposes of pursuing growth opportunities. The latter would be more characteristic of a firm with levels of gearing acceptable to the board.

The differentiation is significant to the impacts of the rights issue, as it has also been noted that firms with low leverage should be more successful at market-timing to their benefit, as opposed to firms with high leverage that tend towards raising funds at low valuations (Baker & Wurgler, 2002, p. 29).

The period of this study, covering the global financial crisis, gives particular relevance to rights issues by firms in distress, which shall be a significant aspect of the study, and shall be measured through use of the Altman Z Score.

## **2.8 The Altman Z Score as a Measure of Financial Distress**

Professor Edward Altman developed the Altman Z Score in 1968, a statistical model useful in determining financial distress and the likelihood of bankruptcy (Narayanan, 2010, p. 12). The score is calculated purely from financial statement data, with 5 financial ratios weighted to produce the score (Narayanan, 2010, p. 12). The Z Score has been found to have between 72% and 90% success in predicting bankruptcies within 2 years and has become popular in credit-granting and investment decisions (Narayanan, 2010, p. 12).

The Altman Z Score shall be used as the measure of financial distress for the study, and the calculation thereof shall be elaborated upon in the methodology section.

## **2.9 Influences of the Size of the Rights Issue**

Whether the issuer has low or high leverage prior to the rights issue, negative post-issue performance of the company is partly attributed to the reduction in leverage as “their exposures to unexpected inflation and default risks decrease, thus decreasing their stocks’ expected returns relative to matched firms” (Eckbo, Masulis, & Norli, 2000, p. 251).

This is added to by “some evidence that the return-generating process changes from issue to non-issue periods in ways we believe reflects changing systematic risk” (Bayless & Jay, 2008, p. 309).

Given the direct relationship between the reduction in systematic risk through lower leverage and post-issue underperformance, the size of the rights issue relative to the market capitalisation of the firm becomes material.

Little recent and relevant literature was found on the topic, and this could prove an interesting area for further research. This was not included in this study due to the focus on rights issues announcements, with the initial announcement seldom indicating the size of the issue to be undertaken. It was therefore considered inappropriate to measure the reaction according to size of issue, an unknown at that point in time.

## **2.10 Event Studies**

Event studies are a well-established tool which, using financial market data, measure the impact of a specific event on the value of the firm through changes in the share price (MacKinlay, 1997, p. 13).

Stevens articulates the preference for event studies, “The popularity of event studies over measurements which rely on the study of accounting profits can be ascribed to the fact that share prices are much less prone to manipulation by companies than are accounting profits and are hence viewed as a more reliable measure” (Stevens, 2008, p. 10).

Three assumptions underlying the calculation of abnormal returns are identified by Mushidzi and Ward:

1. Market efficiency, that share prices incorporate all available information
2. Unanticipated events, that the market only becomes aware of the event upon the announcement
3. Confounding events, that no other significant events occur during the window period ( (Mushidzi & Ward, 2004).

As described by Smit, the first step to be taken in an event study is to determine the expected return (Smit, 2005, p. 31). The specific methodology used for this research shall be elaborated upon under methodology.

## 2.11 Measuring Abnormal Returns

The abnormal return of an event is the “actual ex post return of the security over the event window minus the normal return of the firm over the event window” (MacKinlay, 1997, p. 15), with the normal return being that expected for the firm had the event not taken place (MacKinlay, 1997, p. 15).

For firm  $i$  and event date  $t$  the abnormal return is calculated by the formula:

$$AR_{it} = R_{it} - E(R_{it}/X_t)$$

Equation 1

Where:

$AR_{it}$  = abnormal return for firm  $i$  for time period  $t$

$R_{it}$  = actual return for firm  $i$  for time period  $t$

$E(R_{it}/X_t)$  = expected return for firm  $i$  for time period  $t$ , and  $X_t$  is the conditioning information for the normal return model.

For each day of the event window, an Average Abnormal Return (AAR) can be calculated, defined as “the standard average of all abnormal returns for each company in the sample for a particular day  $i$ .” (Stevens, 2008, p. 15). Cumulative Average Abnormal Returns are defined as “the sum of the average return for day  $i$  with all the average returns for days preceding day  $i$  in the event window of interest” (Stevens, 2008, p. 15).

At any time, a mix of market and firm specific factors are at play, and the concept of abnormal returns is around controlling for those factors (Serra, 2002, p. 2) and measuring only the impact of the event. A few popular methods are outlined by Mushidzhi and Ward:

- The Mean Adjusted Model, in which the firm is expected to provide the same returns that it averaged during the estimation period
- The Market Model, which expects returns to be those of the market adjusted for firm-specific risk
- The Market Adjusted Model, in which expected returns are those of the rest of the market during the event window
- Control Portfolio Model, which groups firms into a portfolio of firms with similar characteristics according to a set of criteria, with expected returns during the window to be those of the control portfolio (Mushidzi & Ward, 2004, pp. 20-21).

The methods to be utilised for this study shall be the Market Model and the Control Portfolio Model. While simple, the market model was a significant improvement over the constant mean return model (MacKinlay, 1997, p. 18). It assumes a simple linear relationship between the market return and the return of the individual security (MacKinlay, 1997, p. 15), and has been widely used in event studies (Smit, 2005, p. 32).

To calculate the abnormal return for firm  $i$  using the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

Equation 2

Where:

- $R_{it}$  = Period  $t$  return on security  $i$
- $\alpha_i$  = Intercept for security  $i$
- $\beta_i$  = Risk factor for security  $i$
- $R_{mt}$  = Period  $t$  return on the market portfolio

$\epsilon_{it}$  = Zero mean disturbance term (MacKinlay, 1997, p. 18)

The Market Model has however come under much criticism, particularly for the simplicity of the assumed simple linear relationship (Smit, 2005, p. 32) and shall therefore be used in conjunction with the Control Portfolio Model.

The Control Portfolio Model is a powerful tool, improving on the simple Beta through using a number of factors to explain the cross-section of expected returns (2005, p. 32). Fama and French found literature supporting the use of a company's size, leverage, book-to-market equity ratio, and price/earnings ratios (Smit, 2005, pp. 32-33). The model was refined to the following equation, as shown by Smit (2005, pp. 35-36):

$$E(R_i) - R_f = b_1[E(R_m) - R_f] + s_1E(SMB) + h_1E(HML) + \epsilon_{it}$$

**Equation 3**

Where:

$E(R_i)$  = the expected return of security  $i$ ;

$R_f$  = the risk-free rate;

$b_1$  = the market  $\beta$

$E(R_m)$  = the expected return on the broad market portfolio

$s_1$  = the coefficient of tilt or factor sensitivity towards small companies' shares and away from big companies' shares

$E(SMB)$  = the difference between the expected return on a portfolio of small companies' shares and the expected return on a portfolio of large companies' shares (SMB – small minus big)

$h_1$  = the coefficient of tilt or factor sensitivity towards "value" companies with

high book-to-market equity ratios and away from “growth” companies  
with low book to market equity ratios

$E(HML)$  = the difference between the expected return on a portfolio of value  
companies’ shares and the expected return on a portfolio of growth  
companies’ shares.

$\epsilon_{it}$  = The error term (Smit, 2005, pp. 35-36)

This equation underlies the control portfolio to be utilised in line with Ward and Muller, who  
utilised a 12 factor control portfolio, with the same criteria to be utilised as the basis for this  
study (Ward & Muller, 2010, p. 30). The composition of the portfolio shall be expanded upon  
in the methodology section.

### 3. RESEARCH HYPOTHESES

Given the literature discussed, the following hypotheses were developed in-line with the stated research objectives:

#### 3.1 Hypothesis 1:

The null hypothesis states that a rights issue will not affect the share price performance of the company. The alternative hypothesis states that the announcement of a rights issue will cause the share price of the company announcing the issue to decrease. This is represented by the following equation:

$$H_0: CAR_{RI} = 0$$

$$H_A: CAR_{RI} < 0$$

The rationale behind this hypothesis follows that of the study conducted by Pascoe, Ward & MacKenzie (2005, p. 18) which, “seeks to confirm the negative share price response to rights issues in the fourteen-year period of data being analysed,” but is applied to the 10 year period of more recent data applicable to this study.

The expected finding is that there will be a negative share price reaction similar to that found in previous studies.

#### 3.2 Hypothesis 2:

The null hypothesis states that the financial position, as measured by the Altman Z Score, of the issuer will not affect share price performance of the company around a rights issue. The alternative hypothesis states that the financial position of the issuer will influence the drop in share price around a rights issue. The second hypothesis is represented by the equation:

$$H_0: CAR_{AZ1} = CAR_{AZ2}$$

$H_A: CAR_{AZ1} \neq CAR_{AZ2}$

As little literature was found to exist on the impact of an issuers' financial position, this hypothesis is exploratory in nature. Two schools of thought support a more negative reaction on an announcement for a company in a poor financial position. Firstly, the announcement may be met with more concern by the market, as possibly a first signal of the companies' stressed financial position. Secondly, the market may read into a rights issue for a company under financial distress as a last resort for funding, as opposed to an announcement by a financially strong company whose announcement would speak of pursuing opportunities with the funds received. Considering an alternative, the market may view rights issue announcements of distressed companies relatively positively, particularly if the issue is underwritten. The markets perception could be interpreted as the troubled firms finding their means for rescue.

Logical arguments can also be made for companies in a better financial position to suffer a larger reaction. The luxury of being able to better time the market would suggest a strong share price performance prior to the announcement, lending itself to a sharper negative correction. It is also possible that the market may meet the announcement with more surprise, relative to a company in distress for whom the market may anticipate the need for a rights issue even without any indication of this from the company.

The next section shall cover the methodology used to test the two hypotheses.

#### **4. RESEARCH METHODOLOGY AND DESIGN**

The study conducted was quantitative and causal in design, and was used to accept or reject the hypotheses.

##### **4.1 Unit of Analysis**

The unit of analysis was a company listed on the JSE that announced a rights issue between 1<sup>st</sup> January 2001 and 31<sup>st</sup> December 2010.

##### **4.2 Population**

The research population is all companies that issued equity through rights issues on the Johannesburg Stock Exchange. The population of relevance was companies that announced a rights issue between January 2001 and December 2010.

##### **4.3 Exclusions from Sample**

MacKinlay outlines the necessity for criteria on which firms will be included in an event study, (MacKinlay, 1997, p. 15). The criteria applied for acceptance into the sample were in-line with those for Pascoe, Ward and MacKenzie (2005, p. 19)'s study:

1. The sample shall be restricted to ordinary shares (Pascoe, Ward, & MacKenzie, 2005, p. 18).
2. Only rights issues for shares in the issuing company shall be included (Pascoe, Ward, & MacKenzie, 2005, p. 18).
3. The sample shall be restricted to Rand-denominated shares (Pascoe, Ward, & MacKenzie, 2005, p. 18).
4. Confounding events including the announcement of an impending merger, signing of a major government contract, announcement of a new product, and the filing of a large

damages suit (Pascoe, Ward, & MacKenzie, 2005, p. 18), as well as any other significant transaction outside the normal course of business.

5. Simultaneous announcement of interim or annual financial results will also be excluded as confounding events (Pascoe, Ward, & MacKenzie, 2005, p. 19).
6. Rights issue announcements anticipated prior to the formal announcement in the press or on SENS will be excluded (Pascoe, Ward, & MacKenzie, 2005, p. 19).
7. Announcements with less than 30 daily returns in their estimation period and in the 20 days surrounding the announcement will be excluded from the sample (Pascoe, Ward, & MacKenzie, 2005, p. 19).
8. Announcements that have no trading days during the event window, due to the shares' trading being suspended or for any other reasons, will be excluded from the sample because the share price reaction cannot be measured (Pascoe, Ward, & MacKenzie, 2005, p. 19).

#### **4.4 Screening of Sample**

Two initial data sources were utilised, the first being an extract of all SENS announcements containing the words "Rights Issue" and the second being a list of all share issues listed in the JSE data archives for the relevant date range.

The two data sources were used together to search for potential rights issues announcements. Each announcement identified was then analysed individually through reviewing that company's SENS archive, accessed through Moneyweb's SENS portal. Individual SENS announcements were checked for confounding events, as well as to establish the first date of announcement of the rights issue, generally preceding the date of the announcement of finalisation of the decision to proceed with the rights issue recorded in the JSE's archives.

A significant portion of the population of relevance were excluded through the process described, making the cause of exclusion of some interest and also providing insight into firm behaviour around rights issues announcements. In some instances, more than 1 of the reasons for exclusion applied; only the first cause identified is shown below.

#### 4.4.1 Rights Issues Excluded due to Simultaneous Announcements of Results

Common practice was found to be to announce the intention of a rights issue with trading updates or with annual or interim financial results, with the formal rights issue announcement following shortly thereafter. This was particularly the case with many of the large market capitalisation companies in the sample, unfortunately necessitating their removal.

The companies whose rights issues were excluded due to simultaneous announcements of results are:

**Table 1: Exclusions due to Simultaneous Announcements of Results**

02/08/2001	MXN	MONEX LTD
05/04/2002	GLT	GLOBAL TECHNOLOGY LTD
19/06/2002	NED	NEDBANK GROUP LTD
20/12/2002	PIM	PRISM LTD
25/03/2003	OLG	ONELOGIX GROUP LTD
09/04/2003	SGG	SAGE GROUP LTD
17/03/2004	NED	NEDBANK GROUP LTD
15/04/2004	AMS	ANGLO PLATINUM LTD
09/07/2004	HYP	HYPROP INVESTMENTS LTD
23/07/2004	MTL	MERCANTILE BANK HLDGS LD
21/04/2005	BRN	BRIMSTONE INVESTMENT LTD
07/10/2005	MRF	MERAFE RESOURCES LTD
07/11/2005	WAR	WESTERN AREAS LIMITED
21/09/2006	BSR	BASIL READ HLDGS LTD
13/10/2006	MFL	METROFILE HOLDINGS LTD
18/05/2007	PPE	PURPLE CAPITAL LTD

20/09/2007	HPB	HOSPITALITY PROP FUND B
20/09/2007	HPA	HOSPITALITY PROP FUND A
13/03/2008	SAL	SALLIES LTD
06/05/2008	ANG	ANGLOGOLD ASHANTI LTD
13/08/2008	SPG	SUPER GROUP LTD
18/03/2009	SPG	SUPER GROUP LTD
22/02/2010	EQS	EQSTRA HOLDINGS LTD
15/10/2010	AET	ALERT STEEL HOLDINGS LTD
24/05/2010	BDM	BUILDMAX LTD
18/08/2010	HPB	HOSPITALITY PROP FUND B
02/07/2010	BEG	BEIGE HOLDINGS LTD
31/05/2010	ABK	AFRICAN BRICK CENTRE LTD
16/11/2010	TDH	TRADEHOLD LTD
18/08/2010	HPA	HOSPITALITY PROP FUND A

#### **4.4.2 Rights Issues Excluded due to Simultaneous Announcements of Acquisitions or Material Transactions**

The listed rights issues announcements were combined with announcements of significant transactions, most commonly major acquisitions, which transactions were to be funded by way of the rights issue:

**Table 2: Exclusions due to Simultaneous Announcements of Acquisitions or Material Transactions**

12/09/2001	CPT	CAPITAL ALLIANCE HOLDINGS LTD
26/07/2002	BEG	BEIGE HOLDINGS LTD
25/07/2002	GDA	GLODINA HOLDINGS LTD
14/10/2003	KOS	KOLOSUS HOLDINGS LTD
09/10/2003	CPT	CAPITAL ALLIANCE HOLDINGS LTD
01/11/2005	BEG	BEIGE HOLDINGS LTD
14/05/2007	MYT	MONYETLA PROPERTY FUND LTD
14/05/2007	PAP	PANGBOURNE PROPERTIES LTD
18/06/2007	YRK	YORK TIMBER HLDGS LTD
25/10/2007	MDC	MEDI-CLINIC CORP LTD ORD

04/06/2008	SDH	SECUREDATA HOLDINGS LTD
03/11/2008	SAP	SAPPI LTD

#### 4.4.3 Rights Issues Excluded due to Simultaneous Announcements of Major Restructures

A number of rights issues announcements were contained in announcements regarding significant financial restructuring, most commonly due to financial distress. The announcements on occasion contained negative information regarding the necessity for the rights issue, such as breach of debt covenants and auditors qualifying their audit opinion due to going concern uncertainties. The nature of the restructuring typically contained actions far wider than the rights issue, including at times changes of management, closure of loss-making divisions, significant cash injections from major shareholders and cost-cutting initiatives.

Rights issues announcements rejected due to simultaneous restructuring announcements include:

**Table 3: Exclusions Due To Simultaneous Announcements of Major Restructures**

12/01/2001	RAG	RETAIL APPAREL GROUP LTD
19/01/2001	MTC	MCCARTHY RETAIL LTD
06/09/2001	RAG	RETAIL APPAREL GROUP LTD
13/02/2002	CYD	CYCAD FINANCIAL HOLDINGS LTD
01/03/2002	MTO	MATHOMO LTD
16/04/2002	CAM	CONSOLIDATED AFRICAN MINES LTD
06/05/2002	MES	MESSINA LTD
25/07/2002	RLY	RELYANT RETAIL LTD
29/07/2002	JCD	JCI LTD
22/08/2003	AAA	AST GROUP LTD
12/12/2003	SKJ	SEKUNJALO INVESTMENTS LD
03/07/2006	ACT	AFROCENTRIC INV CORP LTD
28/04/2010	SIM	SIMMER AND JACK MINES
01/07/2009	VUN	VUNANI LTD

03/08/2009 PNG PINNACLE POINT GROUP LD

#### 4.4.4 Rights Issues Excluded due to Absence of Data

The following share codes are recorded in the JSE archives as conducting rights issues during the relevant date range, however, insufficient data was available to do any meaningful analysis on the rights issues conducted. In many instances, share names could not be identified.

**Table 4: Exclusions due to Absence of Data**

19/01/2001	AXA
14/02/2002	ZLT
20/02/2002	ISC
29/08/2003	IMR
11/12/2003	KOL
18/11/2003	ARP
09/12/2004	AVA
18/02/2005	AAA
23/03/2006	HCL
05/05/2006	ORY
30/06/2006	SZA
30/06/2008	A L J
27/08/2008	ABO

#### 4.4.5 Rights Issues Excluded on the Basis of Illiquidity

Rights issues were excluded due to illiquidity, if the announcement was made prior to the shares listing, if shares were in a period of suspended trading, or if there was insufficient trading activity to measure returns.

**Table 5: Exclusions due to Illiquidity**

18/09/2001	KNG	KING CONSOLIDATED HOLDINGS LTD
13/04/2006	TAW	TAWANA RESOURCES NL

16/04/2008	PFG	PIONEER FOODS GROUP LTD
05/11/2008	REI	REINET INVESTMENTS SCA
09/12/2008	BIO	BIOSCIENCE BRANDS LTD
17/12/2010	BAU	BAUBA PLATINUM LTD
01/06/2009	RSG	RESOURCE GENERATION LTD

#### 4.4.6 Other Exclusions

Remaining exclusions were done on the basis of the issue not being for ordinary shares in the issuing companies or pre-emption in the market or media.

**Table 6: Other Exclusions**

30/06/2005	PAP	PANGBOURNE PROPERTIES LTD
08/02/2010	AMS	ANGLO PLATINUM LTD
03/09/2001	TDH	TRADEHOLD LTD
26/09/2001	ISC	ISCOR LTD

#### 4.5 Resulting Sample

The sample was thus compiled as a list of share codes with announcement dates and event windows only for rights issues announcements meeting the strict criteria. The sample is shown in tables 7, 8 and 9 according to their Altman Z Score groups, with just 35 rights issues comprising the sample from 116 rights issues of ordinary shares found in the relevant period.

#### 4.6 Altman Z Scores

Altman Z Scores, necessary for categorising the issuing companies by their state of financial strength or distress, were manually calculated for the sample companies utilising standardised annual financials from BFA McGregor. The standardised financials exclude the value of intangible assets from the balance sheet, appropriate for consistent assessment of the companies.

The following inputs are used in calculating the Z Score:

- $X1 = \text{Working Capital} / \text{Total Assets}$
- $X2 = \text{Retained Earnings} / \text{Total Assets}$
- $X3 = \text{EBIT} / \text{Total Assets}$
- $X4 = \text{Market Value of Equity} / \text{Total Liabilities}$
- $X5 = \text{Net Sales} / \text{Total Assets}$

Two versions of the Altman Z Score are of relevance, the first being for publicly held manufacturing firms:

$$Z = 1.23X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5$$

Result interpretation:

Healthy:  $>2.99$

Grey Zone: 1.81-2.99

Unhealthy:  $< 1.81$

The second test is appropriate for public, general use firms:

$$Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$$

Result interpretation:

Healthy:  $>2.6$

Grey Zone: 1.1-2.6

Unhealthy:  $< 1.1$

Initially the test for publicly held manufacturing firms was used. Scores were retested using the non-manufacturing test, which excludes net margin on sales from the calculation, a

variable greatly influenced by the industry in which the firm operates (Narayanan, 2010, p. 13), and this was deemed a better measure to use.

For purposes of grouping data according to the financial distress of the issuing company, the following categorisations were used in-line with Altman:

1. Scores below 1.1 were grouped into a category “Unhealthy”
2. Scores of 1.1 to 2.6 were grouped into a category “Grey Zone”
3. Scores above 2.6 were grouped into a category “Healthy”

For most companies, the score was calculated from the full year financials for the period immediately prior to the rights issue announcement, however, a feature of the Altman Z Score is that it can change dramatically in short periods of time (Narayanan, 2010, p. 13). To allow for this, where dramatic changes are noticed between the prior and post rights issue period, in some instances the scores for both periods was averaged. This was not done in situations where the additional equity for the rights issue would reflect in the financials, potentially increasing the score significantly due to lower leverage.

It was noted specifically that the nature of the listed property companies’ business model, with a significant portion of profits paid out to shareholders at regular intervals, negatively affects their scores in a manner not truly reflecting their financial position. For consistency, no adjustments were made in this regard.

**Table 7: Z -Scores Below 1.1, Unhealthy**

Z Score	Share Code	Share Name
ERROR	WAR	WESTERN AREAS LTD
-142.00	TAW	TAWANA RESOURCES NL
-17	CSY	CASEY INVESTMENT HOLDINGS LTD
-11.40	SAL	SALLIES LTD
-7.15	PIM	PRISM HOLDINGS LTD
-5.20	PPE	PURPLE CAPITAL LTD

-4.90	DRD	DRDGOLD LTD
-4.10	SAL	SALLIES LTD
-4.00	SAL	SALLIES LTD
-2.00	SIM	SIMMER AND JACK MINES
-0.6	MLL	MILLIONAIR CHARTER LTD
-0.30	GRT	GROWTHPOINT PROP LTD
-0.30	CSP	CHEMICAL SPECIALITIES LTD
0.15	SAH	SOUTH AFRICAN COAL MIN

**Table 8: Z Scores between 1.1 and 2.6, Grey Zone**

Z Score	Share Code	Share Name
1.80	COM	COMAIR LTD
2.00	MDC	MEDI-CLINIC CORP LTD ORD
2.00	PMM	PREMIUM PROPERTIES LTD
2.40	RDF	REDEFINE PROPERTIES LTD
2.60	DAW	DISTRIBUTION AND WAREHSG

**Table 9: Z Score above 2.6, Healthy**

2.9	NEP	NEW EUROPE PROP INV PLC
3.0	SOV	SOVEREIGN FOOD INVEST LD
3.1	TFX	TOP FIX HOLDINGS LTD
3.1	OMN	OMNIA HOLDINGS LTD
3.2	DSY	DISCOVERY HOLDINGS LTD
3.3	ESR	ESORFRANKI LTD
3.4	BRT	BRIMSTONE INVESTMNT CORP
3.5	SER	SEARDEL INVEST CORP LTD
3.8	SBL	SABLE HLDGS LTD ORD
4.2	PON	PROFURN LTD
4.2	CPI	CAPITEC BANK HLDGS LTD
5.3	AQP	AQUARIUS PLATINUM LTD
5.4	PSG	PSG GROUP LIMITED
8.3	DGC	DIGICORE HOLDINGS LTD
8.9	MTX	METOREX LTD
15.4	PAM	PALABORA MINING CO ORD

#### 4.7 Data Collection

Data was collected through three mechanisms:

1. For the Market Model, daily share prices were manually obtained from I-Net Bridge on individual shares, as well as on the J203 ALSI index for benchmarking against. This was used to test normality of the data from the event study windows. A 100 day window around the announcement was obtained to assist identifying abnormalities.
2. With the kind assistance of Professor Ward, the sample was processed through a market model event study engine, which gave the daily abnormal returns.
3. Again with the kind assistance of Professor Ward, the sample was processed through a control portfolio engine which gave daily abnormal returns for the event study window according to the 12 factor model as follows:
  - The market capitalisation of the company was used to rank its size into small, medium and large companies (Ward & Muller, 2010, p. 30).
  - The price earnings ratio was used to classify firms into value or growth, with value shares being below the median price earnings ratio, and those above the median being growth (Ward & Muller, 2010, p. 30).
  - Companies were classified into “resource” and “non-resource” according to their JSE sector grouping, with all mining and non-mining resource companies classified as resource.

#### 4.8 Data Integrity

On collection of the data, some companies in the sample were rejected through evidently abnormal data or unavailability of share price data, assumed to be illiquidity which was not identified through review of the SENS announcements. In the case of abnormal data, this was identified through reviewing the abnormal returns, some of which did not display the expected random nature.

For the Market Model, only three transactions were rejected for data integrity purposes:

**Table 10: Market Model Rejected Data**

2002/09/20	CSY	CASEY INVESTMENT HOLDINGS LTD
2005/04/21	BRT	BRIMSTONE INVESTMNT CORP
2008/11/11	SBL	SABLE HLDGS LTD ORD

For the control portfolio, data integrity problems were more prevalent, possibly attributable to the increased complexity of the model. Table 11 details the exclusions. The better data integrity for the Market Model, despite being an otherwise inferior method, gives value to utilising both methods.

**Table 11: Control Portfolio Rejected Data**

2002/02/11	PON	PROFURN LTD
2001/12/06	MLL	MILLIONAIR CHARTER LTD
2002/09/20	CSY	CASEY INVESTMENT HOLDINGS LTD
2003/06/12	DSY	DISCOVERY HOLDINGS LTD
2005/04/05	DRD	DRDGOLD LTD
2005/04/21	BRT	BRIMSTONE INVESTMNT CORP
2007/09/13	TFX	TOP FIX HOLDINGS LTD
2008/02/20	TAW	TAWANA RESOURCES NL
2008/06/26	SAH	SOUTH AFRICAN COAL MIN
2010/04/13	CSP	CHEMICAL SPECIALITIES LTD
2010/11/25	CPI	CAPITEC BANK HLDGS LTD

2010/09/21	NEP	NEW EUROPE PROP INV PLC
2010/11/16	DGC	DIGICORE HOLDINGS LTD
2010/12/20	PMM	PREMIUM PROPERTIES LTD

There was only one data integrity problem with calculation of Altman Z Scores, which was for Western Areas Limited, and this company was excluded from the analysis of financial distress.

#### **4.9 Event Window**

MacKinlay recommends that returns in the periods prior and post the event are both of interest (MacKinlay, 1997, p. 15). An event window of 10 days prior to the announcement of the rights issue and 20 days post the event is used for this study.

#### **4.10 Data Analysis**

The sample transactions were analysed through several tests as outlined below.

##### **4.10.1 Calculation of Means and Graphs**

The first step in analysis was a simple calculation of means. This was conducted for the Market Model and Control Portfolio Model, as well as for the Altman Z Score groups utilising only the Market Model with its larger sample, as detailed in section 5.3. Average Abnormal Returns and Cumulative Average Abnormal Returns were calculated for each day in the event window.

The Mean is calculated by summing the observations and dividing by the number of observations (Albright, Winston, & Zappe, 2009, p. 92), and shows the central tendency of the data. Graphs of means are also provided, which were created using Microsoft Excel.

##### **4.10.2 One-Sample T-Tests**

The one-sample T-Test procedure tests whether the mean of a single variable differs significantly from a specified constant. In this instance, each daily abnormal return was

measured against the benchmark of zero. Both Average Abnormal Returns and Cumulative Average Abnormal Returns were tested, with the expectation that the cumulative data would be of more use for testing the hypotheses. The tests were two-tailed as a variation in either direction was significant. A p-value was obtained which, if smaller than 0.05, would show a statistically significant difference. This was conducted in-line with the procedure outlined by Albright, Winston and Zappe (2009, pp. 510-512).

Further to the t-test, boot-strapping was also carried out which is expanded upon below.

#### **4.10.3 Independent T-Tests**

The independent t-test, also known as the two sample test, compares the means of the same variable for two groups of cases. This test is commonly used for comparisons between groups of only two categories, in this instance the groups classified according to their Altman Z Scores. The groups classified by Altman Z Score, as shown in section 5.3, had to merge the “unhealthy” and “grey-zone” classifications due to the small number of samples in these two groups. The result was two groups, suited to statistical analysis by way of the independent t-test.

If the value is found to be less than 0.05, then the independent variable in question does differ between the groups with statistical significance. This testing was conducted as outlined by Albright, Winston and Zappe (2009, pp. 523-527). Again, boot-strapping was applied to the results, which process is detailed below.

#### **4.10.4 Boot-Strapping**

Boot-strapping was conducted on both the one sample t-tests and independent t-tests, in-line with the process outlined by Ward and Muller (2010, p. 31). Using a window of 20 days before and 229 days post the announcement date for each company in the sample’s daily share movements, a distribution of 1000 abnormal return observations was randomly created. As in Ward and Muller, the observations in the event window could be tested against this

distribution for significance (2010, p. 31). This method is superior to t-tests in that there are no assumptions of normality (Ward & Muller, 2010, p. 31).

#### **4.11 Research Limitations**

The research is only applicable to the sample period of 1<sup>st</sup> January 2001 to 31<sup>st</sup> December 2010, the JSE as a market, and the event window of ten days prior and 20 days post the rights issue announcement. Findings should be applied with caution outside these parameters.

More specifically, following the lengthy process of examining SENS announcements for confounding events, the sample obtained was much smaller than had been anticipated and represents a small portion of the rights issues announced during the sample period. It raised attention to the fact that rights issue announcements seldom occur without the confounding events detailed. The value of this research is therefore discounted by its application only to the minority of rights issues announcements, and further research may overcome this through considering coupled events, such as the impact of simultaneous announcements of negative results and rights issues.

Consideration was given to weighting results by issuer market cap to avoid skewing by small caps, results of which may be exaggerated. Due to the small sample this was decided against, as the weighting would effectively reduce the sample to an even smaller sample, dominated by large cap companies in the analysis.

The Altman Z Score, although a widely used measure of financial distress, would have been well complemented by an analysis of cash requirements as used by DeAngelo, DeAngelo and Stultz (2010).

## 5. RESULTS

The sample is as outlined in the methodology section, with 31 rights issues announcements out of an initially identified 150 meeting the criteria and being analysed through the market model, and 20 rights issues announcements for the control portfolio.

### 5.1 Daily Average Abnormal Returns

Table 12 shows the daily Average Abnormal Return for both the Market Model and Control Portfolio. Day 0 is the date of the rights issue announcement. Statistical analysis was conducted for the market model, through one-sample t-tests and boot-strapping. The resulting p-values are shown, and statistical significance confirmed at 95% confidence. Review of the p-values also shows a number of daily movements significant at 90% confidence level had that been the test.

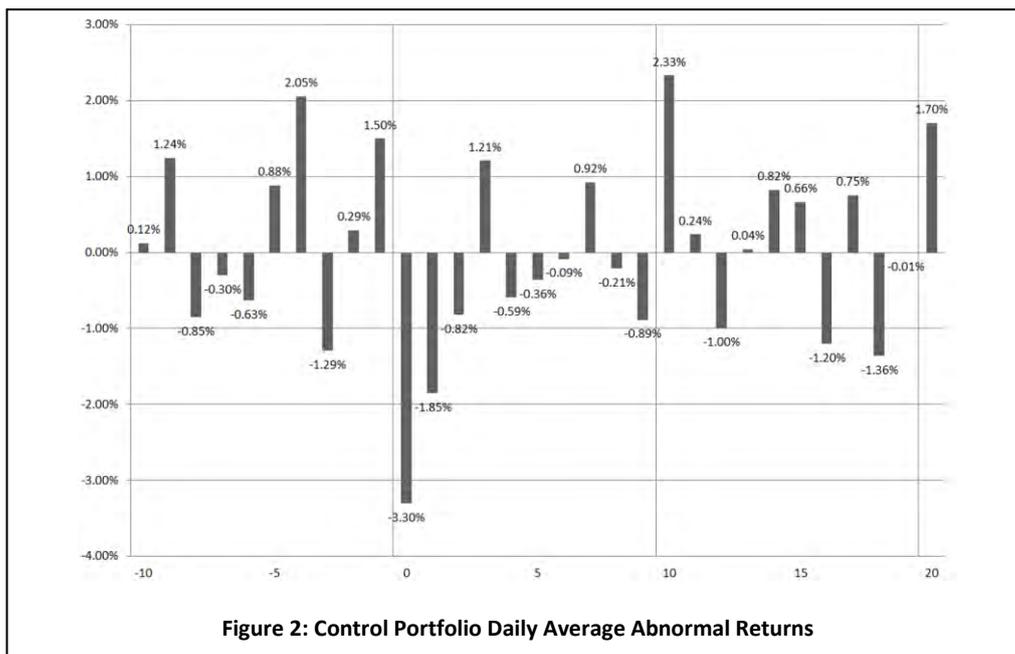
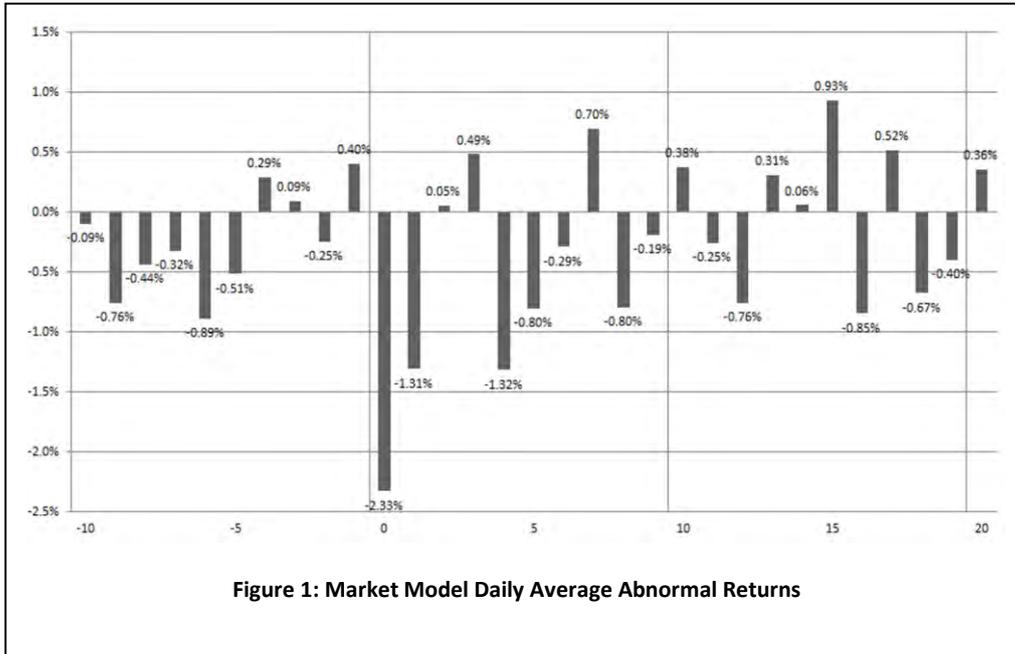
Table 12: Daily Average Abnormal Returns

Day	Market Model AAR%	Market Model P-Value	Market Model Statistical Significance	Control Portfolio AAR%
-10	-0.09	0.769	No	+0.12%
-9	-0.76	0.220	No	+1.24%
-8	-0.44	0.380	No	-0.85%
-7	-0.32	0.672	No	-0.30%
-6	-0.89	0.204	No	-0.63%
-5	-0.51	0.436	No	+0.88%
-4	+0.29%	0.681	No	<b>+2.05%</b>
-3	+0.09%	0.901	No	<b>-1.29%</b>
-2	-0.25%	0.781	No	+0.29%
-1	+0.4%	0.523	No	<b>+1.50%</b>
<b>0</b>	<b>-2.33%</b>	<b>0.016</b>	<b>Yes</b>	<b>-3.30%</b>
+1	<b>-1.31%</b>	0.051	No	<b>-1.85%</b>

+2	+0.05%	0.937	No	-0.82%
+3	+0.49%	0.335	No	<b>+1.21%</b>
<b>+4</b>	<b>-1.32%</b>	<b>0.025</b>	<b>Yes</b>	<b>-0.59%</b>
+5	-0.8%	0.243	No	-0.36%
+6	-0.29%	0.674	No	-0.09%
+7	+0.7%	0.128	No	-0.92%
+8	-0.8%	0.107	No	-0.21%
+9	-0.19%	0.738	No	-0.89%
+10	+0.38%	0.539	No	<b>+2.33%</b>
+11	-0.25%	0.731	No	+0.24%
+12	-0.76%	0.162	No	<b>-1.00%</b>
+13	+0.31%	0.388	No	+0.04%
+14	+0.06%	0.927	No	+0.82%
+15	+0.93%	0.238	No	0.66%
+16	-0.85%	0.166	No	<b>-1.20%</b>
+17	+0.52%	0.230	No	+0.75%
+18	-0.67%	0.363	No	<b>-1.36%</b>
+19	-0.4%	0.460	No	-0.01%
+20	+0.36%	0.613	No	<b>+1.70%</b>

Daily movements of greater than 1% are highlighted in bold, with a concentration around the event and then others apparently at random. Statistically significant days are also highlighted in bold.

The same data is well depicted by way of graphs:



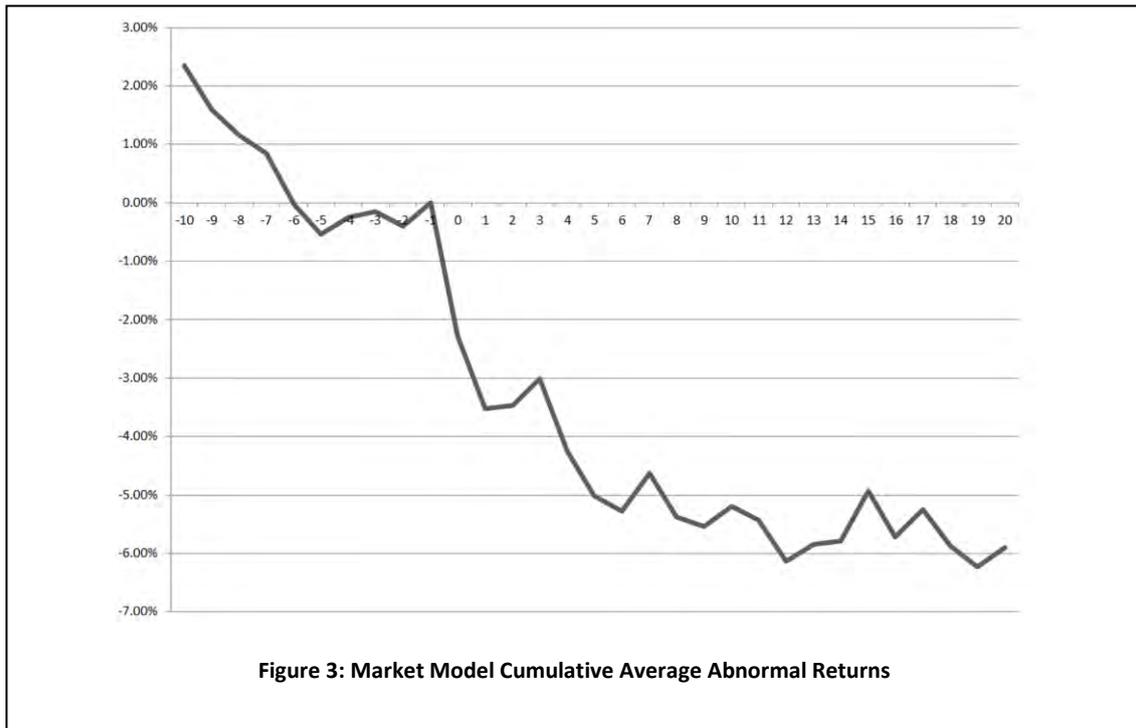
## 5.2 Cumulative Average Abnormal Returns

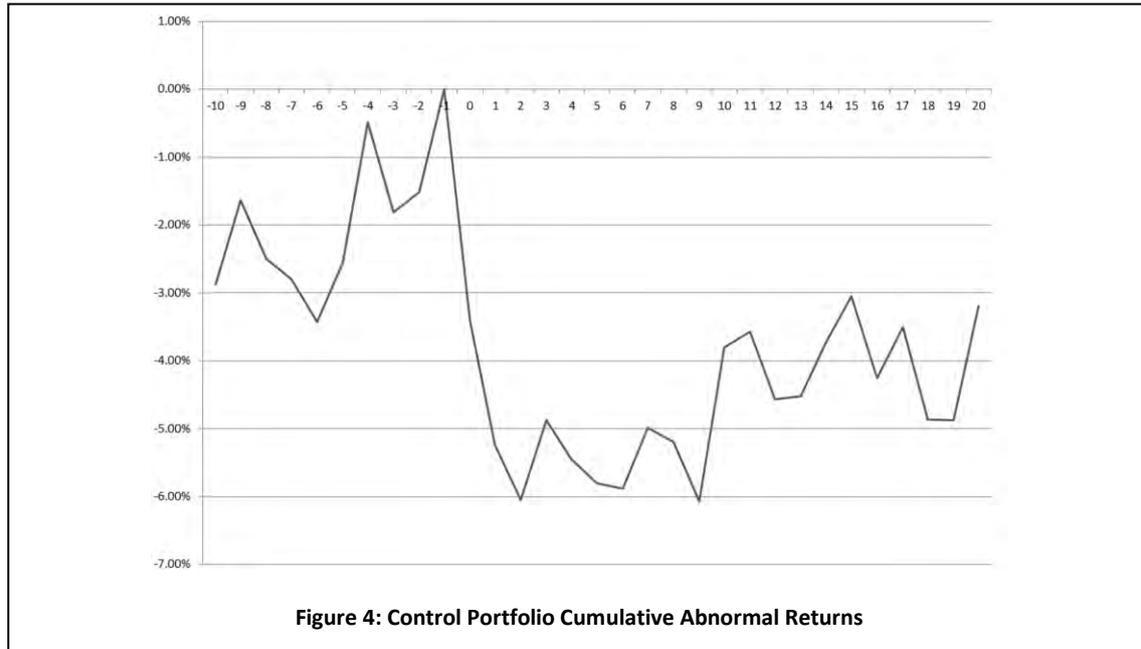
The table shows the CAARs over selected relevant periods. P-values are shown for the market model, as well as significance at 95% confidence. The p-values were obtained through one-sample t-tests and boot-strapping. A table showing CAAR for each day of the event window is provided in the appendix.

**Table 13: Cumulative Average Abnormal Returns**

Event days	Market Model CAAR	P-Value	Statistical Significance	Control Portfolio CAAR
[0, +5]	-5.01%	0.008	Yes	-5.80%
[0, +10]	-5.20%	0.025	Yes	-3.81%
[0, +20]	-5.90%	0.014	Yes	-3.20%

The same data is, again, well depicted by way of figures:





### 5.3 Descriptive Statistics on Data Grouped by Altman Z Score and Statistical Testing

Results of the Altman Z Score groups shall be shown in two sections. Table 14 provides descriptive statistics for the three Altman Z Score groups, using market model data, which will provide the basis of the first presentation of results. Table 15 shows the same groups using the control portfolio data, the smaller sample causal in utilising only the market model data.

**Table 14: Descriptive Statistics on Altman Z Score Groups – Market Model**

Data used	Group	Frequency	Valid Percent	Cumulative Percent
Market Model	Healthy	14	45.2	45.2
	Grey Zone	5	16.1	61.3
	Unhealthy	12	38.7	100.0
	Total	31	100.0	

**Table 15: Descriptive Statistics on Altman Z Score Groups - Control Portfolio**

Data used	Group	Frequency	Valid Percent	Cumulative Percent
Control Portfolio	Healthy	10	50.0	50.0
	Grey Zone	5	25.0	75.0
	Unhealthy	5	25.0	100.0
	Total	20	100.0	

Due to the small samples for the grey and unhealthy groups shown in Table 14, for statistical purposes these were regrouped as shown in Table 16. The two resulting groups both have similar frequency. The second set of results for the two relevant sections shall both be presented based on the revised groups, while the simple averages will be based on the original 3 groups as shown in Table 14.

**Table 16: Revised Altman Z Score Groups – Market Model only**

Data used	Group	Frequency	Valid Percent	Cumulative Percent
Market Model	Healthy	14	45.2	45.2
	Grey Zone	17	54.8	100.0
	Total	31	100.0	

#### 5.4 Average Abnormal Returns grouped by Altman Z Score

Table 17 shows the daily AARs of the Altman Z Score groups.

**Table 17: Daily Average Abnormal Returns According to Altman Z Score Groups**

Day	UNHEALTHY AAR	GREY ZONE AAR	HEALTHY AAR
-10	+0.81%	+0.42%	+0.05%
-9	-0.62%	-0.16%	-1.12%
-8	-0.72%	-0.40%	-0.26%
-7	+0.54%	-1.90%	-0.41%
-6	-0.80%	+0.68%	-1.64%
-5	-0.09%	-0.38%	-1.14%
-4	+1.72%	-0.57%	-0.46%
-3	-1.48%	+1.42%	+1.28%
-2	-0.81%	-0.72%	+0.45%
-1	-0.27%	+0.16%	+1.06%
0	-2.23%	-3.58%	-1.92%
+1	-1.86%	-1.76%	-0.58%

+2	-0.74%	+1.42%	+0.21%
+3	+0.29%	-1.41%	+1.39%
+4	-1.80%	-0.41%	-1.30%
+5	-1.92%	+0.75%	-0.36%
+6	-0.89%	-0.07%	+0.23%
+7	+1.52%	+1.32%	-0.06%
+8	-1.76%	+0.21%	-0.32%
+9	-0.41%	+0.63%	-0.24%
+10	+0.73%	-2.22%	+1.25%
+11	-1.23%	+0.45%	+0.33%
+12	-1.23%	-0.09%	-0.50%
+13	+0.65%	-0.82%	+0.46%
+14	-0.80%	+2.00%	+0.22%
+15	+2.76%	-1.72%	+0.43%
+16	-1.13%	-1.49%	-0.14%
+17	+0.37%	+0.14%	+0.88%
+18	-1.13%	-1.44%	+0.06%
+19	-0.29%	-0.20%	-0.56%
+20	+1.34%	-0.06%	-0.22%

AARs for the regrouped data, including statistics, are shown in Table 18. An independent sample t-test, with bootstrapping, produced p-values which show none of the daily movements differing with statistical significance.

**Table 18: Regrouped Altman Z Score Daily Average Abnormal Returns**

Day	Healthy AAR	Grey Zone / Unhealthy AAR	P-Value	Statistical Significance
-10	0.051%	-0.208%	0.699	No
-9	-1.119%	-0.476%	0.626	No



-8	-0.255%	-0.580%	0.778	No
-7	-0.409%	-0.254%	0.901	No
-6	-1.641%	-0.307%	0.320	No
-5	-1.136%	-0.030%	0.415	No
-4	-0.464%	0.883%	0.346	No
-3	1.281%	-0.829%	0.171	No
-2	0.446%	-0.786%	0.483	No
-1	1.000%	0.000%	0.331	No
0	-1.916%	-2.649%	0.689	No
+1	-0.580%	-1.873%	0.343	No
+2	0.208%	-0.066%	0.852	No
+3	1.391%	-0.219%	0.118	No
+4	-1.299%	-1.335%	0.979	No
+5	-0.364%	-1.142%	0.581	No
+6	0.229%	-0.692%	0.526	No
+7	-0.064%	1.292%	0.146	No
+8	-0.316%	-1.168%	0.328	No
+9	-0.236%	-0.157%	0.951	No
+10	1.254%	-0.304%	0.236	No
+11	0.330%	-0.707%	0.459	No
+12	-0.498%	-0.959%	0.675	No
+13	0.458%	0.193%	0.729	No
+14	0.218%	-0.064%	0.836	No
+15	0.431%	1.322%	0.576	No
+16	-0.137%	-1.397%	0.288	No
+17	0.879%	0.243%	0.537	No
+18	0.059%	-1.245%	0.340	No
+19	-0.555%	-0.271%	0.790	No
+20	-0.220%	0.812%	0.446	No

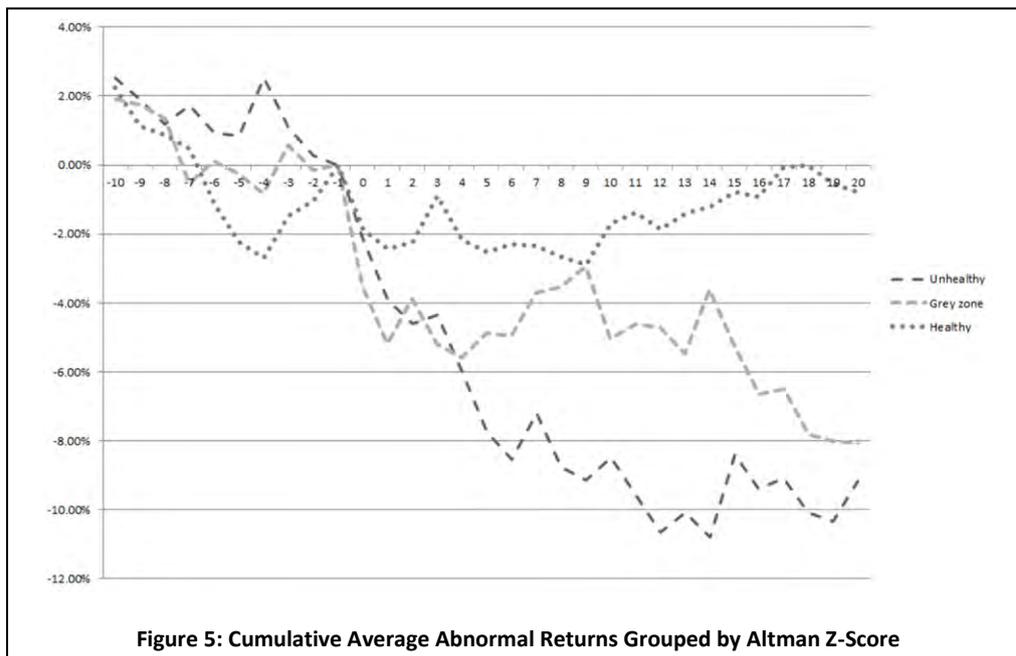
### 5.5 Cumulative Average Abnormal Returns Grouped by Altman Z Score

CAARs are shown at intervals of interest per group in Table 19. The movements are based at zero on day t-1.

**Table 19: Cumulative Average Abnormal Returns grouped by Altman Z Score**

Event days	Unhealthy CAR	Grey-Zone CAR	Healthy CAR
[0, +5]	-7.74%	-4.88%	-2.51%
[0, +10]	-8.49%	-5.05%	-1.69%
[0, +20]	-9.17%	-8.06%	-0.77%

The data in Table 19 is represented graphically in Figure 5, which illustrates the divergence in performance over the event window.



**Figure 5: Cumulative Average Abnormal Returns Grouped by Altman Z-Score**

CAARs were then tested according to the regrouped data as shown in Table 16, using an independent sample t-test and bootstrapping, with testing at 95% confidence level.

Table 20: Altman Z Score Groups CAAR with Statistical Significance

Event days	Healthy CAAR	Grey-Zone/ Unhealthy CAAR	P-Value	Statistical Significance
[0, +5]	-1.59%	-7.05%	0.099	No
[0, +10]	-0.89%	-8.15%	0.100	No
<b>[0, +15]</b>	<b>-0.59%</b>	<b>-8.785%</b>	<b>0.042</b>	<b>Yes</b>
<b>[0, +20]</b>	<b>-0.28%</b>	<b>-10.41%</b>	<b>0.028</b>	<b>Yes</b>

## 6. DISCUSSION OF RESULTS

The results shall be discussed according to the relevant hypotheses.

### 6.1 Hypothesis 1

The first hypothesis was that the announcement of a rights issue would have a negative impact on the issuers share price. According to the Average Abnormal Returns in Table 12, we see a negative 2.33% abnormal return on the day of a company announcing a rights issue, followed by an additional negative 1.31% AAR the following day for the market model. The control portfolio showed an even larger decline of 3.30% on the day of the announcement.

Cumulative Average Abnormal Returns, according to the market model, were negative 5.20% over the 10 days post the announcement, and negative 5.90% over the 20 days post the announcement, with all returns in the 20 day post event window showing statistical significance.

Noise is visible in the study, shown on the bar chart in Figure 1, with AARs in either direction prior to the announcement. The movement on the announcement date is however shown to be significantly greater than abnormal returns on any other day in the window, and was found to be statistically significant at a 95% confidence level.

Figure 3 shows the abnormal price decline in the period immediately prior to the rights issue announcement, suggesting that there may be some level of pre-emption by the market as measured according to the market model.

Comparing the two models, Figures 2 and 4 of the control portfolio both show more erratic movements than the equivalent Figures 1 and 2 in the market model. This higher volatility could logically be attributed to the smaller sample. Taking into account the positive abnormal return of 1.5% on the day prior to the announcement in the Control Portfolio, as opposed to the 0.4% in the market model, results are similar in magnitude and consistent in direction,

confirming each other. The results for both models around the event date are similar to those found by Bhana (1999, pp. 35-37) of negative 3.51% over the two-day announcement period, Pascoe, Ward & MacKenzie's approximately negative 3% on the day of the announcement using two different models (2005, p. 26), and Eckbo, Masulis and Norli's negative 3% over the two-day announcement window (2000, p. 38).

Moving forward in our window, the control portfolios' more volatile movements show a negative CAAR of negative 3.81% at day t+10 and negative 3.20% at day t+20, with a maximum negative CAAR in excess of 6% reached at days t+2 and t+9 both followed by days of large single gains reversing some of the movement. Interestingly, in contrast to the market model, the period immediately prior to the rights issue shows large gains, with a 2.88% positive CAAR to day t-1. In considering these differences, weight must be given to the results from the market model, with its' larger sample. In support of this, there are arguments that the simple market model is in any event not inferior to more complex models (Yun & Kim, 2010, p. 260). Nevertheless, and more importantly, both models agree on the negative impact of a rights issue announcement on share prices, and this is confirmed by the statistics conducted.

**Hypothesis 1** was tested:

$$H_0: CAR_{RI} = 0$$

$$H_A: CAR_{RI} < 0$$

Based on the results presented, notably Tables 12 and 13, the null hypothesis is rejected.

Rights issue announcements are found to have a negative impact on the issuers share price.

## 6.2 Hypothesis 2

The second hypothesis stated that the financial position of the issuer would influence the drop in share price around a rights issue. Table 17 shows the daily Average Abnormal Returns for the three groups of companies, ranked according to their Altman Z Score, with Table 18 showing the regrouped results. Little difference is evident in the daily movements, confirmed by the absence of statistical significance on any individual day.

The Cumulative Average Abnormal Returns, shown in Table 19 and Table 20, show a far more convincing argument however, which is best illustrated by Figure 5: Cumulative Average Abnormal Returns Grouped by Altman Z-Score. It's evident from the graph that based on the measurements of share price returns in Table 19, companies conducting rights issues' share prices are far worse impacted for companies categorised as unhealthy, while those considered healthy perform much better.

Analysis of Figure 5 shows that all 3 groups have negative share price returns in the 10 days prior to the announcement, with the healthy companies declining 2.25%, grey zone 1.9% and the unhealthy companies declining the most in the pre-event period, 2.52% to t-1.

Interestingly, the healthy and grey zone companies decline more in the preceding period, and then have a positive recovery prior to the announcement.

Figure 5 also shows the unhealthy companies' worst hit around the announcement of the rights issue, with an AAR on the announcement date of negative 2.33%, followed by negative 1.86% on day t+1, and a CAAR over the two days of 3.91%. This is significantly greater in magnitude than the market reaction for the healthy companies, who have declines of 1.92% and 0.58% on the announcement date and t+1 respectively, with a cumulative abnormal decline of 2.43%. Notably, companies in the grey zone suffered the biggest announcement

impacts over the two-day announcement period. Their CAAR is negative 5.2%, comprising AARs of negative 3.58% and negative 1.76%.

Over the longer period of the full window, we see the middle categories performance move to the middle, with the healthy performing best and unhealthy significantly worse. The healthy companies share prices perform best to the extent that they suffer very little other than in the few days surrounding the announcement, with table 19 confirming a CAAR of just negative 0.77% at day t+20. The CAAR is greatest at day t+9, totalling negative 2.88%, but by day t+18 has almost entirely disappeared at just negative 0.01%.

The grey zone companies share price impact is in the middle but far closer to that of the unhealthy companies, with a fairly steady decline to the largest CAAR on the last day of the window at negative 8.6%. The unhealthy companies are impacted only slightly more but with greater volatility than the other categories, with CAARs having declined beyond 10% by day t+12. At the close of the event window, cumulative abnormal decline is 9.17%.

The statistics shown in Table 20 confirm that the difference in performance between the two groups is significant with 95% confidence, with p-values of 0.042 and 0.028 at 15 and 20 days post the event respectively.

**Hypothesis 2** was tested:

$$H_0: CAR_{AZ1} = CAR_{AZ2}$$

$$H_A: CAR_{AZ1} \neq CAR_{AZ2}$$

Given the results as discussed, most notably Table 20 and Figure 5, the null hypothesis is rejected. The financial position of the issuer of a rights issue, as categorised by their Altman Z Score, is found to have a statistically significant impact on the share price reaction to the announcement of a rights issue.



## 7. CONCLUSION

The research report conducted on the Johannesburg Securities Exchange set out exploring relevant literature around rights issues announcements and specifically the impact on share prices and factors that influence that impact. Literature explored found a negative reaction to the announcement, and further that numerous company specific and external factors influence the markets' reaction to the announcement. From this, the objectives sought were re-testing the negative share price movement in response to a rights issue announcement, and to explore uncharted territory around the influence of the issuers' financial position on this response. This was of particular relevance given the global financial crisis during the period of the study, and given the recent findings of DeAngelo, DeAngelo and Stultz (2010), who found financial distress to be a key cause of companies' decisions to conduct rights issues, given that most did so to meet short-term cash flow requirements.

The abnormal negative share price reaction found to be 3 – 3.5% over the two-day announcement period in a number of studies was confirmed for the rights issues announcements analysed, with a statistically significant negative CAAR of 3.52% according to the market model, and 5.24% according to the control portfolio. Further, the study found that the negative returns persisted over the event window, with negative CAAR of 3.2% for the control portfolio and 5.9% for the market model 20 days post the event.

The findings again support and give substance to the markets' negative perception of rights issues announcements. However, findings for the second aspect of the research suggest that this should not be uniformly so.

To differentiate share price reactions according to the issuers' financial position, groups were categorised by their Altman Z Scores, a widely-utilised measure of financial distress (Narayanan, 2010, p. 12). Comparison of the CAARs of the healthy, grey zone and unhealthy

categories revealed significantly less negative impact on the share price performance of the healthy companies, to the extent that after the initial negative reaction, CAARs almost disappeared at the end of the 20 day event window. The converse was true for the grey zone and unhealthy companies, which suffered significantly negative returns on the announcement, and which negative returns increased in magnitude through the event window. The findings were confirmed statistically significant with 95% confidence, based on comparing the results of the healthy companies to a combination of the unhealthy and grey zone companies.

The key conclusion is therefore that the markets negative response to a rights issue announcement is significantly influenced by the financial position of the issuer, with a positive relationship between the financial position and the market response. The findings contribute to the existing literature, and also raise a number of new questions. Do the companies in the unhealthy category perform worse due to worse market timing? The findings of Pascoe, Ward and MacKenzie (2005, p. 26) suggest that this would not be causal in the negative performance, with issuers being worse hit in strong markets. Is information asymmetry more of a concern to the market for companies known to be potentially financially stretched? Dbouk and Ismail did find governance to be a variable with influence (2010, p. 159), supporting this. Are companies in a poor financial condition subject to a greater dilution due to a proportionately larger issue? To answer this, and the other questions raised, would be speculation at this stage, and are areas appropriate for further research.

The study was hampered by a small sample and could have benefitted through more comprehensive ranking of the companies' financial positions, for example, also considering cash requirements as measured by DeAngelo, DeAngelo and Stultz (2010). In this regard, further research is recommended to support the findings.

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## 9. APPENDICES

### 9.1 Daily CAAR for Full Window

The table shows the Cumulative Average Abnormal Returns per day, as in 5.2 of the main document, but for the full event window and according to both models. P-Values are shown for the market model, and tested at the 5% statistical significance level.

Day	Market Model CAAR	P-Value	Statistical Significance	Control Portfolio CAAR
-10	2.36%	0.069	No	-2.88%
-9	1.60%	0.139	No	-1.64%
-8	1.16%	0.242	No	-2.50%
-7	0.85%	0.407	No	-2.79%
-6	-0.03%	0.93	No	-3.43%
-5	-0.53%	0.793	No	-2.55%
-4	-0.25%	0.998	No	-0.49%
-3	-0.15%	0.972	No	-1.81%
-2	-0.39%	0.621	No	-1.52%
-1	0.00%	n/a	No	0.00%
0	-2.27%	0.025	Yes	-3.40%
1	-3.52%	0.01	Yes	-5.24%
2	-3.47%	0.019	Yes	-6.04%
3	-3.01%	0.043	Yes	-4.87%
4	-4.26%	0.015	Yes	-5.45%
5	-5.01%	0.008	Yes	-5.80%
6	-5.27%	0.003	Yes	-5.88%
7	-4.63%	0.006	Yes	-4.99%
8	-5.37%	0.001	Yes	-5.20%
9	-5.54%	0.003	Yes	-6.06%
10	-5.20%	0.025	Yes	-3.81%
11	-5.43%	0.045	Yes	-3.57%
12	-6.13%	0.014	Yes	-4.56%
13	-5.85%	0.022	Yes	-4.52%
14	-5.79%	0.017	Yes	-3.71%
15	-4.94%	0.014	Yes	-3.05%
16	-5.72%	0.007	Yes	-4.25%
17	-5.42%	0.029	Yes	-3.51%
18	-5.86%	0.022	Yes	-4.86%
19	-6.22%	0.01	Yes	-4.87%
20	-5.90%	0.014	Yes	-3.20%
-10	2.36%	0.069	No	-2.88%

## 9.2 Daily CAR for Full Window - Altman Z Score Groups

As noted in 5.5, the table shows the daily Cumulative Average Abnormal Returns for the 3 Altman Z Score groups, as measured by the market model.

Day	Unhealthy	Grey zone	Healthy
-10	+2.52%	+1.90%	+2.25%
-9	+1.90%	+1.74%	+1.13%
-8	+1.19%	+1.34%	+0.88%
-7	+1.72%	-0.55%	+0.48%
-6	+0.94%	+0.12%	-1.14%
-5	+0.85%	-0.26%	-2.24%
-4	+2.52%	-0.82%	-2.68%
-3	+1.06%	+0.56%	-1.46%
-2	+0.26%	-0.15%	-1.03%
-1	-0.00%	0.00%	0.00%
0	-2.16%	-3.52%	-1.88%
+1	-3.91%	-5.20%	-2.43%
+2	-4.60%	-3.87%	-2.24%
+3	-4.34%	-5.20%	-0.91%
+4	-6.00%	-5.58%	-2.17%
+5	-7.74%	-4.88%	-2.51%
+6	-8.53%	-4.95%	-2.30%
+7	-7.19%	-3.72%	-2.36%
+8	-8.77%	-3.52%	-2.66%
+9	-9.13%	-2.93%	-2.88%
+10	-8.49%	-5.05%	-1.69%
+11	-9.57%	-4.62%	-1.37%
+12	-10.64%	-4.71%	-1.85%
+13	-10.09%	-5.47%	-1.41%
+14	-10.78%	-3.61%	-1.20%
+15	-8.41%	-5.24%	-0.79%
+16	-9.41%	-6.63%	-0.92%
+17	-9.09%	-6.50%	-0.07%
+18	-10.07%	-7.82%	-0.01%
+19	-10.33%	-8.00%	-0.55%
+20	-9.17%	-8.06%	-0.77%

### 9.3 Daily CAR for full window - Revised Altman Z Score Groups for Statistical Analysis

As noted in 5.5, Cumulative Average Abnormal Returns are shown, but for all days in the event window. Statistical testing was done using independent sample t-tests with bootstrapping, and significance is tested at 95% confidence.

Day	Healthy	Grey Zone / Unhealthy	P-value	Statistical Significance
-10	2.397%	2.702%	0.920	No
-9	1.302%	2.229%	0.717	No
-8	0.965%	1.663%	0.777	No
-7	0.589%	1.376%	0.725	No
-6	-1.023%	1.017%	0.470	No
-5	-1.988%	0.943%	0.239	No
-4	-2.274%	1.770%	0.058	No
-3	-1.125%	0.936%	0.288	No
-2	-0.910%	0.157%	0.336	No
-1	0.000%	0.000%	n/a	No
0	-1.584%	-2.428%	0.645	No
+1	-1.813%	-4.312%	0.346	No
+2	-1.611%	-4.518%	0.290	No
+3	-0.492%	-4.639%	0.131	No
+4	-1.590%	-5.771%	0.149	No
+5	-1.588%	-7.054%	0.099	No
+6	-1.749%	-7.678%	0.105	No
+7	-1.892%	-6.664%	0.135	No
+8	-2.158%	-7.545%	0.096	No
+9	-2.320%	-7.860%	0.120	No
+10	-0.894%	-8.149%	0.100	No
+11	-0.253%	-8.834%	0.104	No
+12	-0.875%	-9.736%	0.088	No
+13	-0.560%	-9.602%	0.085	No
+14	-0.621%	-9.699%	0.057	No
<b>+15</b>	<b>-0.589%</b>	<b>-8.785%</b>	<b>0.042</b>	<b>Yes</b>
<b>+16</b>	<b>-0.598%</b>	<b>-10.026%</b>	<b>0.029</b>	<b>Yes</b>
<b>+17</b>	<b>0.372%</b>	<b>-9.780%</b>	<b>0.042</b>	<b>Yes</b>
<b>+18</b>	<b>0.695%</b>	<b>-10.917%</b>	<b>0.021</b>	<b>Yes</b>
<b>+19</b>	<b>-0.110%</b>	<b>-11.108%</b>	<b>0.014</b>	<b>Yes</b>
<b>+20</b>	<b>-0.281%</b>	<b>-10.412%</b>	<b>0.028</b>	<b>Yes</b>