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AN EXAMINATION OF THE PRICE REACTION TO THE ANNOUNCEMENT OF BOND ISSUES BY JOHANNESBURG STOCK EXCHANGE LISTED COMPANIES ON THE BOND EXCHANGE OF SOUTH AFRICA

In partial fulfilment of the requirements for the degree of

MASTER OF FINANCIAL MANAGEMENT

By

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ABSTRACT

This paper examines the effect of straight debt announcements on the daily stock returns of Johannesburg Stock Exchange (JSE) listed companies, on The Bond Exchange of South Africa (BESA), during the period 2000 to 2008. The study is an event study that uses the market model to generate expected returns. The average abnormal returns are standardised by their time series standard errors of regression and tested for significance by the t-test. The evidence indicates that the null hypothesis should not be rejected. Furthermore, the study is examined within the context of contemporary capital structure theory.

Keywords: Abnormal returns; event study; expected returns; market model; significance tests; Modigliani and Miller.

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ABBREVIATIONS

AAR	Average Abnormal Return
AR	Abnormal Return
BESA	Bond Exchange of South Africa
BMA	Bond Market Association
BSE	Botswana Stock Exchange
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CAR	Cumulative Average Residual
FFJR	Fama, Fisher, Jensen and Roll
FTSE	Financial Times Securities Exchange
JSE	Johannesburg Stock Exchange
MM2	Merton Miller
MM1	Modigliani Miller
MPT	Modern Portfolio Theory
NPV	Net Present Value
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
RMB	Rand Merchant Bank
SAB	South African Breweries
SENS	Securities Exchange News Service
ZSE	Zimbabwe Stock Exchange

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CHAPTER 1
INTRODUCTION

1.1 Background

There are several studies that have documented the effects of straight debt issue announcements on stock prices. Chapter 2 details a few of these studies. Most of these studies are focused on the developed economies. This study is focused on the South African economy. It is a developing economy with a relatively infant corporate bond market. A bond is a financial instrument. It promises that the issuer (the borrower) will pay the holder (lender) interest and will repay the capital amount over a certain period of time. South Africa witnessed the first corporate bond listed on the Bond Exchange of South Africa (BESA) in 2000. Consequently, there is little research regarding the effect of straight debt issue announcements on the South African market.

This study investigates the share price reaction to the earliest announcement by Johannesburg Stock Exchange (JSE) listed companies of straight debt issues during the period 2000 to 2008. These debt issues are listed on the BESA. During this period, 34 corporate bond issues were identified that conformed to this event study model requirements. These bond issues represent 29 events.

This share price reaction investigation is based on the information content event study method of analysis described by Bowman (1983) and MacKinlay (1997). An event study measures the impact of a specific event on the value of a firm. The information content event study is the analysis of the security price behaviour before and concurrent with an event.

The measurement of an abnormal stock return is the foundation of the analysis of the security price behaviour.

The origins of these methods are credited to Ball and Brown (1968) and Fama, Fisher, Jensen and Roll (1969). The information content event study method is used to test the effect of corporate bond issue announcements on share prices. This study will furthermore, observe whether the price reaction mirrors what has been observed in other, developed markets of the world.

1.2 Hypothesis

This study hypothesises that the announcement of straight debt issues, by JSE-listed corporates on the BESA, has an insignificant effect on stock prices.

Two hypotheses are tested. The results are recorded in Chapter 7. The first is the null hypothesis, represented by H_0. The second is called the alternative or research hypothesis and is denoted by H_1. Hypothesis testing is a form of statistical inference.

The testing procedure assumes that the null hypothesis (H_0) is true but the goal of the testing procedure is to determine whether there is enough evidence to infer that the research hypothesis is true. The two tests are stated as follows:

$$H_0: \mu = 0$$
$$H_1: \mu \neq 0$$

Significance testing was at the 5% error level using two-tailed t-tests. The tests were conducted so as to determine whether the average cumulative abnormal return differed statistically significantly from zero (H_0).

1.3 Chapter outlines

The remainder of the thesis is organized as follows:

Chapter 2

In this chapter prior research and extant capital structure theory literature is discussed.

Chapter 3

In this chapter research methodology and this study's model choice are examined.

Chapter 4

This chapter reviews the application of beta and alpha in this study.

Chapter 5

In this chapter data and research design are discussed.

Chapter 6

In this chapter the empirical data is presented.

Chapter 7

The conclusions are presented in the final chapter.

CHAPTER 2

LITERATURE REVIEW AND PRIOR RESEARCH

2.1 Background

Firms raise funds for various reasons. These include; investment in capital expenditure, the funding of working capital, research and product development, share buy-backs, the redemption of debt, to adhere to regulatory requirements and to strengthen the firms' capital structures. These funds can be raised in three ways:

i. Internal generation
ii. External debt
iii. External equity funding

Debt is used routinely in local markets and widely in international markets. When a firm changes its capital structure, it emits a signal to investors and consequently its share price may be affected. There is evidence to support this observation.

2.2 International research

Ross (1977) shows that management's willingness to take on debt or to increase leverage is a positive signal and that it furthermore, expresses management's confidence in the future prospects of the firm. According to his argument, the value of common stock should change in the same direction as changes in financial leverage.

Dann and Mikkelson (1984) found, in general, that when there is a change in leverage, then the sign of the revaluation of equity is positively related to that change. Dann and Mikkelson (1984) observe an average, marginal, negative valuation effect of -0.37% for a sample of 150 straight debt issues over a two-day announcement period. They were unable to arrive at a satisfactory explanation for this "anomalous" evidence.

Eckbo (1986) finds no evidence that the issue of debt, "whether straight or convertible", conveys a positive signal to the market. His sample size was larger than seven hundred and most of these were straight debt issues. He observed that straight debt offerings have "non-positive price effects", whereas convertible debt offerings show considerable negative price effects. Eckbo also found no relation between the offering size and the price effects of the offer. In addition, he observed no relation between the "offer-induced" effect on the price and the debt rating, the changes in abnormal earnings after the offer or the debt tax shields.

Masulis (1980) found that firms that offered to exchange common stock for debt experienced an average increase of 9.79% in their stock price over the event window. This includes the announcement day and the first day following the announcement date. His data sample was taken from mid-1962 till mid-1976. During this time 85 samples were identified. His observation is consistent with the theory that the value of common stock should change in the same direction as changes in financial leverage.

Asquith and Mullins (1986) investigated the effect on the stock prices of utilities and industrial firms subsequent to the announcement of 531 registered equity offerings. These offerings took place between January 1963 and December 1981 and were reported in the *Wall Street Journal*. They discovered that the announcement of equity offerings significantly reduces stock prices and concluded that these findings were consistent with two theories; the first is that equity issues emit a negative signal to investors and the second is that there is a "downward sloping demand for a firm's shares".

Masulis and Korwar (1986) studied the effect on common stock pricing subsequent to the announcement of underwritten stock offerings. These announcements were identified in the *Wall Street Journal Index* and the *Investment Dealer's Digest* over the period 1963-1980. They identified 1406 offerings. These were offering issues by both regulated public utilities and industrial firms. The study revealed that stock prices reacted negatively to the announcement of planned common stock sales. They observed that the average announcement period return for industrial firms was -3.25%, while the average announcement period return for public utilities was a noticeably smaller 0.68%.

Dann (1981) and Vermaelen (1981) both examined the effects of common stock repurchases on the values of the repurchasing firm's capital. Dann (1981) identified 143 cash tender offers made by 122 different companies. These were collated from approximately 300 repurchase offers identified from a search of *The Wall Street Journal* and the *Investment Dealer's* Digest over the period 1962-1976. He observed that the day 0 (zero) portfolio return for the sample of tender offer repurchases is 8.95% and the day +1 return is 6.83%. The evidence thus indicated that significant increases in firm values occur within one day of a stock repurchase announcement. Dann concluded that the value changes appeared to be due to "an information signal from the repurchasing firm".

Vermaelen's (1981) analysis was limited to open market repurchases and tender offers. His data on tender offers for the period 1962-1977 was compiled from the *Financial Daily Card Service*, *Corporations in Conflict: The Tender Offer* and the *Standard & Poors Corporation Called Bond Record*. The announcement dates for these offers were however found in the *Wall Street Journal* and the *Wall Street Journal* Index. His data on open market repurchases were collected from 1970 till April 1978 and these were taken from the *NYSE Report on Changes in Treasury Stock.* The announcements for these repurchases were traced in the *Wall Street Journal.* He identified 131 tender offers made by 111 firms and 243 open market purchases made by 198 firms. Vermaelen observed average abnormal returns that exceeded 14% over the two-day interval when firms announced offers to repurchase common stock. He concluded that his results were consistent with the hypothesis that firms offer "premia for their own shares in order to signal positive information and that the market uses the premium".

Mikkelson (1981) reports in his study that announcements by firms of convertible debt calls, which forces the conversion of debt into common stock, results in an average negative return of -2.13% over the two-day announcement period.

Mikkelson and Partch (1986) studied the common stock prediction errors around the announcements of financial decisions for 360 industrial firms listed on the New York Stock Exchange (NYSE). They found a negative and statistically significant valuation effect for the announcement of common stock and convertible debt offers, while the price effect of straight debt offerings was “less pronounced”.

Eckbo (1986) found strong evidence that supports the hypothesis that leverage-decreasing capital structure changes convey negative signals to the market. He found that the effects of the inverse changes; leverage-increasing capital structure changes remained unresolved. Eckbo’s observations confirmed the findings of the Shyam-Sunder (1991) study.

Shyam-Sunder (1991) observed that there was no significant effect on stock prices subsequent to the announcement of debt issues. He found this to be so even when the announcement was for a junk debt issue.

Eckbo (1986) found no evidence to support optimal capital structure theories where the tax advantage of debt is traded off against information costs, agency costs, costs of financial distress or “other debt-related costs”. This is the opposite of the findings of Kraus and Litzenberger (1973), Jensen and Meckling (1976), DeAngelo and Masulis (1980), Ross (1977) and Robert (1982) who imply that an unexpected increase in leverage should result in a positive revaluation of the issuing firm’s common stock.

Miller and Rock (1985) and Myers and Majluf (1984) suggest that an unanticipated external financing will result in a negative stock price effect. Miller and Rock (1985) demonstrate that the unanticipated announcement is an indication of “smaller-than-expected” cash flow from operations. They also contend that there is a negative correlation between the price effect and the amount of the unanticipated new external financing.

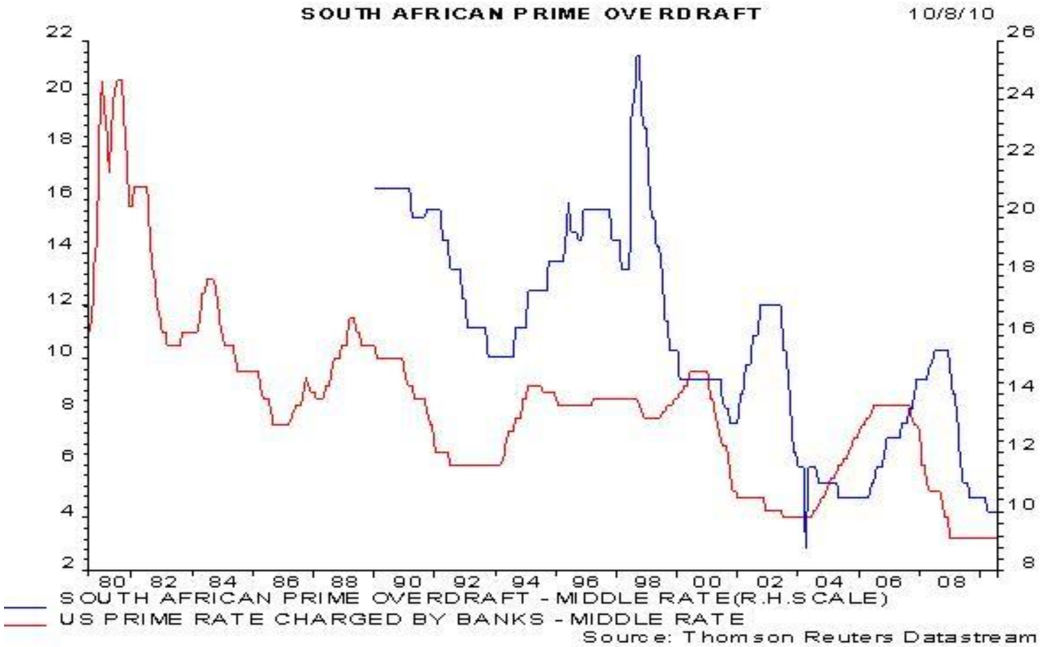
2.3 South African research

There is little evidence of recent event studies in South Africa that assesses the effect to stock prices of corporates who have announced their intention to issue straight debt. There is however sufficient evidence of the use of event studies in South Africa, for which the purpose is to calculate the cumulative abnormal returns associated with public announcements. Some recent event studies are discussed below.

2.3.1 A brief history of the South African corporate debt market

Before we take a look at recent event studies in Southern Africa, it is important that we examine the history of the corporate debt market in South Africa in order to understand why there is little evidence of recent event studies; particularly those that investigate the impact of debt issue announcements on share prices. In South Africa the corporate debt market was non-existent up until the late 1980's. The primary reason, according to Associate Professor Glen Holman of UCT's Finance Department, is that the prime lending rates in South Africa were volatile relative to other developed economies. The graph in Figure 1 below bears witness to this fact. Since 1999 rates have stabilised and there is an expectation that these less volatile rates will become a more permanent feature of the South African economic landscape.

Figure 1: Interest rate comparisons



Rand Merchant Bank (2001) are also of the view that the "low corporate appetite for debt financing, particularly long-term debt financing, and the virtual absence of listed corporate debt, are the result of a number of conditions that have held in the local market" since approximately 1990 until 2001. They held the view that these conditions would undergo change but the real reason was that firms were cash flush. Firms were thus able to fund the "modest outlays of the last few years". Rand Merchant Bank (RMB) reported that corporates had "built up extensive cash resources due to continuing profits in mature businesses, modest investment opportunities in South Africa, and a taxation system that did not favour dividend payments".

Ojah and Pillay (2009) observed that up until the 1980's, when corporates considered external financing they were confronted with two choices; they either issued equity or they borrowed from a bank or a non-bank private lender.

Rand Merchant Bank (2001) reported that up until 2001 South Africa had equity and public debt markets that were "unusually large relative to the size of the economy even by developed country standards" and that" the market for corporate debt was negligible".

Table 1 below shows comparisons of the listed securities by market value in 2000 for South Africa relative to other countries and illustrates the point made by Rand Merchant Bank.

Table 1: Comparisons of the listed securities by market value in 2000

	% of Total Market	Listed Corporate Debt	Domestic Public Debt	Foreign Debt	Equity
Composition of listed securities by market value in 2000	Denmark	49%	26%	2%	23%
	Germany	41%	21%	8%	31%
	Austria	22%	52%	3%	23%
Source: FIBV	Netherlands	17%	22%	0%	61%
	Switzerland	11%	6%	12%	71%
	France	9%	39%	0%	53%
	South Africa	1%	24%	0%	75%

(Rand Merchant Bank – 2001)

FIBV is the body representing the world’s exchanges.

Ojah and Pillay reports that bond issues during 1980-1990 were dominated by the central government and state-owned enterprises (Table 2). During this period 92% of the bond issues were made by central government and state-owned enterprises. There were no corporate bonds issued during this period.

The period 1991-1996 gives more of the same. Central government and state-owned enterprises issued 81% of bonds during this period. This is however, highly significant because in 1992 South African Breweries (SAB) listed and issued the first corporate bond on the Bond Market Association (BMA). The Bond Market Association came into existence in 1987 following recommendations by the Jacobs/Stals Inquiry and is the precursor to the BESA.

Table 2 indicates that the corporate public debt market activity started to pick up from 2001 onwards. By 2006, 305 corporate bonds were issued, confirming RMB's view that conditions in the South African market were changing. By 2008 this amount was 784. It should be noted that the majority of the corporate issues at the end of 2008 were financial services firms.
If financial services firms are removed from the sample (Table 2), the total amount of corporate bond issues during this period (1980-2008) would be 55.

Table 2: Distribution of economic entities listed on BESA

Company name	**No. of debt issues** *1980-1990*	**No. of debt issues** *1991-1996*	**No. of debt issues** *1997-2000*	**No. of debt issues** *2001-2008*	**Total issues** *1980-2008*
Central government	4	13	5	106	128
Municipal bonds	0	0	0	7	7
State-owned enterprises	8	4	0	18	30
State-owned banks	0	2	1	4	7
Water authorities	1	1	3	9	14
Corporate sector	0	1	2	781	784
Total	13	21	11	925	970

(Source: Ojah and Pillay. Data till 2006; updated to include data till 2008 by Lippert, J.)

Table 2 provides evidence that the issuing of public debt by firms during 1990 to 2000 was essentially non-existent. The table clearly shows that corporate bond issuing "came into vogue meaningfully during" 2001-2008. (Ojah and Pillay)

Although the numbers of corporate bond issuers have increased over the last 8 years, the central government still remains the dominant player in this market, particularly in terms of the nominal amounts raised. This is clearly observed from the data provided in Table 3.

Table 3: Distribution of economic categories listed on BESA (nominal value as at 2008)

Name	Nominal value of issue in rand	Nominal value of issue as a % of total value
Central government	437,323,615,396.36	59.50%
Municipal bonds	8,068,000,000.00	1.10%
State-owned enterprises	63,574,081,366.00	8.65%
State-owned banks	10,371,392,700.00	1.41%
Water authorities	18,600,763,373.00	2.53%
Corporate sector	197,096,071,366.33	26.81%
Total	**735,033,924,201.69**	**100.00%**

Source: BESA

2.3.2 Recent event studies conducted in South Africa

Wolmarans and Sartorius (2009) investigated the share performance of companies listed on the JSE and involved in BEE transactions, specifically in terms of the companies' ability to create shareholder wealth. Their study was confined to the equity ownership dimension of BEE and did not investigate the other aspects of the BEE scorecard.

Wolmarans and Sartorius (2009) used the event study methodology to calculate the cumulative abnormal returns (CAR) associated with the public announcement of 125 BEE transactions involving 95 companies between January 2002 and July 2006. They used the market model and the results revealed a positive relationship between corporate social responsibility and share value creation. Furthermore, they found that investors had been lethargic towards BEE announcements during the period 2002 to 2005 while there were positive share price movements during only 2006.

Okeahalam and Jefferis (1999) used an event study to test the hypothesis that the JSE is efficient in the semi-strong form. In their study, they tested the impact of earnings announcements on the abnormal return of a sample of stocks listed in the banking and financial services and retail stores industry sectors of the Botswana Stock Exchange (BSE), the Zimbabwe Stock Exchange (ZSE), and the JSE.

Bhana (2007) examined the share market reaction to share repurchases by a sample of companies listed on the JSE. He used three models. One was an event study based on the methodology developed by Brown and Warner (1985) to examine the excess returns around the announcement day. Smit and Ward (2007) conducted an event study to determine whether large acquisitions, concluded in 2001, 2002 or 2003 added value to acquiring companies listed on the JSE Limited ("the JSE"). The researchers examined the share price performance of the acquiring company around the acquisition announcement date and the impact on the operating financial performance in the two years subsequent to the acquisition. These two measures were used to provide a comprehensive analysis of the wealth effects of large acquisitions on a sample of South African acquiring companies.

2.4 Capital Structure Background Information

2.4.1 Basic categories

There are several capital structure theories. All attempt to explain the combinations of securities and financing sources necessary to run a corporation. The major theories predict how capital structure choices will affect the value of corporations. There is broad agreement that the major theories of optimal capital structures are the trade off theory, the pecking order theory and the free cash flow theory. The trade off theory emphasizes taxes; the pecking order theory examines differences in information and the free cash flow theory examines and interprets agency costs.

Barclay and Smith Jr. (1999) classify taxes, contracting costs and information costs as the three broad categories of capital structure theories. Myers (2001) includes in his "chief reasons" why financing matters; taxes, information costs and agency costs. He asserts that the major optimal capital structure theories differ based on their emphasis and interpretation of the "chief reasons". Nevertheless, there is no single, universal theory of capital structure.

2.4.2 Modigliani & Miller

Modern capital structure theory began with the publication of a paper by Professors Franco Modigliani and Merton Miller (MM1) in 1958.[1] The paper has been described as the most influential finance article ever written.

In it they proposed that if capital markets are perfect and frictionless then three assumptions should be made that would show that any firm's liability side of its balance sheet is a matter of irrelevance as it relates to firm value. The three assumptions are:

i. There are no taxes
ii. There are no transaction costs
iii. The firm's current and future real investment decisions are held constant

MM1 used the concept of arbitrage to show that a firm's value is unaffected by its capital structure. Arbitrage is "the exploitation of differences between the prices of financial assets, currencies or commodities within or between markets by buying where prices are low and selling where they are higher."[2]

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[1] Franco Modigliani and Merton H. Miller, "The cost of Capital, Corporation Finance, and the Theory of Investment", *American Economic Review*, June 1958.

[2] Graham Bannock, Evan Davis, Paul Trott and Mark Uncles, "The New Penguin Business Dictionary", 2002, page 12

Modigliani and Miller prove that financing does not matter. The sum of the market values of the firm's debt and equity, D and E, equals the total firm value; V. MM1's Proposition 1 says that V is a constant, irrespective of the mix of D and E, if the firm's assets and growth opportunities remain constant. Debt financing, or financial leverage would then be a matter of irrelevance.

Proposition 1 also states that a firm's cost of capital remains a constant irrespective of the proportion of debt. Let's see MM1's Proposition 1 and 2 stated in equation form:

$$D + E = V \qquad (1)$$

$$r_E = rD/_{D/V} + rE/_{E/V} \qquad (2)$$

r_E = the cost of equity.

MM1's Proposition 2 shows why "there is no magic in financial leverage." It proves that you cannot substitute "cheap" debt for "expensive" equity; the more debt you add, the more expensive equity becomes – just more expensive so that the overall cost of capital remains constant.

We know that financing can matter and that the primary reasons why it does matter include taxes, information costs and agency costs. The pizza metaphor has been exhausted, but it demonstrates that consumers are willing to pay more for several slices as opposed to the whole pizza. The pizza metaphor is akin to the observation that sometimes the whole is a lot less than the sum of its parts. Similarly, perhaps the value of a firm depends on how it is financed. Myers (2001) and others are convinced that "innovation proves that financing can matter."

2.4.3 Post Modigliani & Miller

Academics and finance practitioners have responded to MM1's capital structure theory by examining the validity of its underlying assumptions. When Merton Miller was asked to explain the MM1 theorems in simple, laymen's terms, he said this: "The main point of the cost-of-capital article was, in principle at least, simple enough to make. It said that in an economist's ideal world, the total market value of all the securities issued by a firm would be governed by the earning power and risks of its underlying real assets and would be independent of how the mix of securities issued to finance it was divided between debt instruments and equity capital."[3]

MM1's propositions, despite the fact that the assumptions apply in an ideal world, provide the clues for determining what is relevant to capital structure and hence the value of a firm. Miller (1989) states that what MM1 meant to show were that "what doesn't matter can also show, by implication, what does".

Therefore, the question asked by many holds the clue; can the capital, which is necessary to support the operations of a firm, be divided up between debt and equity so that firm value is maximized? If the answer is yes, then what are the critical factors that determine the degree of leverage of a firm? Barclay and Smith Jr. (1999) assert these are the fundamental capital structure theory questions.[4] The search to answer these key questions has resulted in a number of theories, none of which is definitive. Barclay and Smith Jr. (1999) agree that we are yet to design "empirical tests that are powerful enough to distinguish among the competing theories."

The predominant theories that have emerged since MM1's seminal work was published in 1958 can be categorised into the following broad categories:

i. The taxes theory;
ii. The information costs theory and;
iii. The agency costs theory.

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[3] Ross, Westerfield, Jordan and Firer. "Fundamentals of Corporate Finance", 1st Edition, 1999, p428.

[4] Michael J. Barclay and Clifford W. Smith, Jr.,"The Capital Structure Puzzle: Another Look at the Evidence", *The Bank of America Journal of Applied Corporate Finance*, Vol.12, part 1, Spring, 1999, pages 8-20.

These theories are intended to give guidance to those who have to make capital structure decisions, yet these theories advocate very different approaches to the decision-making processes.

2.5 The taxes theory

In 1963, Modigliani and Miller published a follow-up paper that revised their earlier work. In this paper, they relax the assumption that there are no taxes and instead show that a firm can increase its market value by increasing its debt level. This is so because interest payments are tax deductible whereas dividend payouts to stockholders are not. A taxpaying firm that pays interest receives a partial "interest tax shield". Interest payments reduce the tax burden and consequently, more cash flow is available to a firm's investors. The interest payments partially shield a firm's pre-tax income against the tax burden. A firm's operating profit can be increased through leverage. MM1's value equation changed to:

$$V_L = V_U + \text{PV of tax shield.}$$

Restated, the equation is:

$$V_L = V_U + TD$$

Where V_L = the value of the levered firm

V_U = The value of the unlevered firm

T = the corporate tax rate

D = the amount of debt

Miller (1977) later demonstrated the effects of personal taxes on MM2's revised work of 1963. He proved that the tax advantages of debt, to corporates, could be completely offset by the tax advantages of equity to individual investors. Miller observed that all bond income is interest and is taxed up to the maximum tax bracket rate whereas income from stocks comes in part from dividends and partly from capital gains. Furthermore, capital gains tax has a lower maximum tax rate than interest income and the gain is realized when the stock is sold or the gain is never taxed if the security is held until the owner dies.

Miller (1977) argued that the marginal tax rates on debt and stock balance out in a way that result in the complete offset of the tax advantage of equity to investors versus the value of the interest tax shield to corporations. Thus Proposition 1 of the original Modigliani and Miller (1958) paper, that the value of a levered firm equals the value of an unlevered firm, was reinstated by Miller (1977). However, most observers believe that there is still a tax advantage to debt.

Kane, Marcus and McDonald (1984) conclude in their study that the different magnitudes of bankruptcy costs across their sample were not sufficient to account for the existence of levered and unlevered firms.

Graham (2000) examined the interest rate spread between corporate bonds and tax-exempt municipal bonds in order to estimate the tax rate paid by investors in corporate debt. He discovers the rate is well below the top bracket of 30 percent. The effective marginal tax rate on interest and dividends, from 1980 to 1994, varied over this sample period. The average rate for equity income is 12 percent. He estimated a tax benefit of 9.7 percent of firm value as maximum and 4.3 percent net of personal taxes. Graham's (2000) estimates are not considered definitive. However, there is near total agreement amongst economists and practitioners that there is a substantial tax incentive for corporates to take on debt. DeAngelo and Masulis (1980) show that investors demand for compensation for the existence of a personal tax bias against interest income diminishes and does not cancel the corporate tax benefit of debt.

The findings of Graham (2000), DeAngelo and Masulis (1980) and Engel, Ericksen and Maydew (1998), should lead us to the conclusion that corporates would maximise their ability to borrow in order to exploit interest tax shields. Yet, this is not what we observe.

This has led to the assumption that there must be costs attached to heavy borrowing and consequently the formulation of the trade-off theory.

2.6 Trade-off Theory

The trade-off theory states that managers will trade off the benefits of debt against the increased probability of higher interest rates and expected costs of financial distress.
MM2 results rely on the assumption that there are no costs of financial distress or bankruptcy costs. However, when a firm is bankrupt it is in a stressed state and will consequently encounter difficulty retaining its employees, suppliers and customers. In addition, a firm, which faces the threat of bankruptcy, will experience similar difficulties. Therefore, bankruptcy-related costs have two components:

i. The probability of financial distress and;
ii. The costs that accrue when financial distress occurs.

The preceding arguments led to the development of the trade-off theory. The theory states that firms will trade off the benefits of debt against the increased probability and costs of financial distress, including the cost that arises from "underinvestment"[5]. The taxation regime allows for the deduction of interest payments but not dividends in the calculation of taxable income. This is the reason why debt is added to a company's capital structure. The debt lowers the firm's expected tax liability and increases its after-tax cash flow.
The MM1 theory holds that capital structure theory is irrelevant and that it has no significant effect on firm value.

Too much debt may cause financial distress and consequently, destroy value. However, too little debt in large, mature firms may result in overinvestment.

[5] Michael J. Barclay and Clifford W. Smith, Jr.,"The Capital Structure Puzzle: Another Look at the Evidence", *The Bank of America Journal of Applied Corporate Finance*, Vol.12, part 1, Spring, 1999, pages 8-20

If the theory is correct, we should observe that firms would not pass up the opportunity to increase value by utilising the interest tax shield if the probability of financial distress is low. This is not what is observed. Many firms, which are profitable, have low debt ratios. The trade-off theory is limited in its usefulness because it cannot explain why several corporations have conservative debt ratios. Myers (1984) finds in his study that the most profitable companies in a given industry tend to have the lowest debt ratios.

2.7 Information costs

One of the underlying assumptions in MM1's original propositions is that all investors have the same information as management about the future investments of the firm. It is immediately clear that this cannot always be true. Corporate managers often have better information about the value of the company than investors. This observation has resulted in two distinct theories – the signalling theory and the pecking order theory.

Ross (1977) asserts that the financing choices of managers reflect their intentions to generate signals to the market. Share prices fall in response to common share offerings whereas value is added when debt is issued as part of a recapitalization strategy.

Signalling theory asserts that firms are more likely to issue debt than equity when they are undervalued because of the large cost of an equity issue. This is the information cost associated with an equity dilution. Leland and Pyle (1977) assert that the firm's capital structure choice is a signal to outside investors about information known by insiders. Thus, Ross (1977) and Leland and Lyle (1977) are credited with the introduction of the signalling theory – the first of the information cost theories.

Myers and Majluf (1984), and Myers (1984) pioneered the second approach to the explanation of the effect of private information in deciding capital structure. They proposed that capital structure decisions were made in order to minimize the inefficiencies of a firm's investment decisions caused by information asymmetry. Myers and Majluf showed that the market might price equity differently if investors are less informed than firm insiders. Therefore, if firms require equity in order to finance new projects, then the investors may undervalue the security and the consequence would be that new investors would gain more than the net present value (NPV) of the project and existing shareholders would suffer loss. This project would be rejected even if its NPV were positive. This is known as the underinvestment problem and it can be avoided if the firm can use a security that is less undervalued by the market. Internal funds and riskless debt are not subject to undervaluation and will be preferred to common stock. Moderately risky debt will be preferred to equity. Myers (1984) refers to this discriminating behaviour as a pecking order. Myers is convinced that capital structure is the result of the cumulative effect of financing decisions by managers. The pecking order theory states that a firm's capital structure is determined by a company's need to finance new investments. A firm will first use internally generated funds, then low-risk debt, and finally equity as a last resort.

Furthermore, managers look to retained earnings as their first source of finance as opposed to outside financing, and when outside financing is considered, debt is preferred to equity. Myers (1984) asserts that managers do not think about an optimal capital structure when making finance decisions. He says they choose the path of least resistance. They simply choose what the cheapest form of finance is at the time of their decision. This modus operandi is referred to as the financial pecking order.

The implications of the pecking order are:

i. The market value of a firm's existing shares will decrease upon the announcement of an equity issue.
ii. New projects will be financed from internal funds or low-risk debt.
iii. Korajczyk, et al. (1990b, c) argue that the underinvestment problem is less severe after announcements of annual reports and earnings, therefore share issues will occur soon thereafter.
iv. Firms with little tangible assets and high growth prospects will accumulate more debt over time.

Narayanan (1988) and Robert and Zechner (1990) obtain similar results to Myers and Majluf however, they used a different approach. They show that there can be overinvestment when the information asymmetry relates to the value of the project only. Some projects with negative NPV will be taken. Firms assessing projects with low NPV benefit from selling overpriced equity. Narayanan shows that when firms have a choice of issuing either debt or equity, all the firms either issue debt or reject the project. Narayanan concludes that the acceptance of a project is associated with the issue of debt and is therefore good news. The result is an increase in the firm's share price. Acceptance or rejection of the project is the signal for Narayanan and Robert and Zechner.

Brennan and Kraus (1987) use a similar example as Myers and Majluf but their findings do not ratify the findings of Myers and Majluf. They show that firms do not prefer issuing straight debt above equity and that the underinvestment problem can be resolved by providing investors (signalling) with better information. Brennan and Kraus conclude that issuing equity is a negative signal whereas the simultaneous issue of equity and the repurchase of debt with part of the proceeds is a positive signal.

Constantinides and Grundy (1989) show that firms will take up a NPV project with the proceeds issued from a security that is neither straight debt nor equity. They interpret the nature of this security as convertible debt. Constantinides and Grundy explain that the repurchase of equity makes an overstatement of firm value expensive while the issue of a security that displays sensitivity to firm value makes it costly to understate real value. In this model, the underinvestment problem is resolved and the model does not support the pecking order theory.

Myers and Majluf (1984) and Krasker (1986) predict that there will be no price effect when a firm issues riskless debt, whereas Noe (1988) and Narayanan (1988) predict a positive stock price reaction to the announcement of risky debt.

Myers and Majluf (1984), Krasker (1986), Noe (1988), Korajczyk, et al. (1990c) and Lucas and McDonald (1990) all predict that the revaluation of equity will be negatively affected by the announcement of an equity issue. Furthermore, they assert that the decrease in valuation will be larger for a larger equity issue and larger where the information asymmetry is larger.

2.8 Agency costs

Costs created through conflicts of interest are called agency costs. Jensen and Meckling (1976) identified two types of conflicts. Conflicts between equity holders and managers occur because managers do not acquire the total gain from their profit-making pursuits, yet they are fully accountable and responsible for their endeavours. More to the point, managers can invest less in the firm by consuming more perks like jets and decadent offices. If managers refrain from these pursuits, then their gains are small relative to the shareholder and they bear the cost of such restraint.

This friction is reduced as the equity owned by the managers is increased. In addition, Jensen (1986) points out that debt "commits the firm to pay out cash" and consequently reduces the amount of "free" cash, which is available to managers.

Harris and Raviv (1990) state that managers "in general do not always behave in the best interest of their investors and therefore need to be disciplined". The reason is that managers are unwilling to give up control and therefore are unlikely to provide information that would result in their loss of control.

Debt is therefore used as the disciplining mechanism because it conveys information to the investors about the firm's ability to honour its contractual obligations. In addition, if the firm is in default then management must placate creditors. This process generates considerable information for investors. Investors then use the information to monitor management and to implement operational decisions (see Harris and Raviv (1990)).

The second conflict is that between debt holders and equity holders. When an investment yields large returns, well in excess of the coupon rate of the debt, it is the equity holder who gains from the excess returns. The converse is that if the investment fails, debt holders suffer the greater loss because of the benefits of limited liability to equity holders. Bankruptcy costs and the costs of the threat of bankruptcy are referred to as the costs of financial distress. There are a host of costs related to financial distress and bankruptcy. Costs include; legal and accounting costs, costs related to retaining staff, customers, and favourable supplier terms

Equity holders often benefit from investing in very risky projects. These investments result in a decrease in the value of debt. The gain is at the expense of the debt holder. There is however a risk to equity holders. If the debt holder anticipates the owners' intent, then the owners' will receive less for their debt. The risk of using debt for value-decreasing investments is borne by equity holders. It is an agency cost of debt financing.

Myers (1977) observed another agency cost of debt. He discovered that when firms are on the verge of bankruptcy, equity holders might then not invest in value-increasing investments since the value generated would be used to stave off the debt holders demands and leave little value remaining for equity holders. Jensen and Meckling (1976) argue that the trade off of the agency cost of debt against the benefits of debt results in an optimal capital structure.

Harris and Raviv (1990) and Stulz (1990) recognise the conflict between managers and owners. They agree with Jensen and Meckling (1976) in identifying the conflict as an agency problem. However, the conflict arises in a specific way and, importantly, Harris and Raviv and Stulz differ with Jensen and Meckling on how debt "alleviates the problem". They also differ in their views on the disadvantages of debt.

CHAPTER 3

RESEARCH METHODOLOGY AND MODEL CHOICE

3.1 Background to the event study method

An event study measures the impact of a specific event on the value of a firm. In this study the specific event is an announcement, by JSE-listed companies, of straight debt issues during the period 2000 to 2008. These debt issues are listed on the Bond Exchange of South Africa (BESA).

If we assume that the market is rational, then the effect of an event should be reflected immediately in security prices. The effect is detected as an abnormal stock return. The measurement of an abnormal stock return is therefore central to any event study.

The objective of this study is to investigate the information content of the announcements. As indicated earlier, the information content event study method is the analysis of the security price behaviour before and concurrent with an event.

The earliest evidence of event studies is credited to James Dolley (1933). In his published work, he examines the price effects of stock splits from 1921 to 1931 by studying the nominal price changes at the time of the split. Ball and Brown (1968) and Fama, Fisher, Jensen and Roll (FFJR) (1969) are regarded as having introduced the methodology that is in use today.

Ball and Brown (1968) investigated the price reaction to the unanticipated component of annual accounting earnings and found that 85 to 90 percent of the information contained in the annual earnings report had been reflected in the share price before the announcement of the annual earnings report.

Fama, Fisher, Jensen and Roll (FFJR) analysed the market reaction to the announcement of stock splits over a period of 60 months surrounding the month of the stock split. They found that security prices adjusted quickly to the information content implicit in a stock split but found no evidence that the news of a stock split could be used to increase profits.

Bowman (1983) agrees that the work of Ball and Brown and FFJR set the stage for the development of four basic types of event studies. These are:

i. Information content;
ii. Market efficiency;
iii. Model evaluation and;
iv. Metric explanation.

The information content event study is the analysis of the security price behaviour before and concurrent with an event. The market efficiency event study analyses the share price behaviour subsequent to an event. Model evaluation and metric explanation event studies occur concurrently with information content event studies.

Bowman (1983) notes that the information content event study and the market efficiency study are interrelated. Therefore, when an information content event study is conducted, the methodology requires the assumption that there is some degree of market efficiency. Conversely, when a market efficiency event study is conducted it is presumed that the event has information content.

3.2 The steps for an event study [adapted from Bowman (1983)]

Procedure 1

First define the event of interest and identify the period during which the stock prices of the firms involved in the event will be analysed. The study could be a single event or a type of event. An announcement by a statutory body is an example of a single event whereas a debt issue or an earnings announcement, are examples of a type of event.

The definition of the event is directly linked to identifying the period over which the security prices of the firms involved in the event will be observed. This period is referred to as the event window. It is customary for the event window to occur over multiple days, including at least the day of the announcement and the day after the announcement. This practice permits the capture of the price effects of announcements, which occur after the stock market has closed on the announcement day. The timing of the event is a critical factor. The standard practice is that the event occurs on the date when the public announcement is made.

Another important consideration is the impact of confounding events. For example, if debt issue announcements are accompanied by earnings announcements, the latter announcement will be a potentially confounding event in an event study that examines the price reaction to the announcement of debt issues. Controls should be implemented to eliminate the impact of confounding events.

Procedure 2

The second step in an event study is to model the security price reaction; in other words, quantify the impact of the event. In a study of straight debt issue announcements one might expect the direction of the security price reaction to differ across firms. This is so because the price reaction may be conditional upon information, which is relevant to the event. A model is shaped in order to classify the firms into those with expected positive reactions and expected negative security price reactions. The formulation is a regression analysis.

Regression is a statistical model "that predicts the mean value of a random variable when one or more variables are fixed".[6] A simple example is a formula that predicts the average weight of a child (mean value of a random variable), of a given height and age (one or more variables that are fixed). This example describes a linear equation and the formula is:

$$E(Y|x) = \alpha + \beta x$$

Where:

$E(Y|x) =$ The mean of Y conditional on x

α And β are parameters called regression coefficients

The primary objective of the regression analysis is to estimate values for the parameters using experimental data.

Procedure 3

The third step is to estimate the abnormal returns for the firms being studied. The excess return or abnormal return for a period is the actual ex post return (actual return) of the security over the event window less the normal return of the security over the event window. The normal return is defined as the expected return, independent of the expected event. The abnormal return for firm i and event date t is:

$$AR_{it} = R_{it} - E\left(R_{it}|X_t\right)$$

Where $AR_{it}, R_{it},$ and $E\left(R_{it}|X_t\right)$ are the abnormal, actual, and normal (expected) returns respectively for the period t.

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[6] David Nelson, "Dictionary of Statistics", 1st Edition, 2004.

There are several methods for modelling the normal (expected) return. Bowman (1983) categorised the common methods as: unadjusted, mean adjusted returns, risk adjusted returns, and risk controlled returns.

The first category was widely used before the Capital Asset Pricing Model (CAPM) by Sharpe (1964), Lintner (1965a and 1965b), and Mossin (1966). The mean adjusted returns procedure simply defines the realised return as the excess return, thus implying zero expected return. The unadjusted procedure defines the expected return as the mean of past security returns. The definition is taken over an arbitrary period.

Brown and Warner (1980) observed that the mean adjusted returns measure was very robust. They determined that under many conditions the mean adjusted returns measure performed as well or was superior to the more sophisticated methods.

Armitage (1995) and Bowman (1983) observed that the market model was the most common choice, of the risk-adjusted category, for estimating abnormal returns. The model assumes a stable linear relation between the market return and the security return. This model has been developed from the Capital Asset Pricing Model (CAPM).

The risk controlled portfolio technique has been used in several studies. However, Brown and Warner (1980) have pfound that the procedure performs unsatisfactorily relative to the more common methods discussed before.

Procedure 4

The fourth step for the researcher is to organise and group the abnormal returns before proper analysis of the results can be attempted. This is normally achieved by separating the firms into portfolios according to the expected security price reaction as determined in step 2. The expected value of the abnormal returns is always zero in an efficient market, assuming proper asset pricing model specification.

In most studies time series aggregation is desired. A time series is a sequence of data points that is measured at successive times. The aggregation is along two dimensions. It is through time and across securities. FFJR (1969) and Ball and Brown (1968) developed the two primary methods of aggregation. Both methods adjust for risk to the security returns.

FFJR used an arithmetic procedure, which they termed the Cumulative Average Residual (CAR). The equation is as follows:

$$CAR_t = \sum_{t=1}^{T} \frac{1}{N} \sum_{i=1}^{N} e_{it}$$

e_{it} = Excess return for firm i in period t

N = number of firms in the portfolio

T = number of time periods being aggregated.

The trading strategy implied by FFJR assumes that equal monetary amounts are to be invested in each of the N securities at time t = 0. The portfolio is then rebalanced so that the total wealth is again equally distributed across the securities.

Ball and Brown (1968) developed a multiplicative formulation, which they termed the Abnormal Performance Index. The formula is as stated below:

$$API_t = \frac{1}{N} \sum_{i=1}^{N} \prod_{t=1}^{T} (1 + e_{it}) - 1.$$

Their trading strategy implies investing 1/N of wealth in each security at t = 0 and holding the investment until time T. The portfolio is never rebalanced.

Bowman (1983) counsels that the way to evaluate the alternative measures is to consider the time series properties of the excess returns. He notes that in an efficient market the following will always hold:

$$\mathrm{E}\left(e_{it}\right) = 0$$

$$\mathrm{Cov}\left(e_{it}, e_{it+k}\right) = 0 \ \ \forall \text{ k} \neq 0$$

The main objective of an event study is generally to determine whether the conditions shown above hold.

Procedure 5

Finally, the last step in an event study is to analyse the results. FFJR conducted no statistical tests in their seminal work. Their CAR's are presented in tabular form and is given a graphical interpretation relative to FFJR's hypothesis. Ball and Brown (1968) conducted a chi-square test and so did a number of subsequent studies.

3.3 Models of expected (normal) returns

3.3.1 Index model

The simplest model of expected returns is probably one that assumes that over any period t, a share i will earn the market rate of return R_{mt}. It then follows that the abnormal return AR_{it} is the actual return R_{it}, less R_{mt}. In arithmetic form:

$$AR_{it} = R_{it} - R_{mt}$$

This formulation is commonly called the index model. Lakonishok and Vermaelen (1990) used this model. In their study, they measured abnormal returns from selling shares to companies, which offered to repurchase them via tender offers.

3.3.2 The average return model

The average return model assumes that the share earns the same return as it does on average during an estimation period, which is clustered around the event or test date.

The formula is:

$$AR_{it} = R_{it} - \bar{R}_i,$$

Where

$\bar{R}_i =$ The average return of the share during the estimation period

$R_{it} =$ The actual return

$AR_{it} =$ The abnormal return of a share i over a period t.

Masulis (1980) used this model to study the share price reaction to announcements of changes to leverage (gearing). He calculated the average daily return from returns for 60 days before and 60 days after the event period.

3.3.3 The market model

The market model is the most commonly used method to estimate expected returns and is one of the most important applications of simple linear regression. It assumes a stable linear relationship between the market return and the share return. The model estimates the relationship between a share's returns and returns on the market by ordinary least squares regression. This relationship is used to estimate expected returns, given returns on the market. Armitage (1995) suggests that there is no better alternative to the market model notwithstanding the fact that its result is a weak relationship between beta and actual returns.

Regression analysis is a process that determines the statistical relationship between a random variable and one or more variables that are fixed in value. The “fixed value” variables are used to predict the value of the random variable. The random variable is commonly referred to as the dependent or response variable and the “fixed value” variable as the independent variable. The dependent variable is the forecast variable .In the regression equation it is modelled as a function of the independent variables, corresponding parameters ("constants"), and an error term.

The error term of a sample is the deviation of the sample from the (unobservable) population mean or actual function, while the residual of a sample is the difference between the samples and either (1), the (observed) sample mean or (2) the regressed (fitted) value. The error term is treated as a random variable. It represents unexplained variation in the dependent variable. The parameters are estimated so as to give a "best fit" of the data. The best fit is most commonly evaluated by using the least squares method. Other, less common criteria can also be used.

The market model is a one factor ordinary least squares regression model and is stated as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it},$$

Where

α_i And β_i = regression coefficients and,

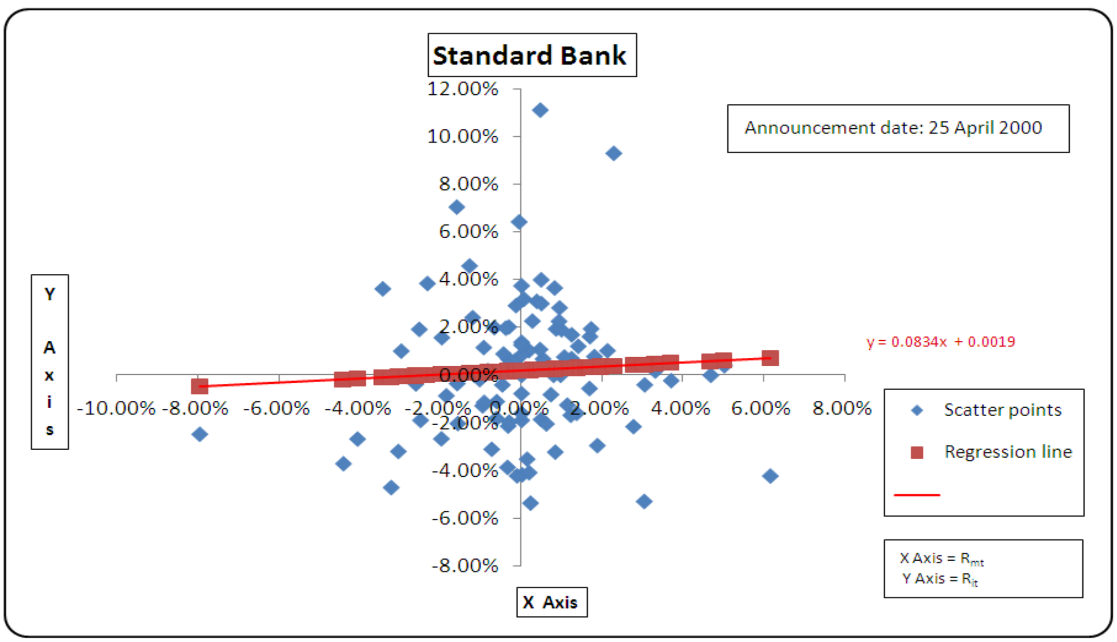
e_{it} = The error term, where $E(\varepsilon_{it}) = 0$.

α_i and β_i are estimates computed with data from an estimation period. The expected return is achieved by inserting the estimated values of α_i and β_i together with the actual return on the market in the following equation:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}).$$

Regression analysis is used to predict the value of one variable (the security return R_{it}) on the basis of other variables. To estimate alpha and beta one needs a list of returns for the asset $(R_{it})$and returns for the index (R_{mt}) for each of the shares in the event portfolio. The figure below (Figure 2) indicates the regression plot line for the first event in the study. The regression equation (indicated in red) predicts the behaviour of the security price. The R_{it} and R_{mt} returns were taken over 100 days prior to the event date. Daily returns were used.

Figure 2: Regression scatter plot graph



When the market model is applied and the test period is distinct from the estimation period, then the abnormal returns are prediction errors. However, in many studies the test period is a subset of the estimation period and so the abnormal returns are given by the subset of regression error terms; these are referred to as residuals. This model was used by FFJR (1969) and represents a potential improvement over the constant mean return model.

3.3.4 The Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a theoretical model whereas the previous three models are not. The CAPM is the result of reasoning from a set of simple assumptions. The model formula is:

$$E(R_{it}) = R_{ft} + \beta_i [E(R_{mt}) - R_{ft}],$$

Where

$E(R_{it})$ =The expected or normal return on share i for time t,

R_{ft} = Some measure of the risk-free rate of interest,

$E(R_{mt})$ =Some measure of the expected return on the appropriate stock market and,

β_i Is the covariance of R_{it} with R_{mt} over some estimation period $(\text{cov}[R_{it}, R_{mt}])$ divided by the variance of R_{mt} over that period $(s^2[R_{mt}])$.

The abnormal return on share i for time t is estimated by subtracting the actual return, R_{it}, from the expected return $E(R_{it})$.

The market model is a CAPM version. The α_i term in the market model can be interpreted as an estimate of $R_{ft}(1-\beta_i)$. The formula for $\beta_i, \text{cov}(R_{it} R_{mt}) / s^2 (R_{mt})$ is the same as for CAPM.

3.3.5 Fama-MacBeth model

Fama and MacBeth (1973) developed a variant of the CAPM, which starts, with shares of different betas. For each month, they regressed the share return for that month against the betas.

The expected returns on shares for a given period are:

$$E(R_{it}) = \alpha_{1t} + \alpha_{2t}\beta_{it},$$

Where α_{1t} and α_{2t} are cross-sectional regressions coefficients for time t of returns against beta and β_{it} is the actual beta of share i at time t. This model defines α_{1t} as the return on a zero-beta portfolio. Theoretically, the return on a zero-beta portfolio should equal the risk-free rate but it was not found to be.

3.3.6 The control portfolio model

In this model, returns of a test portfolio are compared with the returns of a control portfolio, which has the same risk, as measured by beta. The abnormal returns are calculated as the difference between the control portfolio returns and the test portfolio during the test period. The results of Brown and Warner (1980) indicated that the method performs adversely relative to all the previously mentioned procedures. Bowman (1980) cautioned against the continued use of the control portfolio model.

3.4 Preferred model choice

The choice of method for the calculation of abnormal returns hinges on several factors. These include:

i. Is the market considered efficient?
ii. What are the preferred methods used in prior research and,
iii. What is the degree of certainty of the event date?

3.4.1 Market efficiency

Bowman (1983) notes that information content events study and the market efficiency event study are interrelated. Therefore, when an information content event study is conducted, the methodology requires the assumption that there is some degree of market efficiency. In addition, when a market efficiency event study is conducted it is presumed that the event has information content.

Okeahalam and Jefferis (1999) used an event study to test whether the JSE was an efficient market. They had hypothesised that it was efficient, in the semi-strong form. They tested the impact of earnings announcements on the abnormal return of a sample of stocks listed in the banking and financial services and retail stores industry sectors of the Botswana Stock Exchange (BSE), the Zimbabwe Stock Exchange (ZSE), and the JSE.
The findings for the JSE confirmed that the JSE had conformed to the semi-strong version of the efficient market hypothesis. Their findings corroborated the findings of Atkins and Ward (1996).

Bhana (1995) concluded that the JSE reacted in an efficient manner to uncertain information. White and Lusztig (1980) concluded that security prices reflect all available information in capital markets and therefore, these capital markets were efficient. This study is therefore premised on the assumption that the JSE is an efficient market.

3.4.2 Methods in prior research

Brown and Warner (1985) used simulated data to test different methods. In their 1985 paper, they constructed 250 sample portfolios; each sample portfolio contained 50 randomly selected shares. The study used daily returns. The study tested the performance of the average return, index and market models for estimating expected returns. Brown and Warner found similar results for the index model and market model. They found that the average return model performed poorly when the event dates were the same otherwise it performed comparably. Brown and Warner (1985) concluded that there was no evidence that methods that are more complicated added any value.

Dyckman, Philbrick and Stephan (1984) conducted similar tests as Brown and Warner (1985), also using daily returns and 250 sample portfolios. Dyckman et al. (1984) confirmed the findings of Brown and Warner.

Armitage (1995) observed that the different models produced similar results and that the market model was the most reliable for a range of circumstances.

Eckbo (1986) used the market model to calculate the abnormal returns over a two-day trading period for 723 debt offerings consisting of 648 issues of straight debt.

This study uses the market model to calculate the abnormal returns of 29 bond issues over a two-day trading period. The market model analyses the relationship between the returns of the event stock and the behaviour of the JSE stock index and is expressed in the following equation:

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

Where α_i and β_i denote regression coefficients and;

α_i = The intercept of the linear relation for the return on stock i and return on the market portfolio,

β_i = The systematic risk of share i,

R_{mt} = Return on a market portfolio on day t, such as the FTSE/JSE Financial and Industrial Index on the JSE Securities Exchange,

R_{it} = Actual return on the security i on day t, and

e_{it} = Disturbance term or residual sometimes referred to as "white noise".

The model used to calculate the disturbance is:

$$e_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$$

The residuals (disturbance) are assumed to have the following properties:

$$E(e_{it}) = 0$$

$$\sigma(e_{it}, e_{jt}) = 0 \forall i \neq j$$

In an efficient market, the above properties will always hold. Therefore, since the expected value of the residual is zero, any non-zero value of the residual is defined as the abnormal return.

The period of interest, or event window, includes the day of the announcement and the day after the announcement. MacKinley (1997) confirms that this captures the price effects of announcements, which occur after the market has closed on the event day.

3.4.3 The event date

Brown and Warner (1980) found that the efficacy of the tests was very sensitive to the precision with which an event date could be identified. The security price reaction to the announcement of a bond issue is the time the news of the impending issue becomes available to the market. In most cases, the event would occur on the date when the public announcement was made. However, it is possible that leakage could have occurred from insiders. Dodd's (1980) study indicates that this is not likely to be a serious problem. The event date for this study is the first announcement detected on SENS.

CHAPTER 4
BETA AND ALPHA

4.1 Background

The capital asset pricing model asserts that the return of any portfolio consists of two components: the first is attributable to the return on the market benchmark and the second is called an idiosyncratic part (Sharpe [1963]). The former is commonly called beta and the latter is referred to as alpha.

This study uses the market model to calculate the abnormal returns during the event period. The model is expressed as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it},$$

Where α and β are regression coefficients.

4.2 Beta

In finance the beta coefficient (β) is a key parameter. It measures the "part of the asset's statistical variance that cannot be mitigated by the diversification provided by the portfolio of many risky assets".[7] Beta is regarded as one of the "centrepieces of modern finance. It tells us how much systematic risk a particular asset has relative to an average asset" [8] A systematic risk is one that influences a large number of assets. In other words, systematic risks are market wide. These are also termed market risks.

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[7] Wikipedia, 10 November 2009

[8] Ross, Westerfield, Jordan and Firer, "Fundamentals of Corporate Finance", 1st Edition, 1999.

The beta coefficient captures an investment's sensitivity to movements of the market. The market (the average asset) has a beta of 1. An investment with a beta greater than 1 is expected to grow more than the market during an upturn and is expected to fall more than the market during a market decline; it is therefore considered more volatile than the market. The security will be considered less volatile than the market if it has a beta of less than 1. A beta of 1 indicates that the security's price will move with the market. It will mirror the swings in the market. For example, if a stock's beta is 1.2, then theoretically it would, on average be, 20% more volatile than the market. Similarly, a stock with a beta of 0.7 would, on average, be 30% less volatile than the market. Therefore, beta gives an indication of a security's tendency to respond to swings in the market.

4.3 Estimation of beta

The values of beta vary depending on how they are calculated. The main varying components are:

i. Different time frames; the values of beta will differ depending on how far back into history the beta calculations go. The beta calculation for a stock price with a 12-month trail will differ from a 60-month trail.
ii. Different time intervals; the interval between the stock prices influences the beta calculations. A beta calculation that uses the monthly stock prices will differ from the beta calculation that uses weekly or daily stock prices.
iii. Different index; the beta calculations can vary depending on which index is used to measure the overall value of the market.
iv. Inclusion or exclusion of dividends; the inclusion of dividends in the calculations of the returns of the stock will have an impact on the calculation of beta values.

The result of each of these different choices can cause beta values to differ widely depending on how the calculation is made. This means that a beta value is not an exact value of how a stock varies with the market, but a representation.

In this study two betas are used. One is calculated using regression analysis. The other is taken from the Financial Risk Service, which is compiled and released quarterly by Cadiz. The reason why the Cadiz betas were also used was to determine whether the effects of thin trading and different time frames would generate a significantly different result. Also, Armitage (1995) notes that although the market model is the most commonly used to generate expected returns and no better alternative is available, there is a weak relationship between beta and actual returns.

Regression analysis is used to predict the value of one variable on the basis of other variables. To estimate beta one needs a list of returns for the asset (R_{it}) and returns for the index (R_{mt}) for each of the shares in the event portfolio. These returns can be daily, weekly, monthly or any other period.

Because α and β represent the coefficients of a straight line, their estimates are based on drawing a straight line through the estimation period data. The estimation period data is comprised of R_{it}, which is the return on the event stock, and R_{mt}. R_{mt} is the return on the JSE. There appears to be precedent for the use of estimated betas by way of the application of regression analysis. The following citations confirm this.

Wolmarans and Sartorius (2009) obtained daily share prices from the BFA-Net database. They obtained daily share prices for their estimation period and the market index returns for the same period. Subsequently, for each company, estimates were determined for the parameters α and β in the market model equation. These parameters were then used to determine the expected returns for the days relative to the event and to calculate the abnormal returns.

De Beer (2008) estimated α and β by means of ordinary least squares (OLS) regression and used these to calculate the residuals or abnormal returns.

Beta was calculated as the covariance between the market and the security during the estimation period, divided by the variance of the market in that period. The intercept term (alpha) was calculated as the difference between the average return (μ) on the security and the estimated return on the security as determined by the market return and calculated beta.

Bhana (2007) used the event study methodology developed by Brown and Warner (1985) to examine the excess returns around the announcement day. He used three models one of which was the market model. He used an estimation period from day –180 till day –21 to calculate the parameters, α and β.

4.4 Alpha

The basic definition of alpha is: the difference between a portfolio's returns and those attributable to its beta relative to the market. There is however a contrary view; that alpha and the market returns are unrelated.

Alpha is a measure of a portfolio's performance on a risk-adjusted basis. It takes the volatility (price risk) of a portfolio and compares its risk-adjusted performance to a benchmark index. The excess return of the portfolio relative to the return of the benchmark index is a portfolio's alpha.

It is also commonly referred to as the abnormal rate of return on a security or portfolio. In other words, it is the excess of what would be predicted by a model like the capital asset pricing model (CAPM).

Investopedia contextualises Alpha as" one of five technical risk ratios; the others are beta, standard deviation, R-squared, and the Sharpe ratio. These are all statistical measurements used in modern portfolio theory (MPT). All of these indicators are intended to help investors determine the risk-reward profile of a mutual fund. Simply stated, alpha is often considered to represent the value that a portfolio manager adds to or subtracts from a fund's return".

Investopedia provides a good example of how to interpret alpha: “A positive alpha of 1.0 means the fund has outperformed its benchmark index by 1%. Correspondingly, a similar negative alpha would indicate an underperformance of 1%.

If a CAPM analysis estimates that a portfolio should earn 10% based on the risk of the portfolio but the portfolio actually earns 15%, the portfolio's alpha would be 5%. This 5% is the excess return over what was predicted in the CAPM model”.

CHAPTER 5

DATA AND RESEARCH DESIGN

5.1 Selection criteria

The Johannesburg Stock Exchange (JSE) requires a listed company to make an announcement through its Security Exchange News Service if the listed company anticipates that its share price will react to a bond issue.

Only JSE listed companies, or 100% owned subsidiaries of listed companies, which had issued bonds on the Bond Exchange of South Africa (BESA) between 2000 and 2008, were selected for this study.

The rationale for selecting 100% owned subsidiaries of JSE listed companies is inferred from the JSE rule that a company is obliged to announce an event which it deems will have a price reaction. The parent of the 100%-owned subsidiary companies represented in this study made announcements. It is assumed that the listed companies' anticipated that their prices would be affected by the announcements.

Between 2000 and 2008 783 corporate bonds were listed on the BESA. The bonds classified as commercial paper was not considered since these are short-term. Securitizations were also rejected. This study does not examine the impact of the announcement of short-term debt. After the commercial paper was eliminated, the remaining bond issues were examined and the following steps were performed:

- The companies that had issued the remaining bonds were subjected to a search in the "Who owns whom" database so as to determine whether these companies' were listed on the JSE;

- If these companies were not traced to the listed section of the JSE in “Who owns whom”, then the companies were again subjected to a search in order to determine whether said companies were 100%-owned subsidiaries of JSE-listed companies’;

- A search was then conducted in SENS in order to trace bond issue announcements made by the identified JSE-listed companies or 100%-owned subsidiaries of JSE-listed corporates.

Of the 783 bond issues, 103 were identified as listed by JSE-listed companies or 100%-owned subsidiaries of JSE-listed companies. These 103 bonds were issued by 24 companies. Of these, 34 bond issues conformed to the criteria as specified in section 3.2 (procedure 1). These 34 bonds were issued by 15 companies. Two companies announced the issue of 2 bonds on the same day, at the same time, hence these were classified as single announcements and therefore the total sample size was reduced to 29.

The share price and financial information was readily accessible for these companies, hence these were selected. The event, the bond issue announcement, was retrieved from SENS on the Macgregor database. The market returns, R_{mt} and risk-free rate, R_f were retrieved from the DataStream database. For the risk-free rate, the SA T-bill 91 day (tender rates) was selected as opposed to the SA T-bill 182 days (tender rates). Two sets of beta values were obtained. One was obtained from the Financial Risk Service, which is compiled and released quarterly by Cadiz and the other was calculated using regression analysis. In addition, the alpha value derived from regression analysis was also used in the calculation of the abnormal returns for the non-Cadiz set. An abnormal returns calculation was also made using only the regression beta value. The companies’ JSE listing status was confirmed by cross-referencing the BESA listing with the “Who owns whom” database. Of these listings, only 29 conformed to the selection criteria.

In this study the FTSE/JSE Financial and Industrial Index are used as the market portfolio term for 28 sample items. The FTSE/JSE Resources Index is used as the market portfolio term for the remaining sample.

The sample size is relatively small and may be cause for concern but Brown and Warner (1985, p. 25) notes, "standard parametric tests for significance of the mean excess are well specified. In samples of only 5 securities, and even when days are clustered, the tests typically have the appropriate probability of Type I error."

The daily share returns for each sample were regressed for the 100 days preceding the bond issue announcement date against the daily returns of the FTSE/JSE Financial and Industrial Index. Armitage (1995) observed that in practice, estimation periods range from 100 to 300 days for daily studies. This study therefore uses an estimation period of 100 days.

Jin (2006) advised that the α value can be ignored (when using the Cadiz betas), as its value is generally very small. The exclusion of the term is considered immaterial as the term has an insignificant effect on the model's result. The α values were however used when the calculated regression parameters were used to calculate the abnormal returns for categories (i), (iv) and (vii) in section 6.2 below.

5.2 Banks and financial firms

Sixty two percent of the sample is banks. The inclusion of banks in the sample was not unexpected. Banks are, after all, "depository financial institutions that accept deposits and channel the monies into lending activities".[9] In other words, they are in the business of taking on deposits (debt), from the general public, and then lending these deposits, in the form of loans, to borrowers. Only bank deposits are classified as a component of the

[9] Webster's Dictionary Rosetta Edition

country's money supply. They attract funds from surplus-saving units and loan these funds out to deficit-savings units. So it is clear, bank debt is special and one would expect the announcement of straight debt issues by banks to be interpreted as an innocuous event, and consequently the reaction to the announcement is expected to have an insignificant impact on the share value. See Table 6 below for the breakdown of industries.

5.3 Summary of sample characteristics

The observation interval is one day, thus daily stock returns are used. A 2-day event window is used, comprised of 1 pre-event day and the event day. MacKinley (1997) counsels that in an event study using daily data and the market model, the market model parameters could be estimated over 120 days prior to the event. Armitage (1995) observed that in practice, estimation periods ranged from 100 to 300 days for daily studies.

Corrado and Zivney (1992) compared results from three test statistics using pre-event estimation periods of 239, 89 and 39 days. The simulation showed that the t-test and sign and rank test were 'virtually unaffected' by an estimation period of 89 instead of 239 days, and a 39 day period produced a slight deterioration of performance. Armitage (1995) asserts that observations at times other than t could be ignored. In this case, shares' errors at t are treated as a sample. In this study, observations at times other than t are ignored.

5.4 Terminology

5.4.1 Abnormal return (AR)

Abnormal stock returns are computed as the difference between the actual stock return and the JSE Financial and Industrial Index return:

$$AR_{it} = r_{it} - r_{mt}$$

Where AR_{it} is the abnormal return for security i for the period t, r_{it} is the actual return of security i for the day t, and r_{mt} is the return of the FTSE/JSE F&I index market portfolio for day t.

5.4.2 Average abnormal return (AAR)

The daily abnormal returns are averaged over the sample yielding the average abnormal return (AAR).

$$AAR = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \text{ ,}$$

Where N is the number of securities in the sample.

5.4.3 Cumulative abnormal return (CAR)

The cumulative abnormal return is the sum of all the AR's of security i over the period of trading days t, starting from the event date (t = 0).

$$CAR_{it} = \sum_{t=0}^{T} AR_{it}$$

Where t is the event window, t = 0, 1.

5.4.4 Average cumulative abnormal return $\left(\overline{CAR}\right)$

The cumulative abnormal returns are averaged over the sample of securities yielding the average cumulative abnormal return.

$$\left(\overline{CAR_t}\right) = \sum_{t=0}^{T} \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

The average cumulative abnormal return is used to measure the share return performance.

5.4.5 Event date

The event date is the first announcement date as retrieved from SENS and t denotes the event time and the time relative to it. Therefore, t = 0 denotes the announcement or event date and t = 1 is the day following the event date.

5.4.6 Event window

The event window is defined as 1 day before the announcement and the day of the bond issue announcement.

5.5 Significance tests

This event study focuses on the effect of bond issue announcements on share prices. The average abnormal returns calculated for the portfolio of 29 events must therefore be tested for significance.

Bowman (1983) observes that the t-test was consistently a better approximation of the theoretical distribution of the test statistics relative to either the sign or Wilcoxon tests in event studies. Brown and Warner (1980) found that the t-test was best applied to event studies in order to determine the statistical significance of average abnormal returns over the event window.

Armitage (1995) indicates that there are three methods whereby the average abnormal returns for one or more portfolios of N shares can be tested for significance by the t-test. The first is the share time series. In this method each share's abnormal return is standardized by its estimation period standard error of regression, s_i resulting in a standardized error, SE:

$$SE_{it} = e_{it} / s_i ,$$

Where

$$s_i = \sqrt{\left([1/T-2]\sum_{t=1}^{T} e_{it}^{2}\right)}$$

In addition, T is the number of observations in the estimation period. The test statistic is simply $=\sum_{i=1}^{N} SE_{it} / \sqrt{N}$. This method is used by Dyckman et al. (1984) and is similar to the test used in Brown and Warner (1980).

The second method is called the portfolio time series method. With this method the average of the constituent shares' errors for each time t are treated as observations and are used to calculate a time series standard deviation, $s(\bar{e})$.

$$s(\bar{e}) = \sqrt{\left([1/T-1]\sum_{t=1}^{T}\left[\bar{e}_t - \mu\right]^2\right)},$$

Where μ is the mean of the portfolio residuals over estimation period T and

$$\bar{e}_t = (1/N)\sum_{i=1}^{N} e_{it}.$$

This study uses the portfolio time series method to determine the statistical significance of average abnormal returns over the event window. The t-test is calculated using the portfolio time series method by using the standard deviation, $s(\bar{e})$ of abnormal returns of the portfolio of 29 observations. It is the main test used by Brown and Warner (1985). The portfolio error $\bar{e}_t$ is treated as an observation and this simply means dividing the portfolio error by the standard deviation, thus producing the test statistic.

The test statistic is:

$$\frac{\bar{e}_t}{s(\bar{e})}.$$

The third significance test is the cross-sectional method. This test ignores observations at times other than t. The shares' errors at time t are then simply treated as a sample of which $\bar{e}_t$ is the mean and s_t is the cross-sectional standard deviation. The standard deviation equation is therefore:

$$s_t = \sqrt{([1/N-1]\sum_{i=1}^{N}[e_{it}-\bar{e}_t]^2}$$

And the test statistic is;

$$\frac{\bar{e}_t}{s_t/\sqrt{N}}$$

The variance reduction will be greatest in cases where the sample firms have a common characteristic. In the case of this study, it is expected in the banking group. Notwithstanding, a simple model is warranted given that gains from employing multifactor models for event studies are limited.

CHAPTER 6
EMPIRICAL EVIDENCE

6.1 Background

This study asks whether announcements of straight debt issue transactions on the BESA, by JSE listed companies, is related to shareholder value creation. In this study, positive abnormal returns are regarded as an indication of shareholder wealth creation whereas negative abnormal returns are regarded as an indication of value destruction. In order to answer this question, first a list of the JSE listed companies was identified on the BESA listing from 01 January 2000 to 31 December 2008. Thereafter a search was conducted on the Securities Exchange News Service (SENS) in order to identify the announcement dates of the BESA listed bonds.

There were 783 corporate bonds issued between 01 January 2000 and 31 December 2008. Of these, twenty-nine (29) samples were identified. See section 5 for the appropriate selection criteria.

The average abnormal return values were calculated for the 29 samples and then T-tests were performed to determine the statistical significance of average abnormal returns over the event window.

The public announcement date of a straight debt issue transaction involving a JSE-listed company was regarded as day zero (0) of that transaction. If the announcement was made during a weekday, after 16h30, or it was made over a weekend, then the first trading day thereafter was taken as day zero. The study used the BFA-Net database at the University of Cape Town to obtain the necessary daily share prices. Each company's daily share prices were obtained from day -100 to day +1, relative to the bond issue announcement day. The corresponding market index (JSE/FTSE) values were also obtained for the same period, for each announcement.

Subsequently, for each company, estimates of α and β were determined for the regression parameters in the market model equation. These were then used to determine the expected returns for days zero (0) and one (1) relative to the event.

6.2 Categories of Abnormal Returns

This study presents the abnormal returns in 9 categories. These are:

i. Total sample (29) where α and β are derived using regression analysis and both variables are used.
ii. Total sample (29) where α and β are derived using regression analysis but α is excluded.
iii. Total sample (29) where the Cadiz β values are used only.
iv. Banks only (19) where α and β are derived by way of regression analysis and both variables are used.
v. Banks only (19) where α and β are derived by way of regression analysis but α is excluded.
vi. Banks only (19) where the Cadiz β values are used only.
vii. Non-banks only (10) where α and β are derived through the use of regression analysis and both variables are used.
viii. Non-banks only (10) where α and β are derived through the use of regression analysis but α is excluded.
ix. Non-banks only (10) where the Cadiz β values are used only.

The categories were defined in order to determine:

i. the impact that the inclusion of banks make on the entire sample
ii. the result when banks are excluded from the sample
iii. the result when only banks are included in the sample
iv. the impact when the regression α and β are used as opposed to only the regression β, in all categories.
v. the impact when the Cadiz β is applied to all categories

The impact of alpha, in determining the abnormal returns is considered by some as insignificant. The basic definition of alpha is: the difference between a portfolio's returns and those attributable to its beta relative to the market. There appears to be a view that alpha and the market returns are unrelated. This study attempts to comment on this view by calculating the abnormal returns of the regression sample without the inclusion of alpha. The result ought to shed light on the view that alpha does not impact on the market returns.

Jin (2006) asserts that the α value can be ignored, as its value is generally very small and not available for all sample events. She states that the exclusion of the term is considered immaterial as the term has an insignificant effect on the model's result. This study calculates the abnormal returns with and without alpha in order to clarify its significance.

The abnormal returns for each sample, according to the categories of abnormal returns as defined in section 6.2 above, for each of the announcement days, which are measures of cumulative abnormal returns (CAR), are as indicated in Table 1 and Table 2 below.

T-tests were then performed on both all of the results (*Cadiz*, regression and regression with no alpha) to determine if the reactions were on average significantly different from zero (0). The results are given in Table 29 below.

6.3 The sample

The sample portfolio is represented by the industry and service sectors indicated in Table 6 below. As mentioned earlier, the variance reduction will be greatest in cases where the sample firms have a common characteristic. In the case of this study, it is expected in the banking group. Notwithstanding, the market model is warranted given that gains from employing multifactor models for event studies are limited.

Table 4 and Table 5 shows the complete list of bonds that were identified based on the model criteria. The sample indicates 34 bonds issued, however; Standard Bank, MTN, Sanlam, Nedbank, and Group5 each issued two bonds on the same day using one announcement. None of these issues were short-term. These announcements bear the same date and time stamps. These listings were therefore counted as individual events.

Table 4: Banks only

YEAR	BOND CODE	LISTED CORPORATE	SECTOR	SUB	ANN DATE	TIME STAMP	ISSUE AMOUNT
BANKING SECTOR							
2000	SBK1	Standard Bank of South Africa	banking	100%	Tuesday, April 25, 2000	16:03	1,200,000,000
2001	NED1	Nedcor Bank Limited	banking	100%	Monday, September 03, 2001	20:08:07	2,000,000,000
2001	SBK3	Standard Bank of South Africa	banking	100%	Wednesday, October 03, 2001	20:08:56	2,000,000,000
2003	ABL2	African Bank Limited	banking	100%	Thursday, August 21, 2003	12:35:49	1,000,000,000
2004	ABL3	African Bank Limited	banking	100%	Friday, June 04, 2004	10:48:48	1,000,000,000
2004	SBS1	Standard Bank of South Africa	banking	100%	Wednesday, November 17, 2004	12:39:05	3,000,000,000
2004	SBK5	Standard Bank of South Africa	banking	100%	Monday, November 01, 2004	15:48:33	2,000,000,000
2005	AB05	ABSA Bank Limited	banking	100%	Wednesday, May 25, 2005	17:15:37	1,500,000,000
2005	ABL4	African Bank Limited	banking	100%	Monday, August 22, 2005	13:44:17	600,000,000
2005	FRB03	Firstrand Bank Limited	banking	100%	Wednesday, October 26, 2005	13:03:05	1,000,000,000
2005	SBK6	Standard Bank of South Africa	banking	100%	Monday, February 14, 2005	11:19:07	600,000,000
2005	SBK7	Standard Bank of South Africa	banking	100%	Wednesday, May 04, 2005	14:10:11	3,000,000,000
2006	SBK8	Standard Bank of South Africa	banking	100%	Friday, February 10, 2006	7:54:05	1,500,000,000
2006	SBK9	Standard Bank of South Africa	banking	100%	Friday, February 10, 2006	7:54:05	1,500,000,000
2006	SBN23	Standard Bank of South Africa	banking	100%	Monday, August 21, 2006	12:17:05	122,500,000
2006	SBR002	Standard Bank of South Africa	banking	100%	Tuesday, September 12, 2006	17:33:36	400,000,000
2006	NED5	Nedbank Limited	banking	100%	Monday, April 03, 2006	16:23:06	1,500,000,000
2007	NED7	Nedbank Limited	banking	100%	Monday, January 22, 2007	9:00:02	650,000,000
2007	NED8	Nedbank Limited	banking	100%	Monday, January 22, 2007	9:00:02	1,000,000,000
2007	NED11	Nedbank Limited	banking	100%	Monday, August 27, 2007	12:39:01	1,000,000,000
2008	SBR003	Standard Bank of South Africa	banking	100%	Wednesday, October 15, 2008	7:10:02	220,000,000

Table 5: Non-Banks only

YEAR	BOND CODE	LISTED CORPORATE	SECTOR	SUB	ANN DATE	TIME STAMP	ISSUE AMOUNT
BANKING SECTOR							
2003	AG01	Anglo Gold	gold mining		Tuesday, August 12, 2003	12:31:29	2,000,000,000
2004	BAW1	Barloworld Limited	div. ind.		Thursday, July 22, 2004	17:40:13	1,500,000,000
2004	SPG1	Super Group Limited	transport		Tuesday, June 08, 2004	15:36:02	900,000,000
2005	LGL1	The Liberty Group Limited	insurance		Thursday, May 19, 2005	16:00:03	2,000,000,000
2005	OML01	Old Mutual (SA) Limited	insurance	100%	Tuesday, October 11, 2005	14:30:08	3,000,000,000
2006	MET01	Metropolitan Life Limited	insurance	100%	Tuesday, December 12, 2006	16:16:04	500,000,000
2006	MTN01	MTN Holdings (Proprietary) Ltd	mobile tele		Thursday, July 06, 2006	8:56:03	5,000,000,000
2006	MTN02	MTN Holdings (Proprietary) Ltd	mobile tele		Thursday, July 06, 2006	8:56:03	1,300,000,000
2006	SLI1	Sanlam Life Insurance Limited	insurance	100%	Thursday, August 10, 2006	17:42:24	1,160,000,000
2006	SLI2	Sanlam Life Insurance Limited	insurance	100%	Thursday, August 10, 2006	17:42:24	828,000,000
2006	MGL01	Momentum Group Limited	insurance	100%	Thursday, April 20, 2006	14:56:13	1,000,000,000
2007	GFC1	Group 5 Construction (Pty) Ltd	construction		Tuesday, January 23, 2007	8:09:01	700,000,000
2007	GFC2	Group 5 Construction (Pty) Ltd	construction		Tuesday, January 23, 2007	8:09:01	700,000,000

Table 6: Industry Sectors

Industry sector	Proportion
Banking	62%
Insurance	18%
Telecomms	6%
Gold mining	3%
Diversified industrial	3%
Transport	3%
Construction	6%
TOTAL	100%

Table 6 above indicates the various industry sectors represented in the total sample. The total sample is the combined list of Table 4 and Table 5 above. The statistics shown below are based upon the Cadiz beta values whereas the statistics that were compiled using the regression parameters follows.

6.4 The Abnormal returns

The abnormal returns for the nine categories listed in section 6.2 above are tabulated in the tables that follow below. The tables are listed in the following sequence:

- First the abnormal returns table, followed by
- The portfolio error statistics table, followed by
- The estimation period error statistics table and finally
- The estimation period abnormal returns table for the three broad categories, namely: total sample (I), banks only (II) and non-banks only (III). These are in Table 28.

Table 7: Total Portfolio Abnormal Return (AR) Table: Regression β and α

Count	Portfolio	α	β	Abnormal returns
1	STANBNK	0.00191	0.08344	0.017154643
2	NEDBANK	0.00057	0.44816	-0.001232277
3	STANBNK	0.00033	0.36857	-0.011321990
4	ABIL	0.00169	0.18176	0.007182748
5	ANGLO	0.00078	0.27692	0.005130347
6	ABIL	0.00306	0.04860	-0.005291955
7	BARWORLD	0.00007	-0.27736	-0.001043400
8	STANBNK	0.00190	0.26496	-0.002209801
9	SUPER	0.00091	0.43879	-0.009464605
10	STANBNK	0.00230	0.33944	0.003210811
11	ABSA	0.00105	-0.02724	-0.007369428
12	ABIL	0.00233	0.48471	-0.017959104
13	FIRSTRAND	0.00040	1.03148	-0.007782963
14	LIBERTY	-0.00033	0.16755	0.001593945
15	OLDMUT	0.00055	0.30959	0.007161427
16	STANBNK	0.00147	0.81038	-0.011563459
17	STANBNK	0.00088	0.00635	0.011124656
18	STANBNK	0.00071	0.40208	0.011479757
19	STANBNK	-0.00123	0.01253	0.015525098
20	STANBNK	-0.00157	0.10813	0.026712823
21	METLIFE	0.00183	-0.01606	0.007560043
22	MTN	-0.00131	0.16807	0.008122335
23	NEDBANK	0.00372	0.03137	-0.001569508
24	SANLAM	-0.00062	-0.06774	0.002629637
25	MOMENT	0.00264	-0.03910	-0.010601744
26	NEDBANK	0.00144	0.17641	0.010732130
27	GROUP 5	0.00339	0.74907	0.008057464
28	NEDBANK	-0.00087	1.11045	0.015451797
29	STANBNK	0.00208	1.28316	0.010565927

Table 8: Portfolio Error Statistics-Total Portfolio; Regression α and β

Descriptive Statistics	Values
Mean	0.002827081
Standard Error	0.001926764
Median	0.003210811
Mode	#N/A
Standard Deviation	0.010375942
Sample Variance	0.000107660
Kurtosis	-0.318417059
Skewness	0.040418683
Range	0.044671927
Minimum	-0.017959104
Maximum	0.026712823
Sum	0.081985355
Count	29
Largest (1)	0.026712823
Smallest (1)	-0.017959104
Confidence Level (95.0%)	0.003946797

Table 9: Total Portfolio Abnormal Return (AR) Table - Regression β only

Count	Portfolio	α	β	Abnormal returns
1	STANBNK	0.00000	0.08344	0.019060755
2	NEDBANK	0.00000	0.44816	-0.000661426
3	STANBNK	0.00000	0.36857	-0.010989489
4	ABIL	0.00000	0.18176	0.009464685
5	ANGLO	0.00000	0.27692	0.005911548
6	ABIL	0.00000	0.04860	-0.002235705
7	BARWORLD	0.00000	-0.27736	0.005095196
8	STANBNK	0.00000	0.26496	-0.000307726
9	SUPER	0.00000	0.43879	-0.008556214
10	STANBNK	0.00000	0.33944	0.005509752
11	ABSA	0.00000	-0.02724	-0.006319264
12	ABIL	0.00000	0.48471	-0.015630352
13	FIRSTRAND	0.00000	1.03148	-0.007386198
14	LIBERTY	0.00000	0.16755	0.001260581
15	OLDMUT	0.00000	0.30959	0.007709241
16	STANBNK	0.00000	0.81038	-0.010091323
17	STANBNK	0.00000	0.00635	0.012000168
18	STANBNK	0.00000	0.40208	0.012194056
19	STANBNK	0.00000	0.01253	0.014299785
20	STANBNK	0.00000	0.10813	0.026586281
21	METLIFE	0.00000	-0.01606	0.009390761
22	MTN	0.00000	0.16807	0.006808810
23	NEDBANK	0.00000	0.03137	0.002152756
24	SANLAM	0.00000	-0.06774	0.002011123
25	MOMENT	0.00000	-0.03910	-0.007964768
26	NEDBANK	0.00000	0.17641	0.010263034
27	GROUP 5	0.00000	0.74907	0.011451444
28	NEDBANK	0.00000	1.11045	0.014584531
29	STANBNK	0.00000	1.28316	0.012642319

Table 10: Portfolio Error Statistics-Total Portfolio; Regression β only

Descriptive Statistics	Values
Mean	**0.004077737**
Standard Error	**0.001851237**
Median	**0.005509752**
Mode	**#N/A**
Standard Deviation	**0.009969215**
Sample Variance	**0.000099385**
Kurtosis	**-0.344207998**
Skewness	**-0.043234587**
Range	**0.042216633**
Minimum	**-0.015630352**
Maximum	**0.026586281**
Sum	**0.118254362**
Count	**29**
Largest(1)	**0.026586281**
Smallest(1)	**-0.015630352**
Confidence Level(95.0%)	**0.003792087**

Table 11: Total Portfolio Abnormal Return (AR) Table - Cadiz β only

Count	Portfolio	Alpha	Beta	Abnormal returns
1	STANBNK	0.000	1.17	-0.001691
2	NEDBANK	0.000	0.98	0.001788
3	STANBNK	0.000	1.12	-0.029185
4	ABIL	0.000	0.93	0.001503
5	ANGLO	0.000	0.65	0.004512
6	ABIL	0.000	0.95	-0.006626
7	BARWORLD	0.000	1.07	0.005258
8	STANBNK	0.000	0.98	-0.005475
9	SUPER	0.000	1.34	-0.012890
10	STANBNK	0.000	0.98	0.001083
11	ABSA	0.000	0.99	-0.005498
12	ABIL	0.000	1.04	-0.015421
13	FIRSTRAND	0.000	1.06	-0.007440
14	LIBERTY	0.000	0.75	-0.002531
15	OLDMUT	0.000	0.93	0.005423
16	STANBNK	0.000	0.96	-0.009827
17	STANBNK	0.000	0.97	0.004432
18	STANBNK	0.000	1.02	-0.000552
19	STANBNK	0.000	1.05	0.005994
20	STANBNK	0.000	1.05	0.016883
21	METLIFE	0.000	1.01	0.003571
22	MTN	0.000	1.20	0.001040
23	NEDBANK	0.000	0.86	-0.000433
24	SANLAM	0.000	1.11	0.004422
25	MOMENT	0.000	1.06	-0.011885
26	NEDBANK	0.000	0.91	0.009116
27	GROUP 5	0.000	0.90	0.012015
28	NEDBANK	0.000	0.94	0.014744
29	STANBNK	0.000	1.16	0.009343

Table 12: Portfolio Error Statistics – Total Portfolio; Cadiz β only

Descriptive Statistics	Values
Mean	-0.000287173
Standard Error	0.001806710
Median	0.001083433
Mode	#N/A
Standard Deviation	0.009729429
Sample Variance	0.000094662
Kurtosis	1.538543716
Skewness	-0.828777384
Range	0.046068191
Minimum	-0.029185209
Maximum	0.016882982
Sum	-0.008328019
Count	29
Largest(1)	0.016882982
Smallest(1)	-0.029185209
Confidence Level(95.0%)	0.003700877

Table 13: Total Sample Estimation Period Error Statistics

Descriptive Statistics	Values
Mean	0.000559387
Standard Error	0.000400078
Median	-0.000054032
Mode	#N/A
Standard Deviation	0.004000782
Sample Variance	0.000016006
Kurtosis	-0.241986758
Skewness	0.474409464
Range	0.019996486
Minimum	-0.008186626
Maximum	0.011809859
Sum	0.055938658
Count	100
Largest(1)	0.011809859
Smallest(1)	-0.008186626
Confidence Level(95.0%)	0.000793842

Table 14: Portfolio Abnormal Return (AR) Table (Banks Only) – Regression α and β

Count	Portfolio	alpha	beta	Abnormal returns
1	STANBNK	0.0019	0.0834	0.0172
2	NEDBANK	0.0006	0.4482	-0.0012
3	STANBNK	0.0003	0.3686	-0.0113
4	ABIL	0.0017	0.1818	0.0072
5	ABIL	0.0031	0.0486	-0.0053
6	STANBNK	0.0019	0.2650	-0.0022
7	STANBNK	0.0023	0.3394	0.0032
8	ABSA	0.0011	-0.0272	-0.0074
9	ABIL	0.0023	0.4847	-0.0180
10	FIRSTRAND	0.0004	1.0315	-0.0078
11	STANBNK	0.0015	0.8104	-0.0116
12	STANBNK	0.0009	0.0063	0.0111
13	STANBNK	0.0007	0.4021	0.0115
14	STANBNK	-0.0012	0.0125	0.0155
15	STANBNK	-0.0016	0.1081	0.0267
16	NEDBANK	0.0037	0.0314	-0.0016
17	NEDBANK	0.0014	1.4698	0.0107
18	NEDBANK	-0.0009	1.1104	0.0155
19	STANBNK	0.0021	1.2832	0.0106

Table 15: Portfolio Error Statistics – (Banks Only); Regression with α and β

Descriptive Statistics	Values
Mean	0.003307363
Standard Error	0.002736078
Median	0.003210811
Mode	#N/A
Standard Deviation	0.011926287
Sample Variance	0.000142236
Kurtosis	-0.773374809
Skewness	0.048805938
Range	0.044671927
Minimum	-0.017959104
Maximum	0.026712823
Sum	0.062839906
Count	19
Largest(1)	0.026712823
Smallest(1)	-0.017959104
Confidence Level(95.0%)	0.005748286

Table 16: Portfolio Abnormal Return (AR) Table (Banks Only) – Regression β only

Count	Portfolio	alpha	beta	Abnormal returns
1	STANBNK	0.000	0.083	0.0191
2	NEDBANK	0.000	0.448	-0.0007
3	STANBNK	0.000	0.369	-0.0110
4	ABIL	0.000	0.182	0.0095
5	ABIL	0.000	0.049	-0.0022
6	STANBNK	0.000	0.265	-0.0003
7	STANBNK	0.000	0.339	0.0055
8	ABSA	0.000	-0.027	-0.0063
9	ABIL	0.000	0.485	-0.0156
10	FIRSTRAND	0.000	1.031	-0.0074
11	STANBNK	0.000	0.810	-0.0101
12	STANBNK	0.000	0.006	0.0120
13	STANBNK	0.000	0.402	0.0122
14	STANBNK	0.000	0.013	0.0143
15	STANBNK	0.000	0.108	0.0266
16	NEDBANK	0.000	0.031	0.0022
17	NEDBANK	0.000	1.470	0.0103
18	NEDBANK	0.000	1.110	0.0146
19	STANBNK	0.000	1.283	0.0126

Table 17: Portfolio Error Statistics – (Banks Only); Regression β only

Descriptive Statistics	Values
Mean	0.004480876
Standard Error	0.002624228
Median	0.005509752
Mode	#N/A
Standard Deviation	0.011438747
Sample Variance	0.000130845
Kurtosis	-0.766063455
Skewness	-0.033128601
Range	0.042216633
Minimum	-0.015630352
Maximum	0.026586281
Sum	0.085136639
Count	19
Largest(1)	0.026586281
Smallest(1)	-0.015630352
Confidence Level(95.0%)	0.005513299

Table 18: Portfolio Abnormal Return (AR) Table (Banks Only) – Cadiz β only

Count	Portfolio	alpha	beta	Abnormal returns
1	STANBNK	0.000	1.17	-0.0017
2	NEDBANK	0.000	0.98	0.0018
3	STANBNK	0.000	1.12	-0.0292
4	ABIL	0.000	0.93	0.0015
5	ABIL	0.000	0.95	-0.0066
6	STANBNK	0.000	0.98	-0.0055
7	STANBNK	0.000	0.98	0.0011
8	ABSA	0.000	0.99	-0.0055
9	ABIL	0.000	1.04	-0.0154
10	FIRSTRAND	0.000	1.06	-0.0074
11	STANBNK	0.000	0.96	-0.0098
12	STANBNK	0.000	0.97	0.0044
13	STANBNK	0.000	1.02	-0.0006
14	STANBNK	0.000	1.05	0.0060
15	STANBNK	0.000	1.05	0.0169
16	NEDBANK	0.000	0.86	-0.0004
17	NEDBANK	0.000	0.91	0.0091
18	NEDBANK	0.000	0.94	0.0147
19	STANBNK	0.000	1.16	0.0093

Table 19: Portfolio Error Statistics – (Banks Only); Cadiz β only

Descriptive Statistics	Values
Mean	-0.000910714
Standard Error	0.002458715
Median	-0.000433368
Mode	#N/A
Standard Deviation	0.010717289
Sample Variance	0.000114860
Kurtosis	1.591933474
Skewness	-0.754462030
Range	0.046068191
Minimum	-0.029185209
Maximum	0.016882982
Sum	-0.017303572
Count	19
Largest(1)	0.016882982
Smallest(1)	-0.029185209
Confidence Level(95.0%)	0.005165568

Table 20: Estimation Period Error Statistics – (Banks Only)

Descriptive Statistics	Values
Mean	0.000559387
Standard Error	0.000400078
Median	-0.000054032
Mode	#N/A
Standard Deviation	0.004000782
Sample Variance	0.000016006
Kurtosis	-0.241986758
Skewness	0.474409464
Range	0.019996486
Minimum	-0.008186626
Maximum	0.011809859
Sum	0.055938658
Count	100
Largest(1)	0.011809859
Smallest(1)	-0.008186626
Confidence Level(95.0%)	0.000793842

Table 21: Portfolio Abnormal Return (AR) Table (Non-Banks Only) – Regression β and α

Count	Portfolio	alpha	beta	*Abnormal returns*
1	ANGLO	0.00078	0.27692	0.005130347
2	BARWORLD	0.00007	-0.27736	-0.001043400
3	SUPER	0.00091	0.43879	-0.009464605
4	LIBERTY	-0.00033	0.16755	0.001593945
5	OLDMUT	0.00055	0.30959	0.007161427
6	METLIFE	0.00183	-0.01606	0.007560043
7	MTN	-0.00131	0.16807	0.008122335
8	SANLAM	-0.00062	-0.06774	0.002629637
9	MOMENT	0.00264	-0.03910	-0.010601744
10	GROUP 5	0.00339	0.74907	0.008057464

Table 22: Portfolio Error Statistics – (Non-Banks Only); Regression β and α

Descriptive Statistics	Values
Mean	0.001914545
Standard Error	0.002214902
Median	0.003879992
Mode	#N/A
Standard Deviation	0.007004134
Sample Variance	4.90579E-05
Kurtosis	-0.151870297
Skewness	-1.063502504
Range	0.018724079
Minimum	-0.010601744
Maximum	0.008122335
Sum	0.019145449
Count	10
Largest(1)	0.008122335
Smallest(1)	-0.010601744
Confidence Level(95.0%)	0.005010456

Table 23: Portfolio Abnormal Return (AR) Table (Non-Banks Only) – Regression β only

Count	Portfolio	alpha	beta	Abnormal returns
1	ANGLO	0.00000	0.27692	0.005911548
2	BARWORLD	0.00000	-0.27736	0.005095196
3	SUPER	0.00000	0.43879	-0.008556214
4	LIBERTY	0.00000	0.16755	0.001260581
5	OLDMUT	0.00000	0.30959	0.007709241
6	METLIFE	0.00000	-0.01606	0.009390761
7	MTN	0.00000	0.16807	0.006808810
8	SANLAM	0.00000	-0.06774	0.002011123
9	MOMENT	0.00000	-0.03910	-0.007964768
10	GROUP 5	0.00000	0.74907	0.011451444

Table 24: Portfolio Error Statistics – (Non-Banks Only); Regression β only

Descriptive Statistics	Values
Mean	0.003311772
Standard Error	0.002156704
Median	0.005503372
Mode	#N/A
Standard Deviation	0.006820096
Sample Variance	0.000046514
Kurtosis	-0.065720578
Skewness	-0.963807544
Range	0.020007658
Minimum	-0.008556214
Maximum	0.011451444
Sum	0.033117722
Count	10
Largest(1)	0.011451444
Smallest(1)	-0.008556214
Confidence Level(95.0%)	0.004878802

Table 25: Portfolio Abnormal Return (AR) Table (Non-Banks Only) – Cadiz β only

Count	Portfolio	α	β	Abnormal returns
1	ANGLO	0.00000	0.65	0.004511870
2	BARWORLD	0.00000	1.07	0.005258224
3	SUPER	0.00000	1.34	-0.012889565
4	LIBERTY	0.00000	0.75	-0.002530945
5	OLDMUT	0.00000	0.93	0.005423132
6	METLIFE	0.00000	1.01	0.003570553
7	MTN	0.00000	1.20	0.001040466
8	SANLAM	0.00000	1.11	0.004422053
9	MOMENT	0.00000	1.06	-0.011884833
10	GROUP 5	0.00000	0.90	0.012014905

Table 26: Portfolio Error Statistics – (Non-Banks Only); Cadiz β only

Descriptive Statistics	Values
Mean	0.000893586
Standard Error	0.002496600
Median	0.003996303
Mode	#N/A
Standard Deviation	0.007894942
Sample Variance	6.23301E-05
Kurtosis	0.118459428
Skewness	-0.870175193
Range	0.024904470
Minimum	-0.012889565
Maximum	0.012014905
Sum	0.008935861
Count	10
Largest(1)	0.012014905
Smallest(1)	-0.012889565
Confidence Level(95.0%)	0.005647702

Table 27: Estimation Period Error Statistics – (Non-Banks Only)

Estimation error statistics	
Mean	0.000189148
Standard Error	0.000690468
Median	-0.000143722
Mode	#N/A
Standard Deviation	0.006904681
Sample Variance	0.000047675
Kurtosis	-0.086664165
Skewness	0.092629592
Range	0.032698052
Minimum	-0.016464006
Maximum	0.016234047
Sum	0.018914845
Count	100
Largest(1)	0.016234047
Smallest(1)	-0.016464006
Confidence Level(95.0%)	0.001370038

Table 28: Estimation errors

I	II	III
0.00132489	-0.001315400	0.00634144
-0.00126664	0.000269676	-0.00418564
-0.00389263	-0.004762130	-0.00224059
0.00002388	-0.001476308	0.00287424
-0.00416338	-0.000368716	-0.01137326
0.00683003	0.006183819	0.00805784
0.00343624	0.003171302	0.00393961
0.00277816	0.003083564	0.00219789
-0.00013195	-0.003718207	0.00668195
0.00479863	-0.000484581	0.01483673
-0.00089050	0.002332969	-0.00701511
0.00071371	-0.000006743	0.00208258
-0.00339694	0.003480461	-0.01646401
0.00381847	0.004422670	0.00267049
0.00155433	0.000933375	0.00273415
0.00326424	0.008683039	-0.00703148
-0.00620719	-0.005038717	-0.00842728
-0.00081921	-0.000289892	-0.00182492
-0.00314855	-0.003447001	-0.00258149
-0.00330600	0.001565213	-0.01256131
0.00059940	-0.001914200	0.00537525
-0.00468316	-0.007660925	0.00097460
0.00718707	0.005773618	0.00987263
-0.00078128	-0.005620977	0.00841414
-0.00038947	-0.001776512	0.00224591
0.00559032	0.006868934	0.00316096
-0.00354342	0.001703453	-0.01351249
0.00358739	0.002610657	0.00544318
-0.00191181	-0.001802890	-0.00211874
-0.00259240	-0.001879898	-0.00394616
0.00741774	0.011501394	-0.00034120
-0.00235333	-0.004102246	0.00096961
0.00555043	0.009167350	-0.00132172
-0.00429665	-0.003145720	-0.00648343

I	II	III
0.00787827	0.003987280	0.01527116
0.00501199	0.007621589	0.00005376
-0.00355672	-0.004583427	-0.00160598
-0.00455123	-0.007207031	0.00049478
0.00659078	0.006927070	0.00595184
-0.00454027	-0.002218261	-0.00895209
-0.00073952	-0.003194263	0.00392448
0.00475002	0.003687232	0.00676932
-0.00269594	-0.003783069	-0.00063039
0.00100000	0.002209049	-0.00129719
-0.00185015	0.000909582	-0.00709364
0.00126084	-0.001100333	0.00574708
0.00436151	0.009321075	-0.00506167
0.01180986	0.011500220	0.01239817
-0.00248873	-0.001723735	-0.00394221
-0.00435715	-0.005190921	-0.00277300
-0.00182844	-0.000149894	-0.00501767
0.00543847	0.008136400	0.00031240
-0.00430942	-0.007859436	0.00243561
-0.00354946	-0.006232411	0.00154815
0.00105216	0.002235749	-0.00119666
0.01123532	0.008604405	0.01623405
-0.00818663	-0.005034828	-0.01417504
0.00068673	-0.002040191	0.00586789
0.00086232	0.000897157	0.00079614
0.00217383	0.002064886	0.00238081
-0.00095872	0.000031807	-0.00284073
-0.00370760	-0.007970942	0.00439274
0.00225237	0.004747119	-0.00248764
0.00070110	0.002546701	-0.00280554
-0.00232570	-0.002325210	-0.00232664
0.00706015	0.010476337	0.00056940
0.00555787	0.006862065	0.00307989
-0.00473481	-0.003128920	-0.00778601
-0.00296629	-0.003833034	-0.00131948
-0.00119423	-0.000127718	-0.00322061
-0.00189671	-0.002531952	-0.00068976

I	II	III
-0.00372136	-0.000666647	-0.00952532
0.00186617	-0.003726894	0.01249298
0.00487974	0.003828159	0.00687774
-0.00055953	0.001811215	-0.00506394
-0.00122281	0.001391847	-0.00619066
-0.00362892	-0.002011803	-0.00670145
0.00468402	0.003012384	0.00786013
0.00565635	0.003344381	0.01004911
-0.00069831	-0.000795842	-0.00051299
0.00421744	-0.000938578	0.01401387
0.00177817	0.009688434	-0.01325134
0.00746157	0.004658355	0.01278767
0.00125114	-0.000183624	0.00397718
-0.00096357	0.003813544	-0.01004009
-0.00056989	0.001601959	-0.00469640
-0.00026967	-0.003168946	0.00523896
-0.00128657	-0.000638961	-0.00251702
0.00268891	0.006854629	-0.00522595
0.00164511	-0.000251445	0.00524856
0.00005246	0.003059731	-0.00566136
0.00627188	0.010065891	-0.00093674
-0.00244294	0.000523822	-0.00807980
0.00338097	0.002481253	0.00509042
0.00064637	0.000696404	0.00055130
-0.00404232	-0.009072154	0.00551436
-0.00489243	-0.008173443	0.00134151
0.00428122	-0.000212404	0.01281911
0.00194664	0.003633932	-0.00125922
-0.00241745	-0.000670901	-0.00573588

6.5 The test statistic

This study uses the portfolio time series method to determine the statistical significance of average abnormal returns over the event window. The t-test is calculated using the portfolio time series method by using the standard deviation, $s(\bar{e})$ of abnormal returns of the portfolio of 29 observations. It is the main test used by Brown and Warner (1985). The portfolio error $\bar{e}_t$ is treated as an observation and this simply means dividing the portfolio error by the standard deviation, thus producing the test statistic.

The test statistic is:

$$\frac{\bar{e}_t}{s(\bar{e})}.$$

Let's repeat the categories defined in 6.2 above for ease of reference. The sequence below is the same sequence followed in Table 29. They are:

i. Total sample (29) where α and β are derived using regression analysis and both variables are used.
ii. Total sample (29) where α and β are derived using regression analysis but α is excluded.
iii. Total sample (29) where the Cadiz β values are used only.
iv. Banks only (19) where α and β are derived by way of regression analysis and both variables are used.
v. Banks only (19) where α and β are derived by way of regression analysis but α is excluded.
vi. Banks only (19) where the Cadiz β values are used only.
vii. Non-banks only (10) where α and β are derived through the use of regression analysis and both variables are used.
viii. Non-banks only (10) where α and β are derived through the use of regression analysis but α is excluded.
ix. Non-banks only (10) where the Cadiz β values are used only.

Table 29: t-test results

Sequence	Categories of Abnormal Returns	t	degrees of freedom	critical values
i	regression full sample	0.707	28	2.048
ii	regression full sample-no alpha	1.019	28	2.048
iii	Cadiz full sample	-0.072	28	2.048
iv	regression banks only	0.697	18	2.101
v	regression (no alpha) banks only	0.945	18	2.101
vi	Cadiz banks only	-0.192	18	2.101
vii	regression no banks	0.277	9	2.262
viii	regression (no alpha) no banks	0.480	9	2.262
ix	Cadiz no banks	0.129	9	2.262

In Table 29 above, t= $\frac{\bar{e}_t}{s(\bar{e}_t)}$. The Student's t-Distribution tables were used and at the 0.025 confidence level, with n-1 degrees of freedom, the results for each category is given in Table 29 above.

CHAPTER 7
CONCLUSION

The results stated in Table 29 in chapter 6 indicates that the null hypothesis (H_0) cannot be rejected when applied to any of the categories listed in sections 6.2 and 6.5 above. Significance testing was at the 5% error level using two-tailed t-tests. The tests were conducted so as to determine whether the average cumulative abnormal return differed statistically significantly from zero (H_0).

The Student's t-Distribution tables were used and at the 0.025 confidence level, with n-1 degrees of freedom.

In chapter 6, section 6.2 and 6.5, nine (9) categories are derived from 3 groupings. These are:

- Total Sample (29 issues)
- Banks Only (19 issues), and
- Non-Banks Only (10 issues).

For each group the abnormal returns were calculated using beta and alpha values derived through regression analysis. Abnormal returns were also calculated using only the beta values derived from the regression analysis calculation. And finally, abnormal returns were calculated using only quarterly beta values obtained from Cadiz.

The t-test results for the combined sample (29) revealed that announcements of an intention to issue straight debt had no significant effect on stock prices on the announcement date or subsequent to it. This result varied based on the method used to calculate abnormal returns but the variances did not alter the conclusion, namely that the announcement had no significant effect on stock prices subsequent to the announcement date.

The t-test results for the "Banks Only" (19) category confirms the view that announcements made by banks of an intention to issue debt results in no significant effect on stock prices on the announcement day or subsequent to the announcement of debt issues. This conclusion applies to all three calculations.

The t-test results for "Non-Banks" also reveal no significant effect on stock prices on announcement day and subsequent to the announcement of debt issues.

It should be noted that even though all the results reveal that no significant effect on stock prices arose as a consequence of the announcement of bond issues by the identified companies, there are however differences in the t-test results as a consequence of the use of the regression calculated alpha and beta and Cadiz beta values. These differences are recorded in Table 29. These differences are not insignificant.

In conclusion, this study observes that the price reaction to the announcement of BESA straight debt issues by JSE-listed companies on the announcement day is statistically insignificant.

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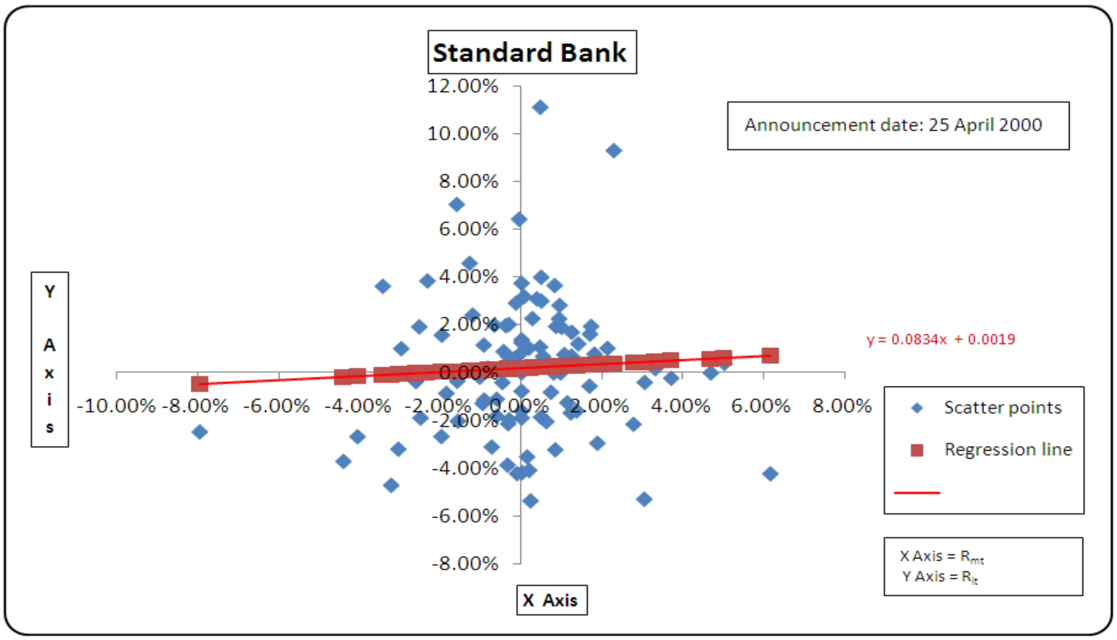
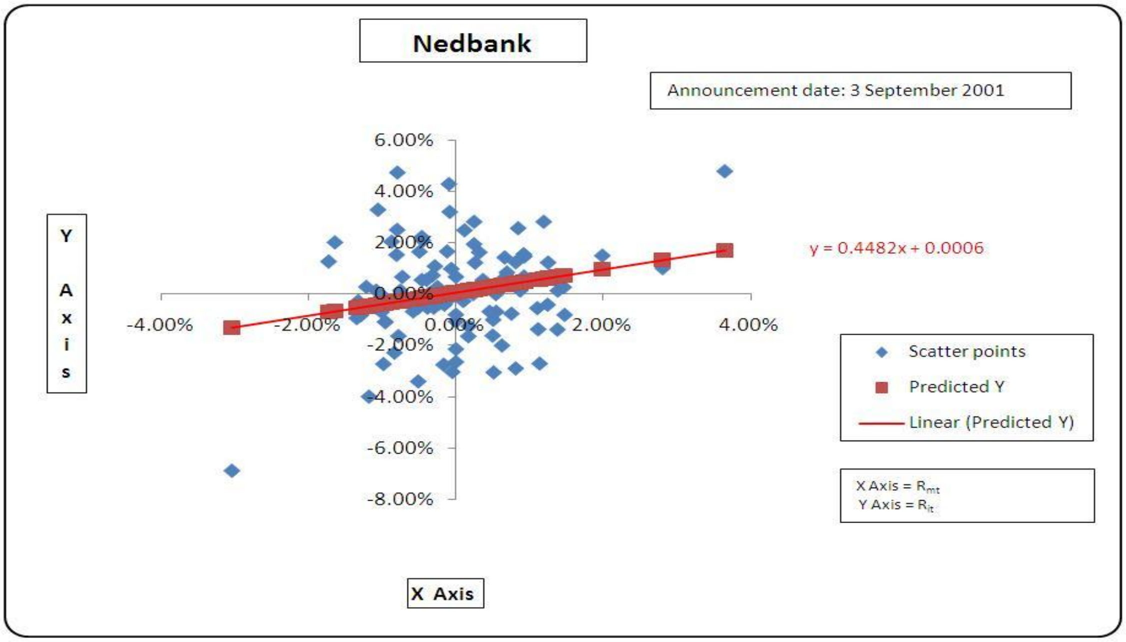
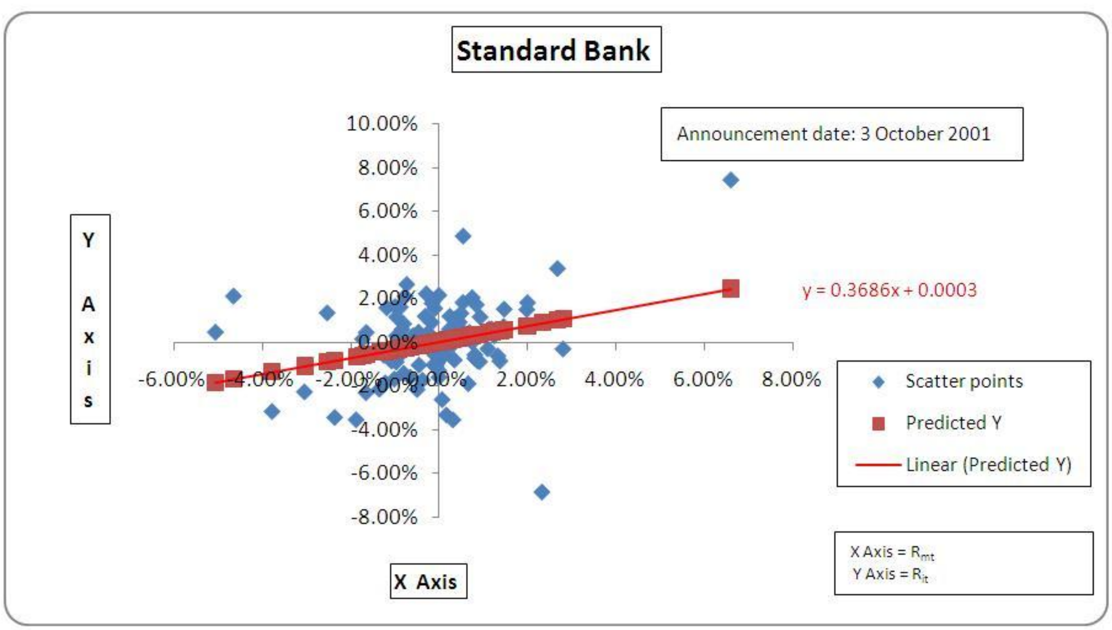
APPENDICES

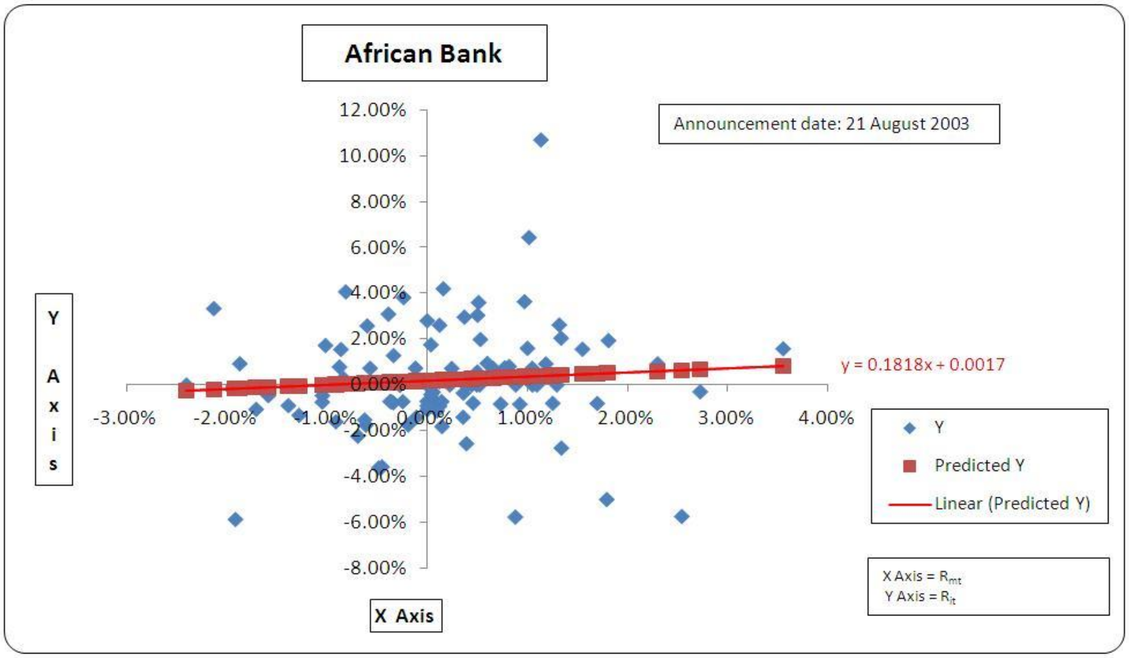
Appendix 1

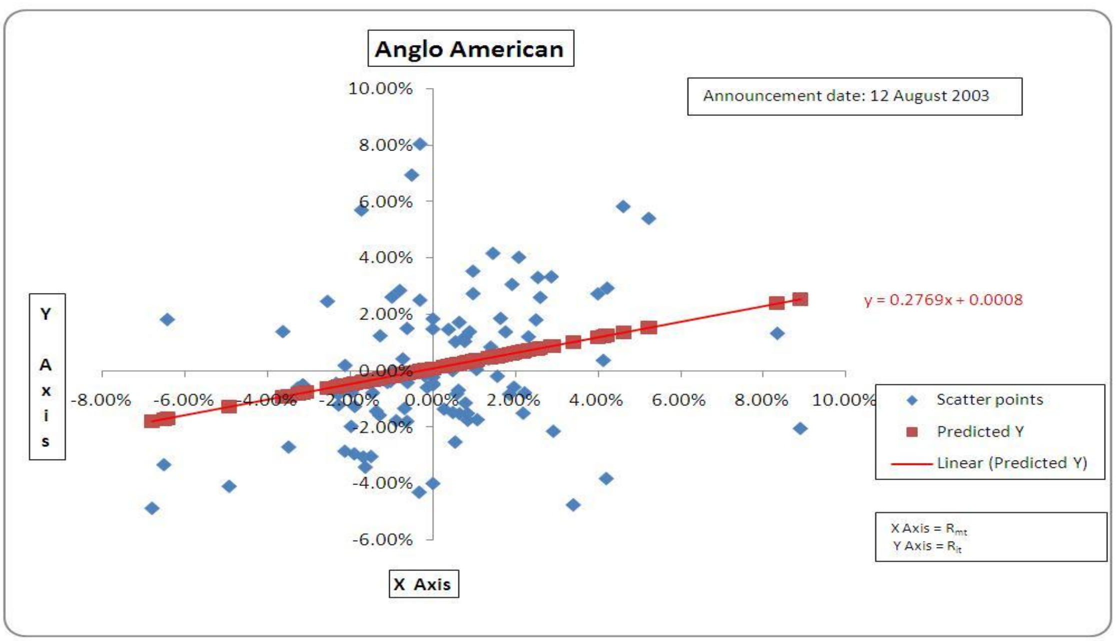
Below find the regression scatter graph for each of the 29 samples.

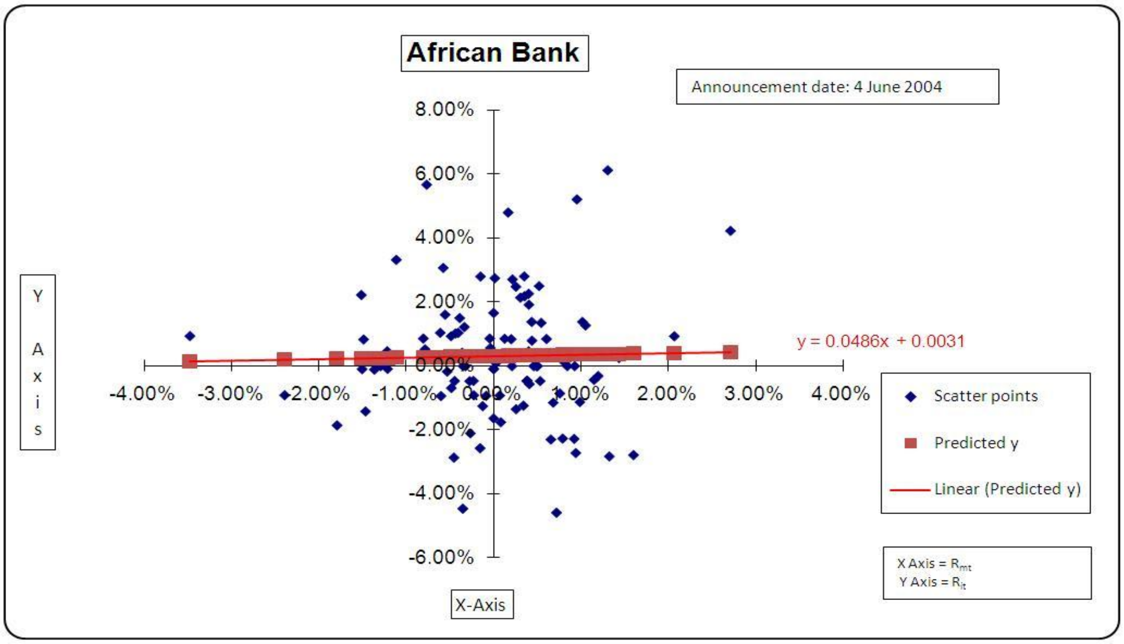


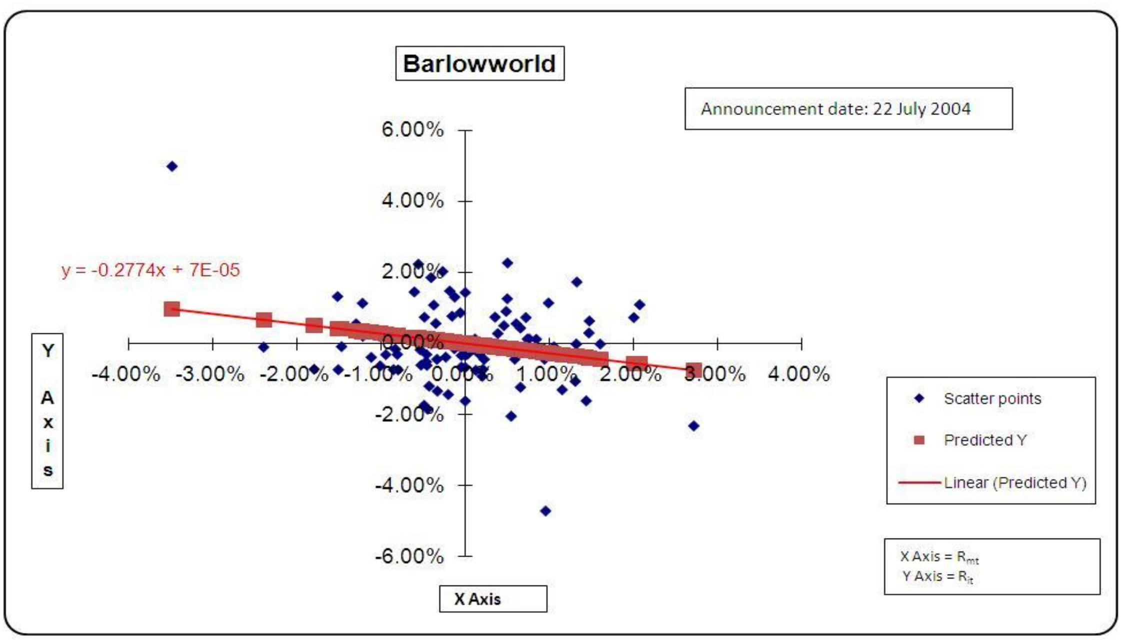

Nedbank
Announcement date: 3 September 2001
y = 0.4482x + 0.0006
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
X Axis
Y Axis

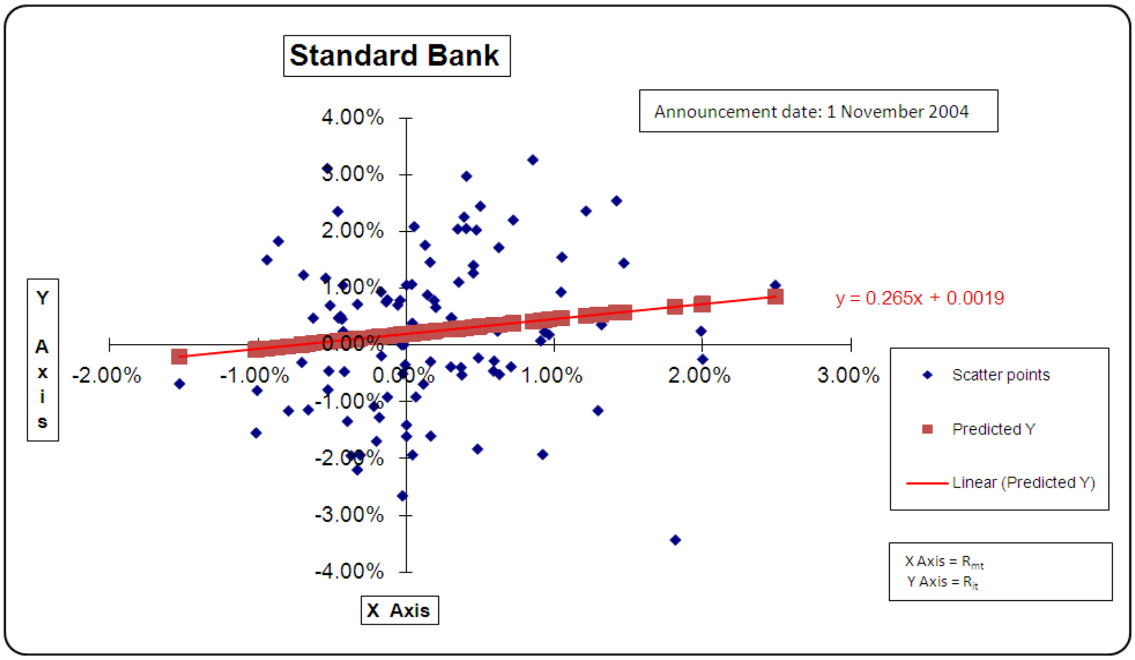

Standard Bank
Announcement date: 3 October 2001
y = 0.3686x + 0.0003
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
X Axis
Y Axis

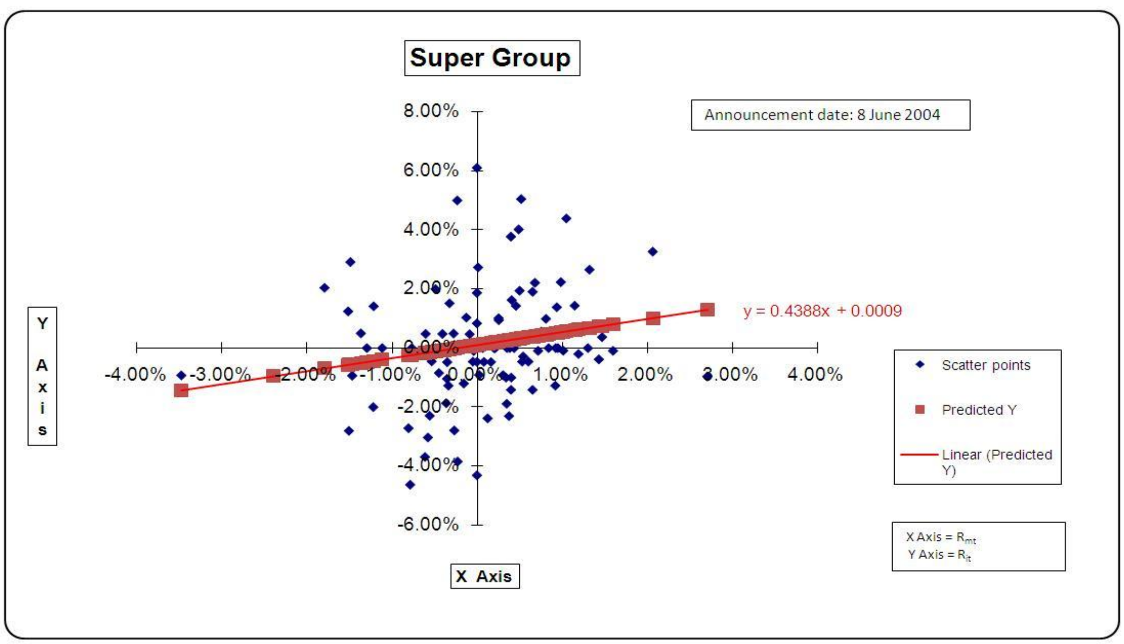

African Bank
Announcement date: 21 August 2003
y = 0.1818x + 0.0017
Y
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
Y Axis
X Axis

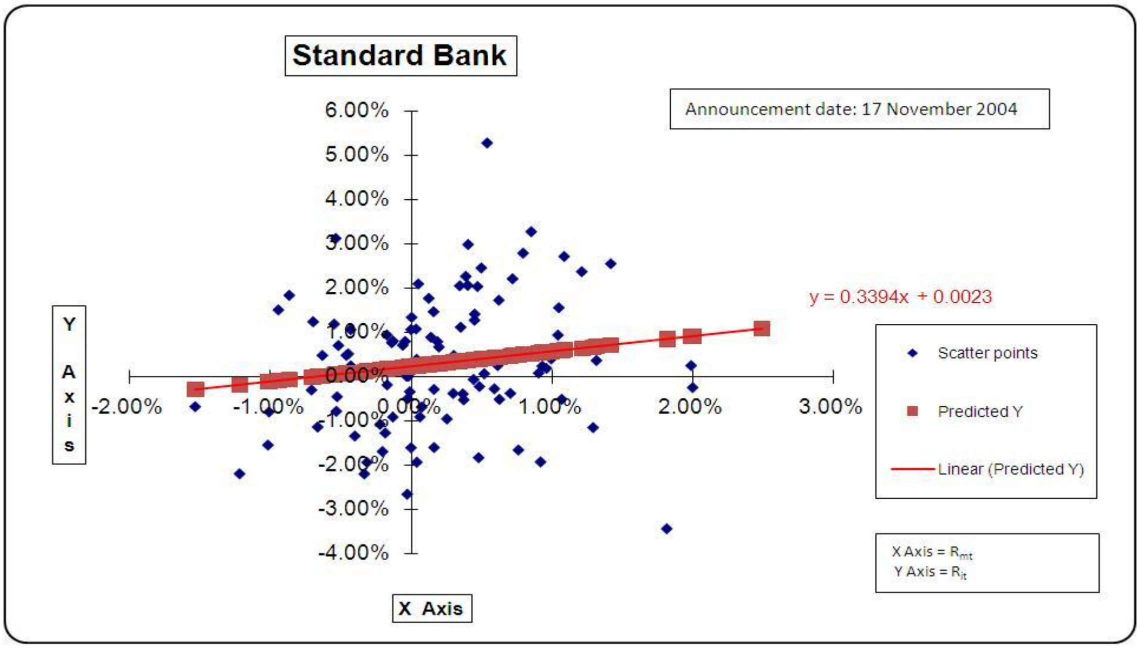

Anglo American
Announcement date: 12 August 2003
y = 0.2769x + 0.0008
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
Y Axis
X Axis

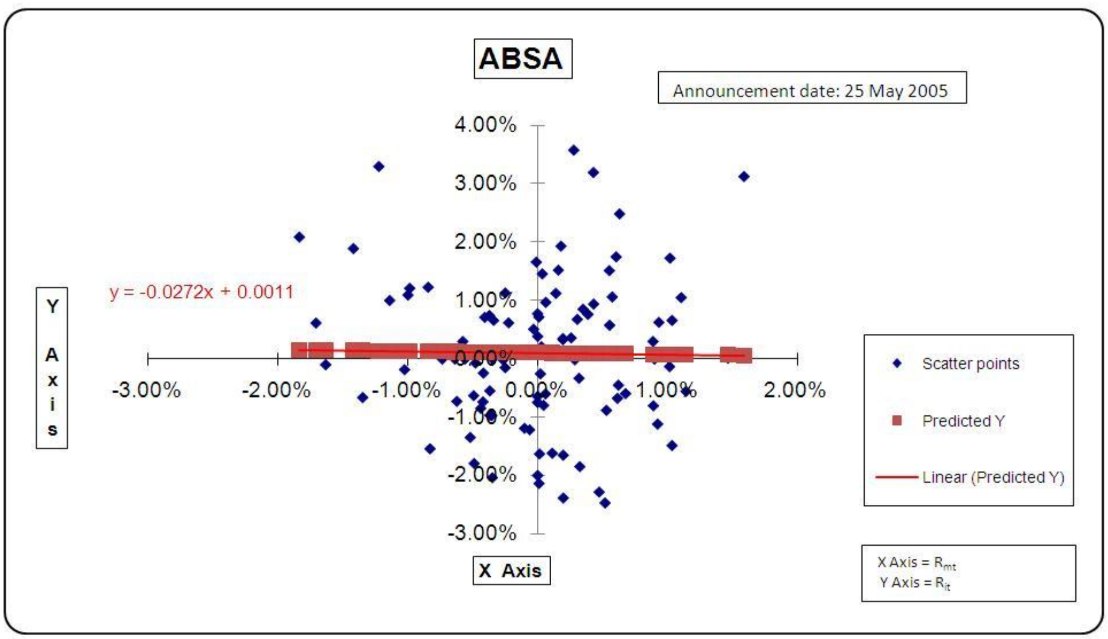

African Bank
Announcement date: 4 June 2004
y = 0.0486x + 0.0031
Y Axis
X-Axis
Scatter points
Predicted y
Linear (Predicted y)
X Axis = R_mt
Y Axis = R_it
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-4.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
4.00%

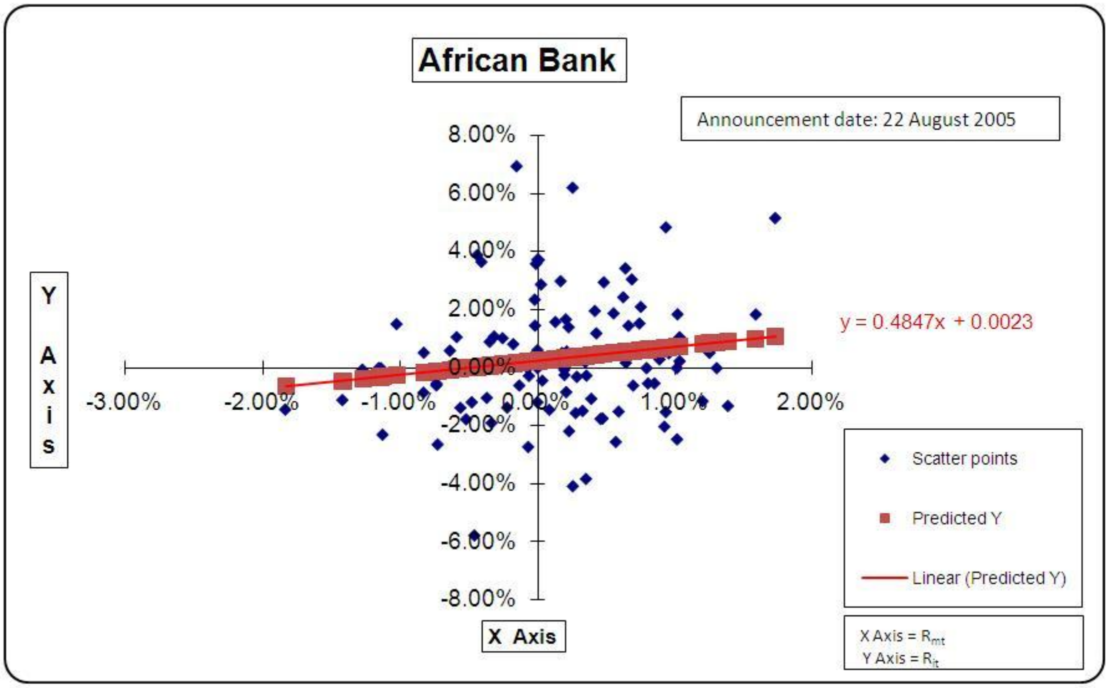

Barlowworld
Announcement date: 22 July 2004
y = -0.2774x + 7E-05
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_mt
Y Axis = R_it
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-4.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
4.00%

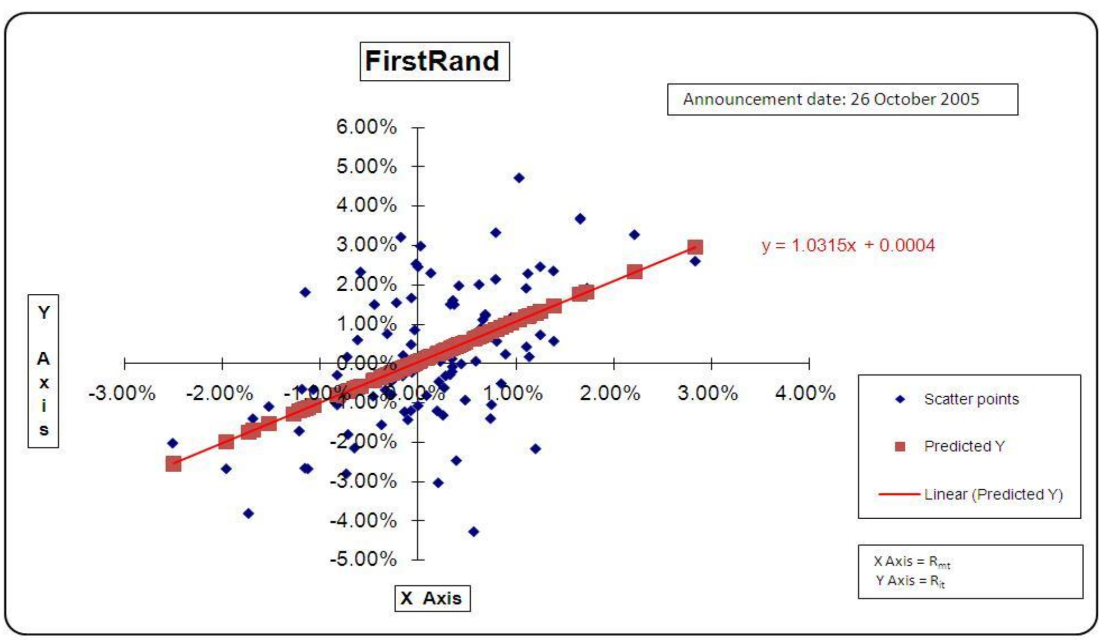

Standard Bank
Announcement date: 1 November 2004
y = 0.265x + 0.0019
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
Y Axis
X Axis

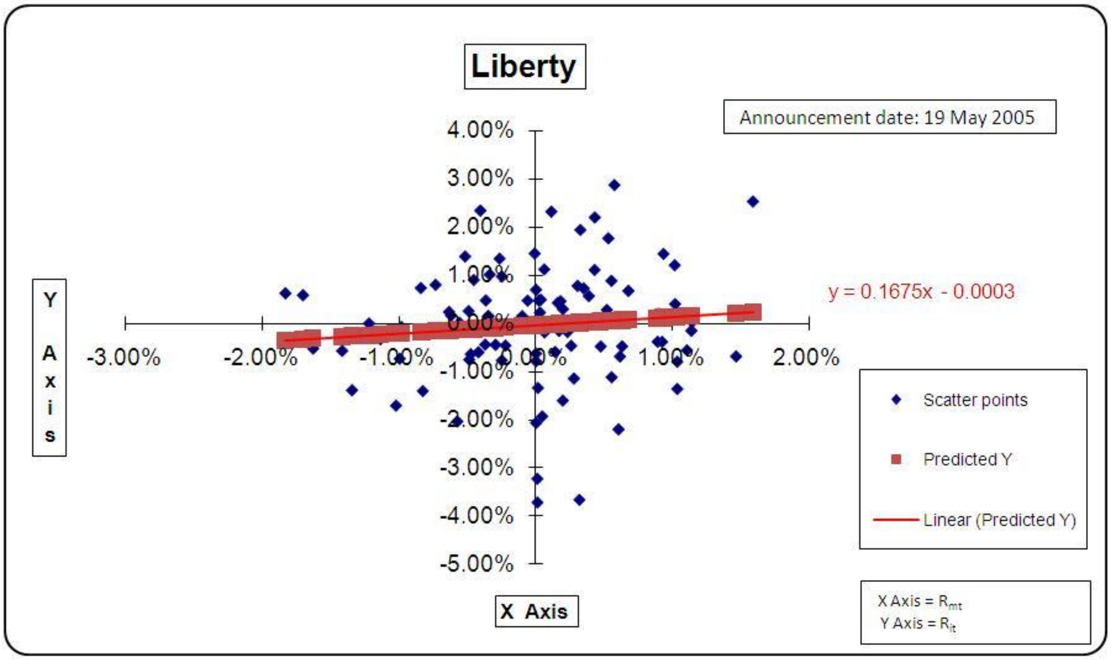

Super Group
Announcement date: 8 June 2004
y = 0.4388x + 0.0009
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}
Y Axis
X Axis

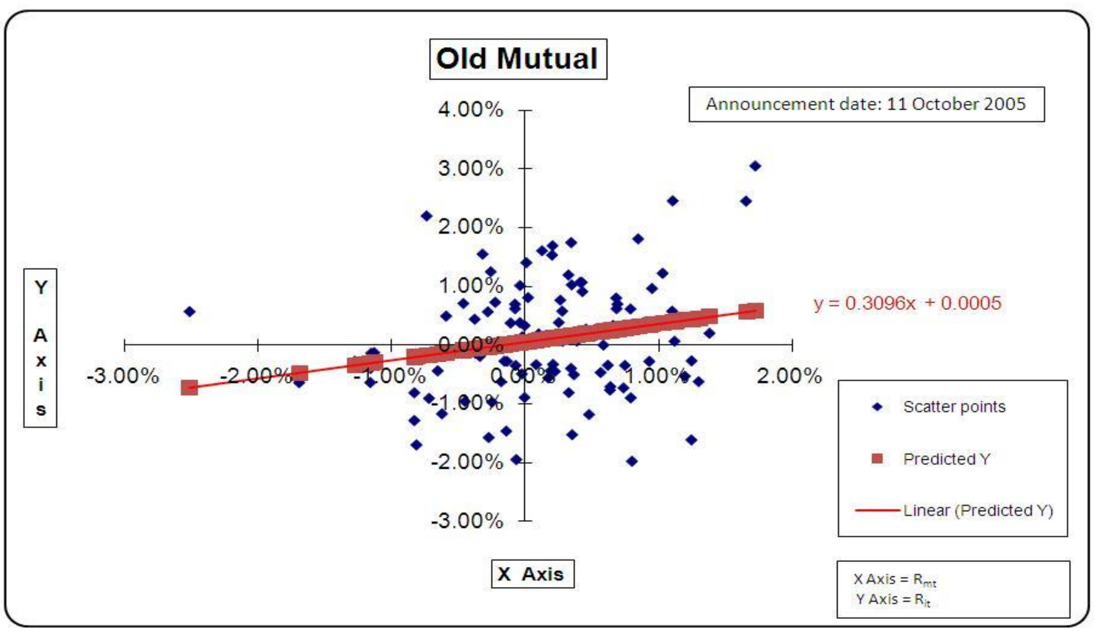

Standard Bank
Announcement date: 17 November 2004
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
-2.00%
-3.00%
-4.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
y = 0.3394x + 0.0023
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = Rmt
Y Axis = Rit

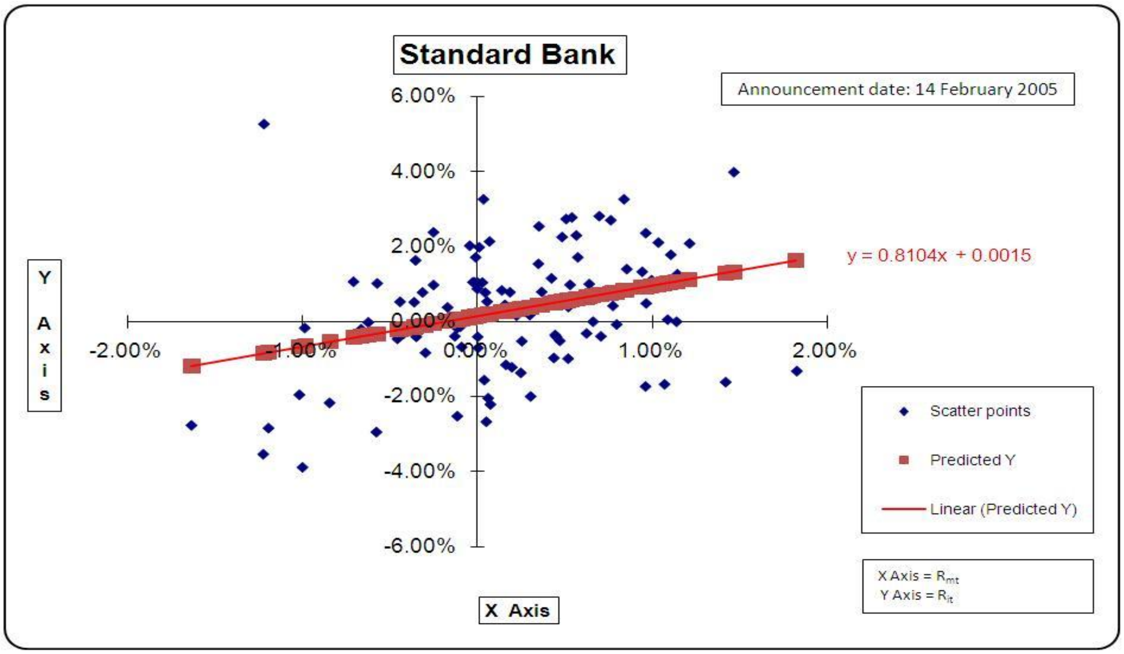

ABSA
Announcement date: 25 May 2005
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
-2.00%
-3.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
y = -0.0272x + 0.0011
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = Rmt
Y Axis = Rit

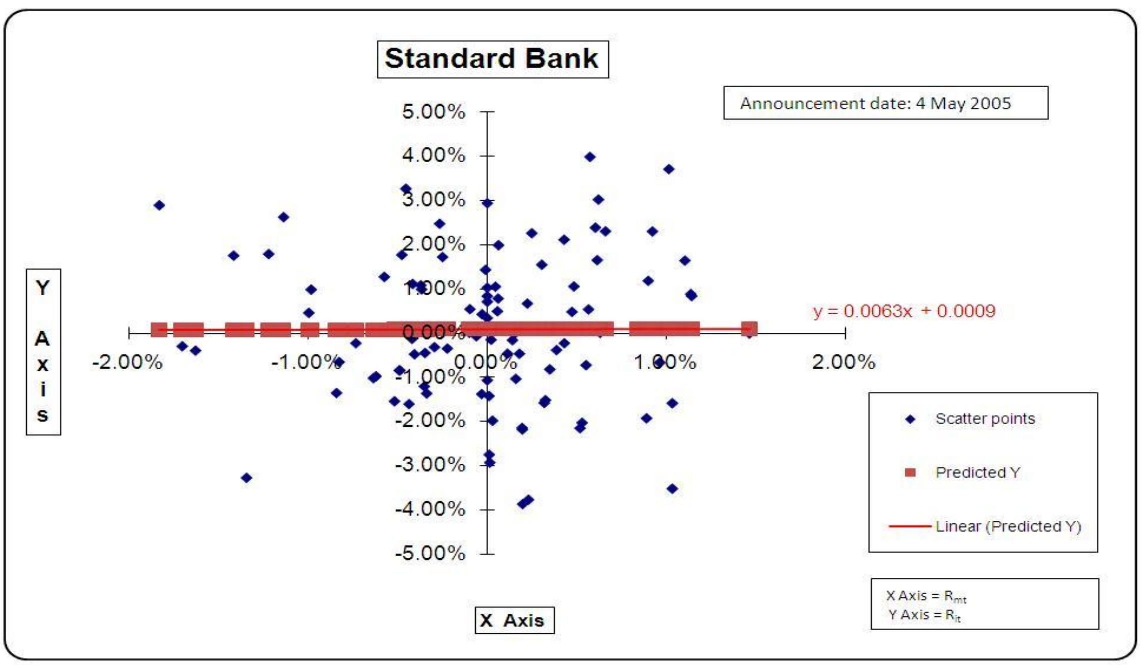

African Bank
Announcement date: 22 August 2005
y = 0.4847x + 0.0023
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

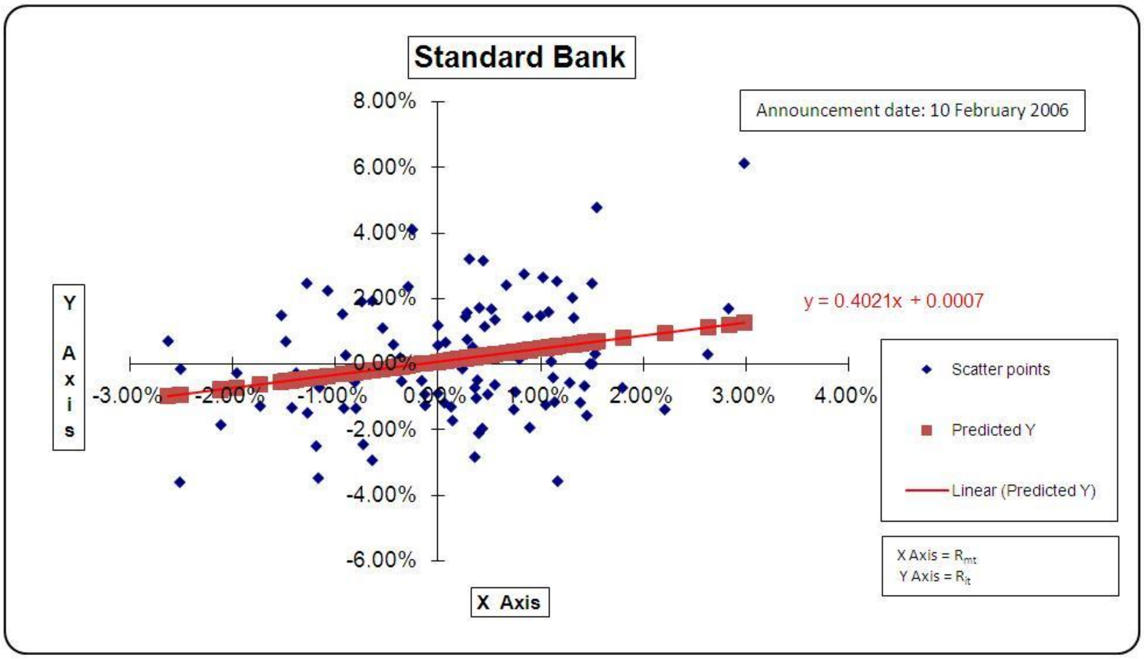

FirstRand
Announcement date: 26 October 2005
y = 1.0315x + 0.0004
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

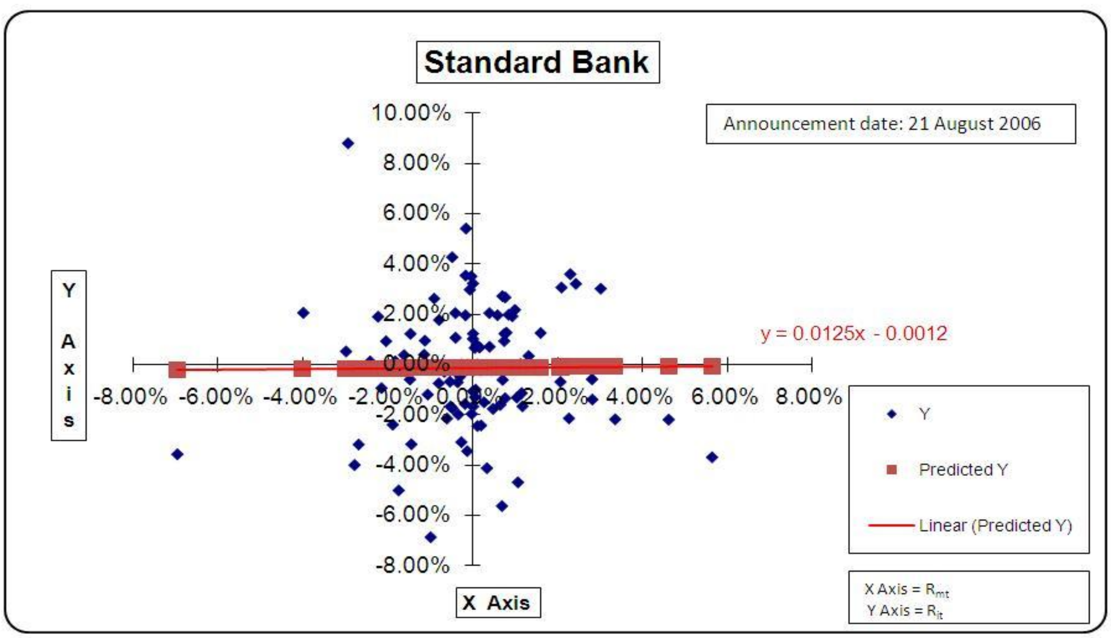

Liberty
Announcement date: 19 May 2005
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
-2.00%
-3.00%
-4.00%
-5.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
y = 0.1675x - 0.0003
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = Rmt
Y Axis = Rit

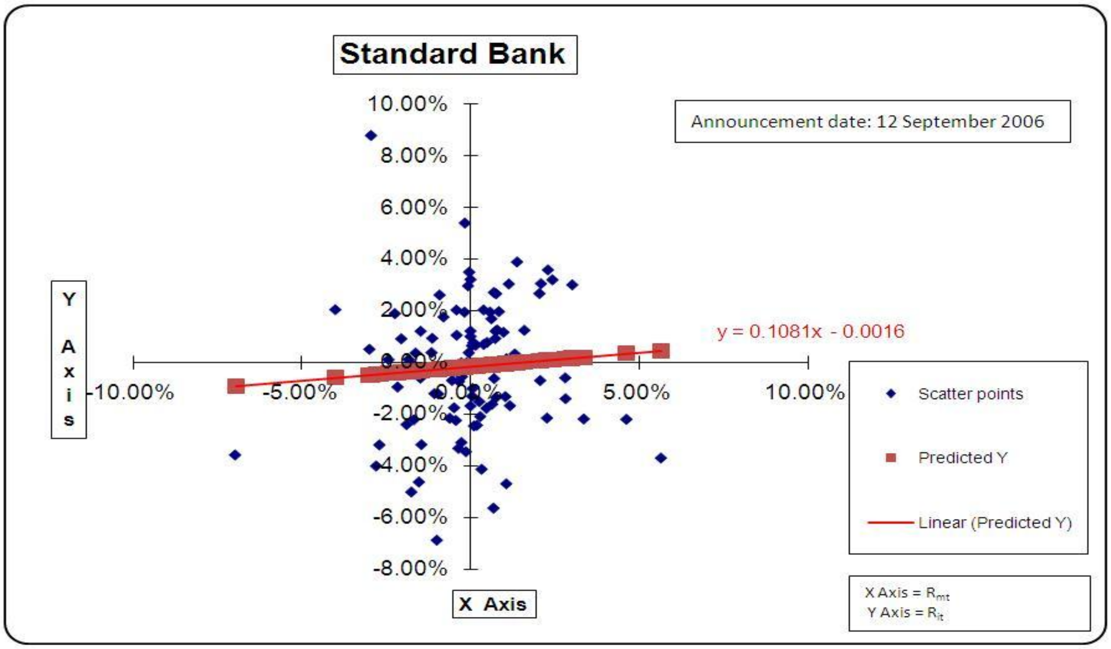

Old Mutual
Announcement date: 11 October 2005
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
-2.00%
-3.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
y = 0.3096x + 0.0005
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = Rmt
Y Axis = Rit

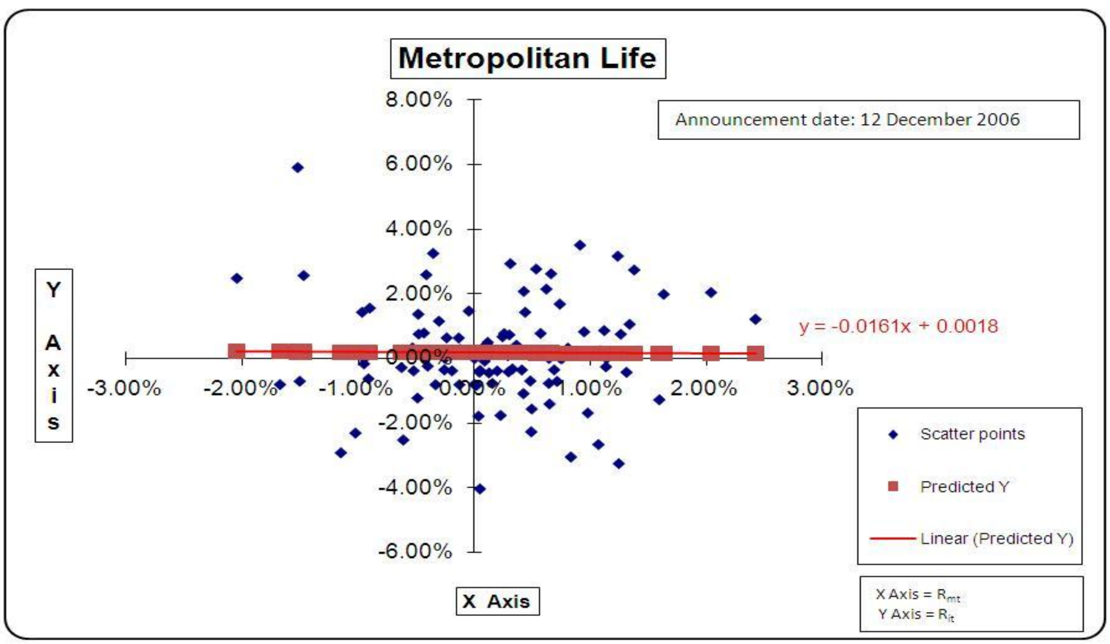

Standard Bank
Announcement date: 14 February 2005
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
y = 0.8104x + 0.0015
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

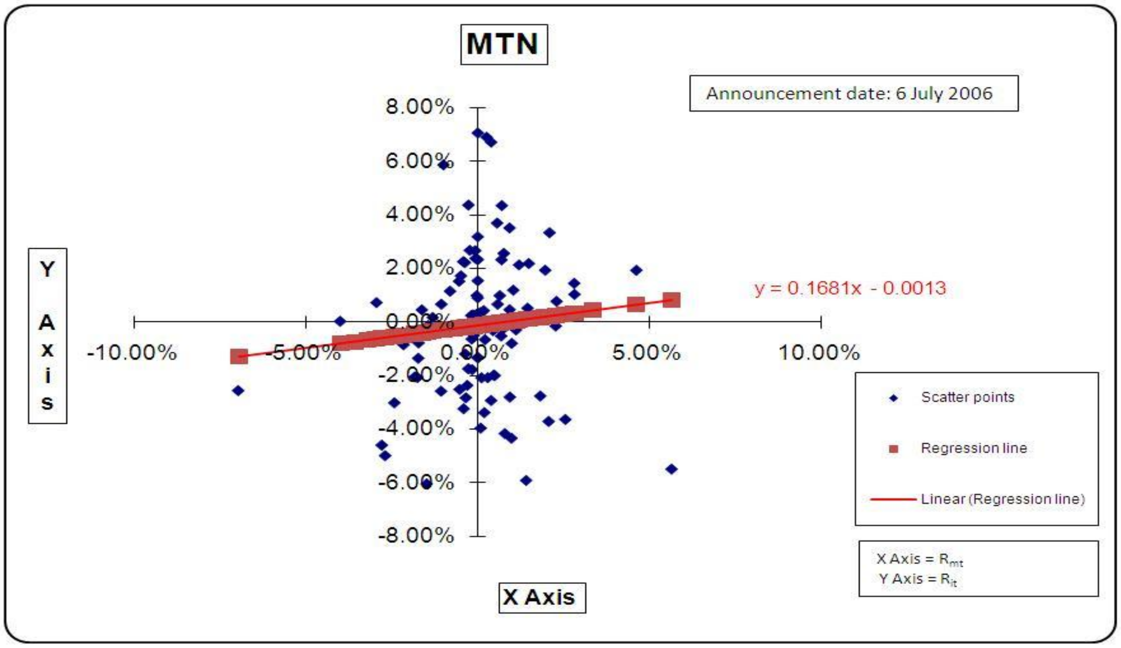

Standard Bank
Announcement date: 4 May 2005
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
-2.00%
-3.00%
-4.00%
-5.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
y = 0.0063x + 0.0009
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}


Standard Bank
Announcement date: 10 February 2006
y = 0.4021x + 0.0007
Y Axis
X Axis
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-3.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
4.00%
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

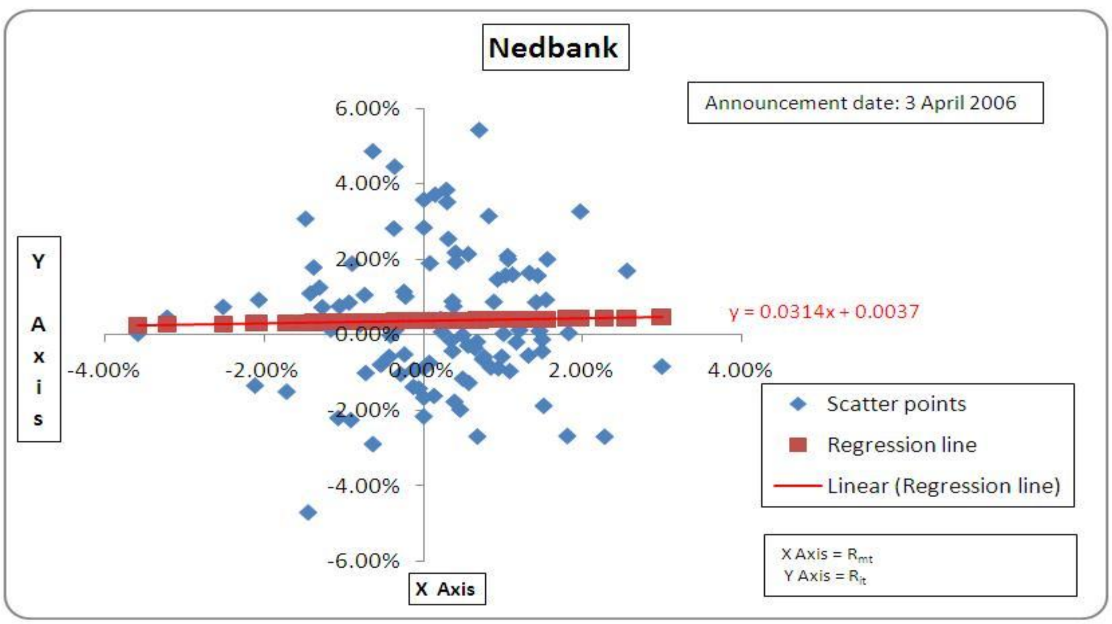

Standard Bank
Announcement date: 21 August 2006
y = 0.0125x - 0.0012
Y Axis
X Axis
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-8.00%
-8.00%
-6.00%
-4.00%
-2.00%
0.00%
2.00%
4.00%
6.00%
8.00%
Y
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}


Standard Bank
Announcement date: 12 September 2006
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-8.00%
-10.00%
-5.00%
5.00%
10.00%
y = 0.1081x - 0.0016
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

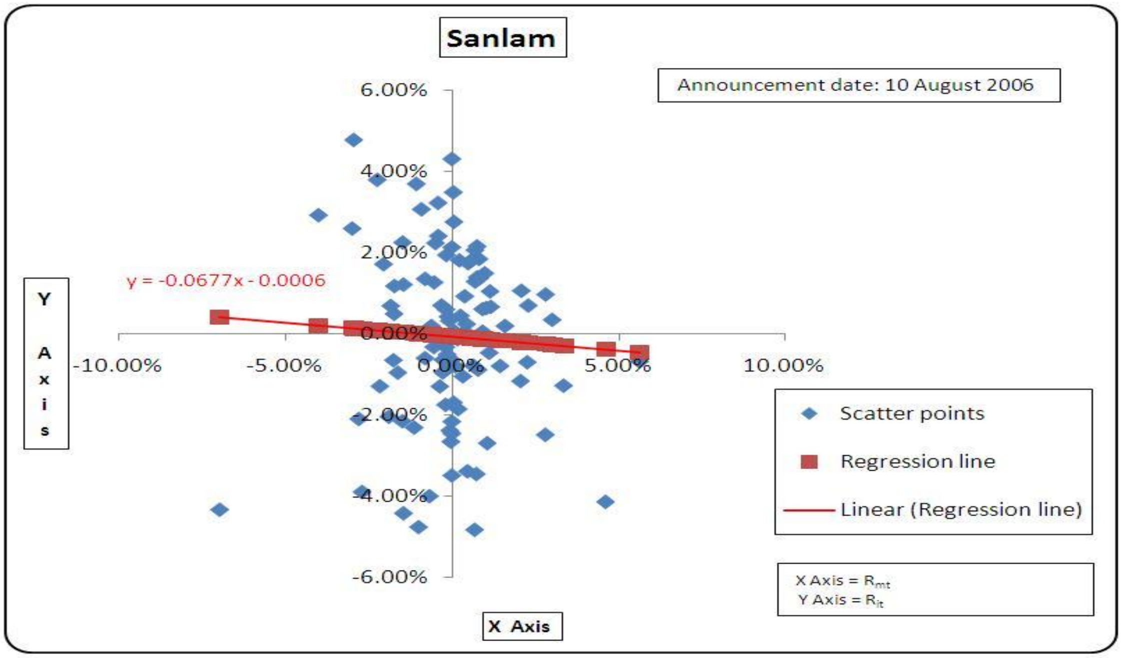

Metropolitan Life
Announcement date: 12 December 2006
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-3.00%
-2.00%
-1.00%
1.00%
2.00%
3.00%
y = -0.0161x + 0.0018
Y Axis
X Axis
Scatter points
Predicted Y
Linear (Predicted Y)
X Axis = R_{mt}
Y Axis = R_{it}

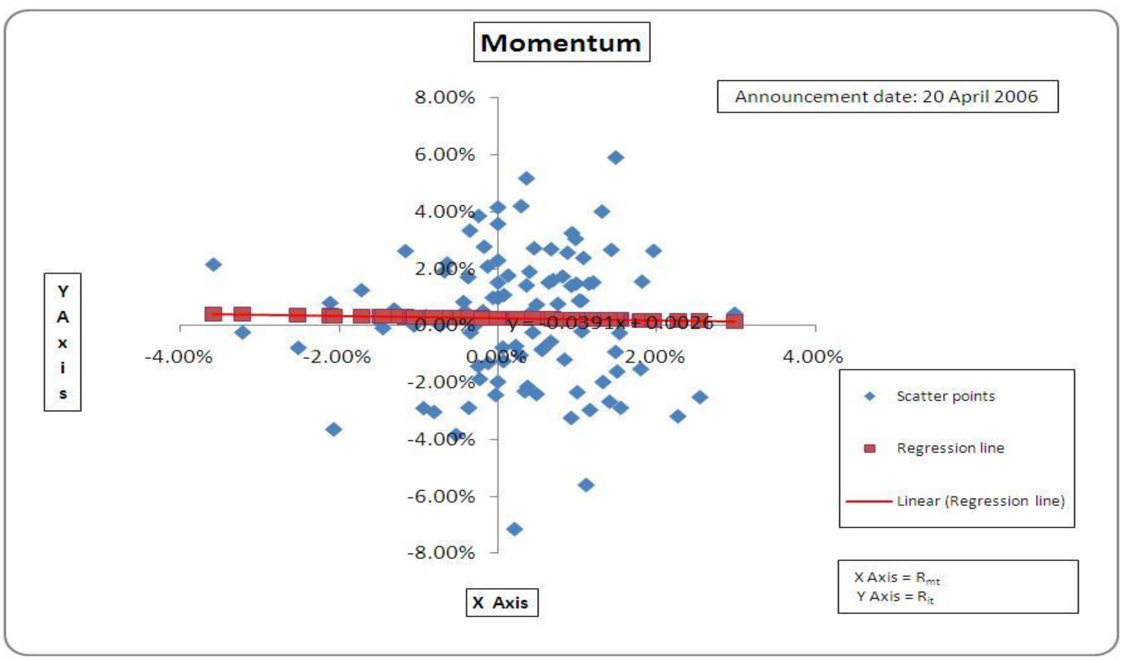


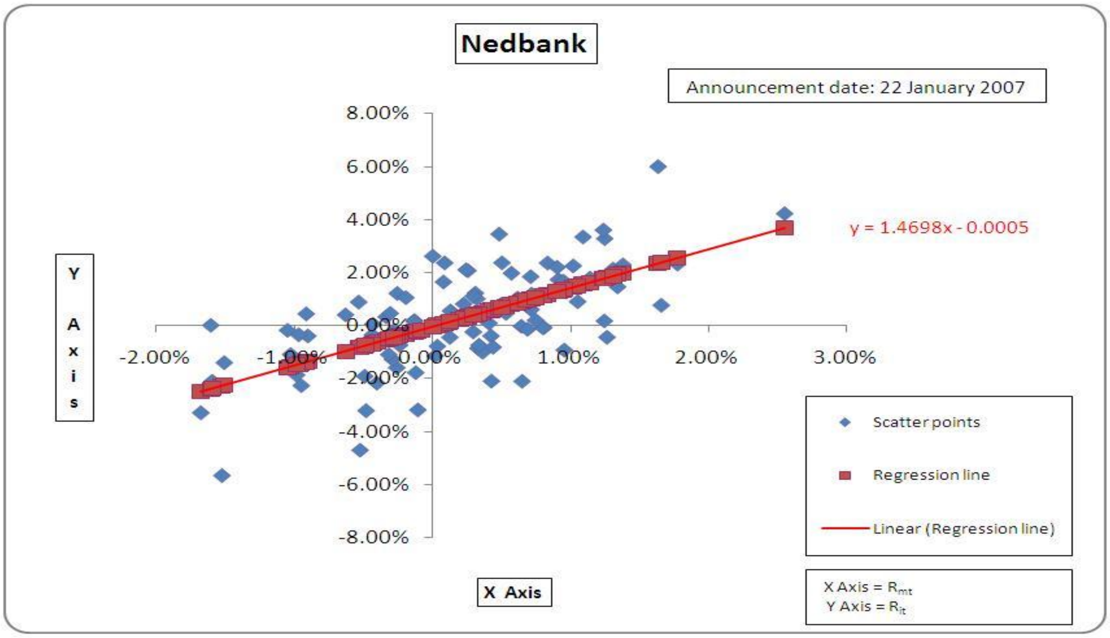
MTN
Announcement date: 6 July 2006
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-8.00%
-10.00%
-5.00%
0.00%
5.00%
10.00%
y = 0.1681x - 0.0013
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}



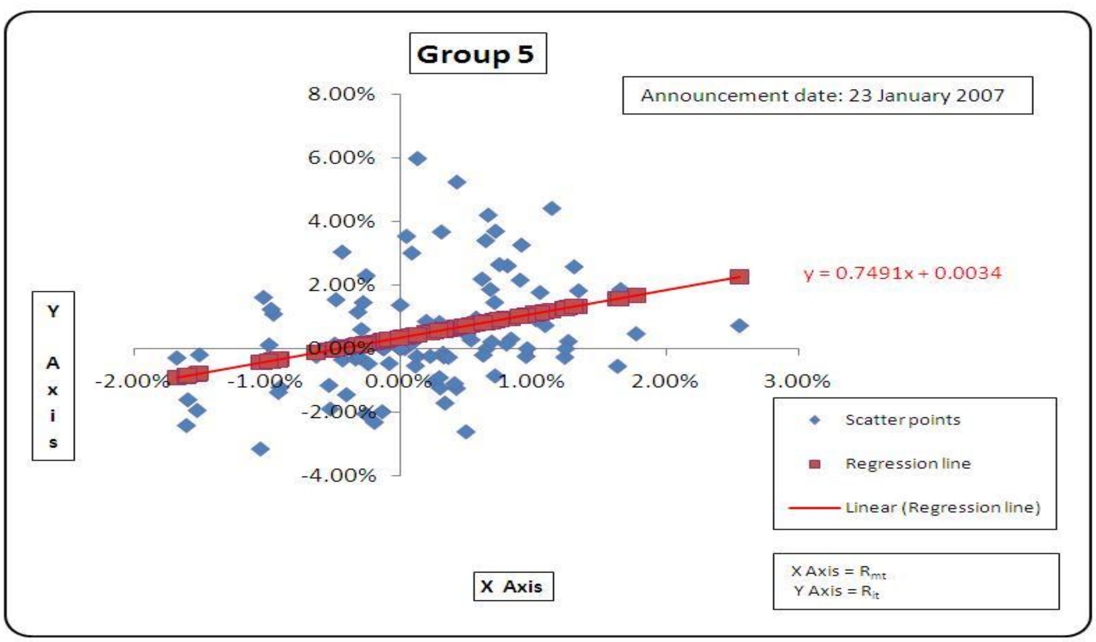
Nedbank
Announcement date: 3 April 2006
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-4.00%
-2.00%
0.00%
2.00%
4.00%
y = 0.0314x + 0.0037
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}


Sanlam
Announcement date: 10 August 2006
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-10.00%
-5.00%
0.00%
5.00%
10.00%
y = -0.0677x - 0.0006
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}

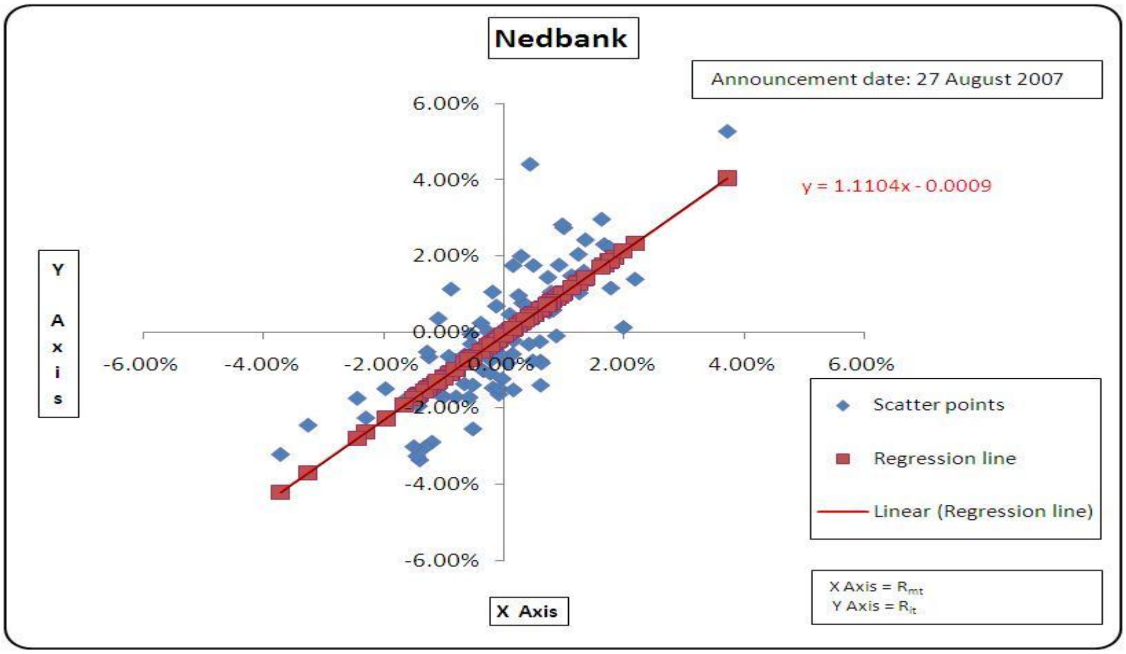

Momentum
Announcement date: 20 April 2006
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-8.00%
-4.00%
-2.00%
0.00%
2.00%
4.00%
y = -0.0391x + 0.0026
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}

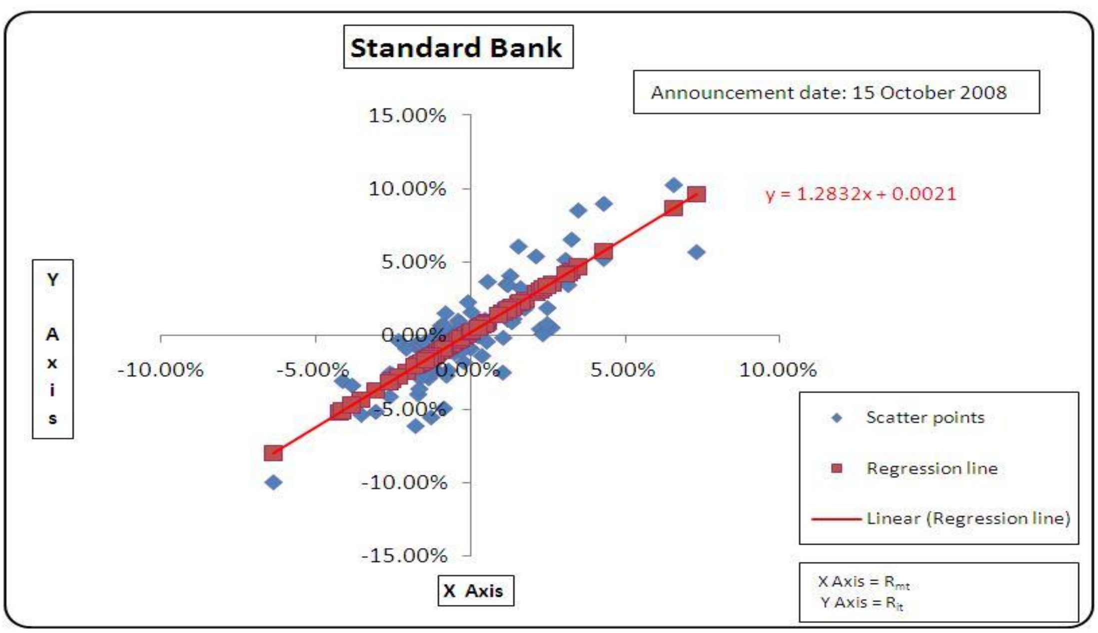


Nedbank
Announcement date: 22 January 2007
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-8.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
y = 1.4698x - 0.0005
Y Axis
Scatter points
Regression line
Linear (Regression line)
X Axis
X Axis = R_{mt}
Y Axis = R_{it}



Group 5
Announcement date: 23 January 2007
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-2.00%
-1.00%
0.00%
1.00%
2.00%
3.00%
y = 0.7491x + 0.0034
Y Axis
Scatter points
Regression line
Linear (Regression line)
X Axis
X Axis = R_{mt}
Y Axis = R_{it}


Nedbank
Announcement date: 27 August 2007
y = 1.1104x - 0.0009
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
-6.00%
-4.00%
-2.00%
0.00%
2.00%
4.00%
6.00%
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}


Standard Bank
Announcement date: 15 October 2008
y = 1.2832x + 0.0021
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
-10.00%
-5.00%
0.00%
5.00%
10.00%
Y Axis
X Axis
Scatter points
Regression line
Linear (Regression line)
X Axis = R_{mt}
Y Axis = R_{it}