Can Bank Regulators Use Financial Markets As Indicators for Supervisory Intervention? An Event Study Analysis on the Impact of Earnings Announcements on Bank Equity.

A Mini-Dissertation submitted in partial fulfilment of the requirements of the Degree of

MASTER OF BUSINESS SCIENCE (ECONOMICS)

of

THE UNIVERSITY OF CAPE TOWN

by

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(MTHMUN001)

2007

ABSTRACT

Financial regulation plays a critical role in the provision of a stable banking sector however this role requires significant resources in the form of time, finance and human capital. Resources that at best, are barely sufficient in developing economies. The major banks in developing countries are listed on the stock exchanges therefore providing another, although weak, disciplining mechanism to compliment the efforts of the regulator.

This paper explores the efficiency of the market disciplining mechanism for banks listed on the Johannesburg Stock Exchange (JSE) using a traditional Event Study methodology. Two approaches are used. The first aggregates the earnings announcements of banks in the industry and the second splits the earnings announcements into different 'News' categories (Bad News, No News or Good News). As daily returns data is non-normal this necessitates the use the non-parametric Wilcoxon Signed Rank Test, which fails to reject the null hypothesis of no abnormal returns when the earnings announcements are combined. However, when the data are split into the News categories both the t test and the Wilcoxon Rank test find similar results. The paper finds that investors react quicker when the event is Bad News and the reaction begins before the announcement is made and persists for several days after. It is also found that investors in bank equity react to more than just the fundamentals of the concerned equity resulting in persistent abnormal returns. Furthermore the process of information dissemination is weak resulting in firstly a delayed reaction to news and then secondly a post-announcement drift.

From these results the paper concludes that more research into the channels used to release information is needed, so as to establish who knows what and when, and once the information is known, how long it takes to act on it. Secondly, more research into the drivers of persistent abnormal returns on the JSE needs to be conducted in order to better understand the general workings of the market.

Acknowledgements

I would like to sincerely thank my supervisor, Professor Haim Abraham, for his assistance in pointing me in the right direction with helpful comments on earlier drafts. His time and effort were greatly appreciated. Thank you to the Staff of The School of Economics for their unfaltering support throughout.

To my mother, Ms. Shupi Bvumbe, for being the truly great woman you are – Thank you; and thank you for all the support and encouragement. My brothers, Ndanatseyi and Vernon for trying to keeping me balanced – I love you guys! And last, but not least, my irrepressible Aunt, Marge Zvimba, for being such an inspiration.

Thank You All.

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1. Introduction

The importance of market discipline as a complementary force to formal supervision, in regulating financial institutions and maintaining stability in the financial sector, is receiving increasing support from empirical evidence. As financial institutions become more complex and innovative, it has become increasingly apparent that official regulators do not have the resources to meet the additional monitoring requirements. It is against this background that the importance and attractiveness of sharper incentives for private stakeholders has grown. As a result regulators need to ask the following: *To what extent can the market be relied upon to discipline institutions, given the restrictions imposed by the cost of information gathering faced by the private market participants?*

In developing countries the need to develop and promote market discipline is even more evident. The absence of adequate safety nets and the inability of individual depositors to absorb losses during a bank failure, added to the official regulators lack of resources, provide a strong case for market discipline. The lack of information available to poorer depositors makes them overly reliant on the efforts of the Central Bank. While on the other hand investors in developing markets do have access to information but possibly free-ride on the efforts of the Central Bank on two accounts. By ensuring listed banks are sound, the Central Bank firstly protects the investor's investment (equity) and secondly, the investor's deposits (both demand and term).

Investors in bank equity may have to shoulder part of the responsibility of ensuring banks act prudently. Although there is extensive evidence as to the existence of market discipline, the majority of the literature provides evidence on the U.S economy. In recent years more studies have been conducted on non-U.S. economies, including developing countries, such as Argentina, Mexico and Columbia.

The objective of this paper is to investigate the efficiency of the JSE in disciplining listed banks by testing for the semi-strong form of market efficiency. Evidence of semi-strong form efficiency will suggest that publicly available information is rapidly and

correctly assimilated into prices. In this case the central bank may look to financial markets for complimentary signals to it regulatory efforts. The lack of semi-strong efficiency will suggest one or more of the following – Insider Trading, poor information dissemination, inadequately skilled investors (to deal with the information timeously), a poor forecasting model or that the market is not driven primarily by the fundamental value of firms.

In the latter case regulators may seek to enhance the regulation along with the efficiency of the information flow in order to promote market discipline. The paper proceeds as follows. In Section 2 a review of the literature is conducted. The section discusses the merits of market discipline, the financial instruments that are available to regulators in promoting it and which are most appropriate in developing countries. As market discipline is built on market efficiency the section also provides a background on the existing literature and the debate around tests for semi-strong market efficiency. Section 3 outlines the model used and two tests, one parametric and a non-parametric test for the hypothesis. The results are discussed in Section 4 and conclusion presented in Section 5.

2. Literature Review

What Is Market Discipline?

The term Market Discipline tends to cover a wide range of activities in its use. Lane (1993) as quoted in Llewellyn and Mayes (2003) defines it as "...financial markets providing signals that lead borrowers to behave in a manner consistent with their solvency", while Greenspan (2001) describes it as "...private counterparty supervision" taking two forms: Direct Discipline and Indirect Discipline (Federal Reserve, 2000). Direct Market Discipline refers to the pressure applied to banks by investors through the interest rate paid on debt (e.g. Subordinated debt), deposits and or the equity markets. Investors will demand higher interest payments on subordinated debt in instances where the institution is performing poorly. Indirect Market Discipline is that which comes from regulators after they analyse prices in the secondary market (Ghosh and Das, 2002). Where a bank has to pay a higher rate of interest on, for example, subordinated

debt, it could be an indication that investors observe current, or anticipate future, poor performance (See Figure 1 below, for a flow diagram on Market Discipline). Calomiris and Powell (2000) define "Market Discipline as [the] reactions of private debt holders to bank actions such that the bank is penalised for increasing the default risk on its debt, either by a higher risk premium on debt, or by the withdrawal of debt."

Table 1: Stakeholder Monitors (SHM)

Supervisory Agencies	Debt-Holders
Rating Agencies	Depositors
Market Traders	Managers
Shareholders	Borrowers
Board of Directors	Employers

Source: Llewellyn and Mayes (2003)

The role of market discipline is to, through Stakeholder Monitors (SHMs) (Table 1); monitor the behaviour of financial institutions (Llewellyn and Mayes, 2003). Official monitors do not have perfect or complete information and furthermore suffer the possibility of regulatory forbearance. Each SHM faces a different set of incentives when deciding when and how to apply effort in monitoring an institution, increasing the probability of detecting problems.

Table 2 below identifies 8 necessary conditions (Llewellyn and Mayes, 2003) for market discipline to be effective.

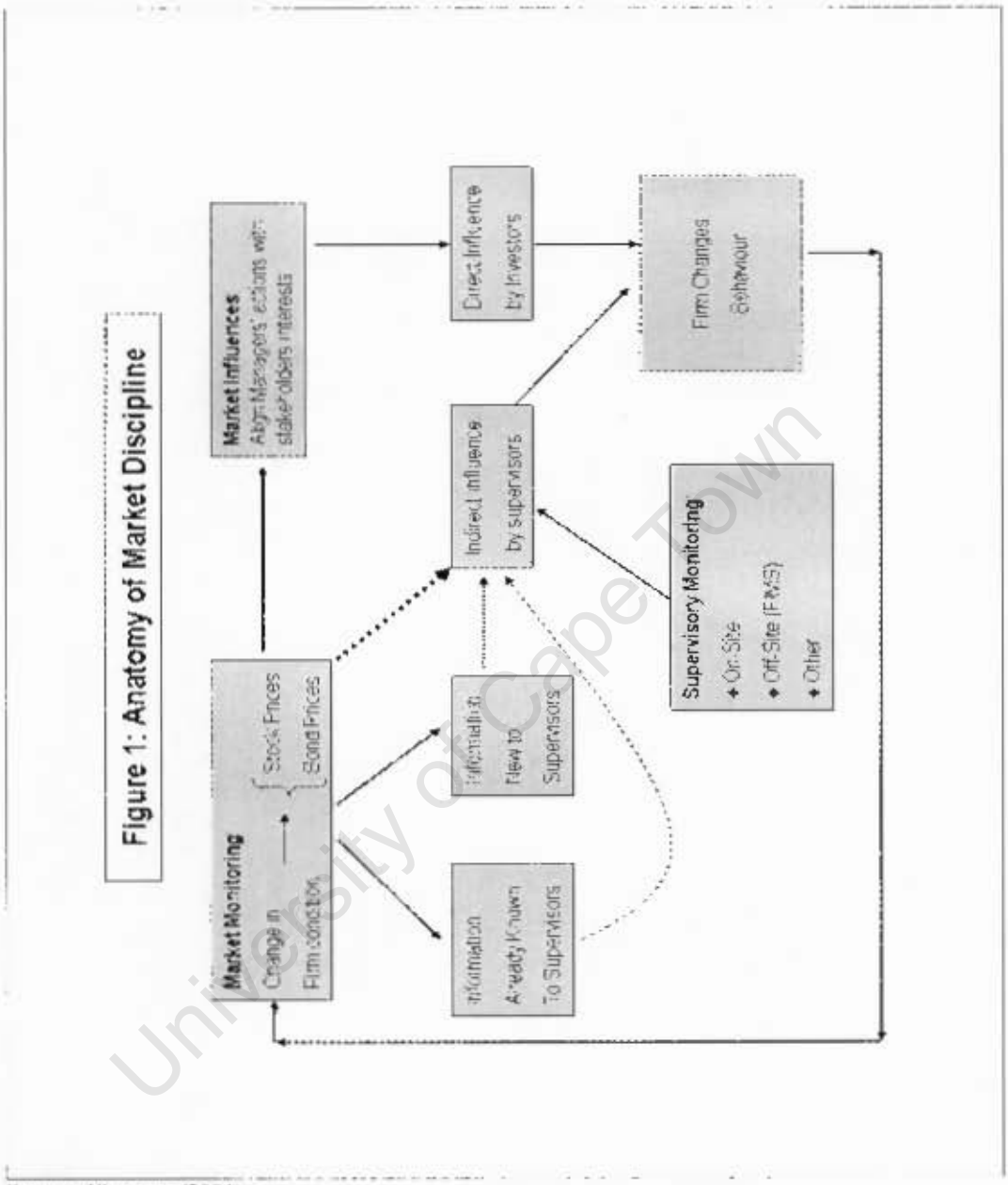
Table 2: Conditions for Market Discipline

1	Disclosure - Relevant, accurate and timely information must be available to all SHMs
2	There must be a sufficient number of SHMs available and capable of analysing the information.
3	Incentives - these must be clear for the SHMs. This includes the risk of losing money. However, potential benefits must exceed costs.
4	A sufficient number of SHMs need to adjust their behaviour based on the information.
5	The reaction must be rational; so that it is evident SHMs are not subject to the same errors as the banks.
6	The rational responses should lead to equilibrating changes in market quantities and/or prices.
7	Bank managers must be aware of, and be able to respond appropriately to the market changes
8	From the above conditions it is clear markets should factor risks into their prices.

Source: Llewellyn and Mayes (2003)

If any one of the above conditions are absent or impeded in any manner the market discipline mechanism will be distorted and ineffective.

Figure 1: The Anatomy of Market Discipline



Source: Flannery (2001)

The Importance of Market Discipline

Of major concern is the limited effectiveness of official monitoring agents. Firstly, there is the principal-agent problem as identified in Mishkin (2000). Here supervisory agents may engage in regulatory forbearance, possibly with the mistaken belief that if given time the bank will pull through. Secondly, the supervisor does not have perfect and

complete information (Oda, 1999). This is not to say markets have perfect and complete information, but the two can complement each other given their differing incentives, as actions by the one will provide information for the other. Therefore, by increasing the number of agents directly monitoring banks, problems will be identified earlier.

Market Discipline is an important element in ensuring the overall soundness of the banking systems and maintaining financial stability (Baumann and Nier, 2003). Although a bank may be within regulatory limits pertaining to risk, the risk profile chosen may not be in the interest of depositors. Secondly, neither will a bank necessarily take into account the likely social impact of its private decision on risk (Baumann and Nier 2003). If financial markets play their correct role, consumers will express their risk choice by choosing those banks that match their risk profile (Witherell, 2003). By being able to freely choose the banks with the best risk profile, creditors are able to punish excessive risk-taking by banks. Thereby improving the efficiency of the system as a whole by pressuring inefficient banks to improve or exit (Ghosh and Das, 2002).

Limitations on the Effectiveness of Market Discipline

Effective market discipline needs a rigorous disclosure framework, and this seems to be a major drawback in emerging, and some industrialised countries (Mishkin 2000). This inadequacy may stem from ineffective business laws as well as insufficiently independent external auditors. The role of independent auditors cannot be understated, as financial accounts must provide a true and fair view of the company in order for market prices to be accurate (Basel Committee, 1997).

Secondly, the private cost of market monitoring and information collection may exceed the private benefit. This is especially so for the smaller depositors, who may take longer to recover from a bank failure. Thirdly, social costs are not factored into market prices for debt, specifically because markets are concerned with private rather than social costs. Fourthly, the existence of an overly prominent supervisory agent may result in private SHMs "free-riding" on its efforts. In such a situation banks may not be pressured by private SHMs to fully disclose their risk profiles (Baumann and Nier,

2003). Fifthly, perfect market discipline requires that not only must there be perfect information, but that SHMs have the necessary skills to carry out the required risk assessments. Finally, where rating agencies are concerned it may not be economical for rating agencies to conduct full credit ratings.

Gathering from the above, the availability of information is critical for an effective market discipline mechanism. In developed nations, information is readily available. Studies have however tended to focus on subordinate debt and the responsiveness of deposit interest rates to banking ratios. Few studies have attempted to address directly the responsiveness of bank equity to new information. In Africa, there are even fewer studies. The existing studies offer a more general analysis of market efficiency, where they look at the broader stock market. This paper contributes to the existing literature on financial regulation by exploring the potential benefit of market monitoring to bank regulators in complimenting their on and off-site monitoring and examination tools by investigating market reactions to certain events.

Equity Markets vs. Subordinated Notes and Debentures – Which is Best?

There are 2 main approaches put forward in the literature with regards to effecting market discipline. The first is the issuing of Subordinated Notes and Debentures (SNDs) by financial institutions. This debt is junior to all other credit held by the bank. The second does not involve the issuing of any more obligations, but rather the sharpening of incentives for equity holders. Both approaches have their benefits and drawbacks, and regulators need to weigh these up before deciding which best suits their sector.

Subordinated Notes and Debentures

Subordinated debt instruments are financial instruments that are both unsecured and junior to other debt held by a firm (Bank of Canada (2005), Basel Committee (2003)). They partly rely on the ability of spreads to reflect bank risk. As with other bonds its risk can be measured by comparing its yield to that of a risk-free instrument such as a treasury bill. However, they also reflect other 'noise' in the economy, and hence interpretation of signals can be difficult. Noise aside, the potential default risk of bank

debt in the bond market can provide regulators with information about the risk profile of a bank (Kwan, 2002b). The nature of the contracts and covenants governing a banks ability to raise debt can play an important role in determining the yield spread of the SNDs. Kwan (2002b) further found that in less regulated periods the moral hazard problem was greater, and the sensitivity of yield spreads to restrictions in debt issuing contracts and covenants was more pronounced.

SNDs are among the first to lose value when a bank is in trouble (Staff (1999), Kwan (2002)) and as such are considered best to exert both direct and indirect market discipline. When and if a bank's risk profile is increasing, SND holders have an incentive to pressure the regulator into PCA – a line of action that may be in contrast with that of equity holders (Bank of Canada, 2005). This will contribute to the overall robustness of the financial safety net.

However, the prerequisites for SNDs to successfully discipline banks by reflecting the actual level of risk make it difficult if not impossible for them to work in developing countries. Firstly, there needs to be a significant number of players within the markets. Secondly, these players need to be sufficiently sophisticated in order to extract the information contained in SND prices and act upon it.

Thirdly, the SNDs must constitute a certain percentage of the banks capital in order to be most effective. Here the markets in developing countries may not be sufficiently deep to absorb the required amount of SNDs to make the mechanism effective. Finally, there needs to be credibility underlying the belief that the probability of repayment is negatively related to the risk of default. Any implicit guarantee will undermine this. Such credibility is difficult to establish, especially where the resources needed to provide the safety net are limited. This is especially true (even in developed countries) when a bank is deemed too-big-to-fail.

The major drawbacks of SNDs are those of; firstly, availability, there are few instruments, and secondly the few available instruments are concentrated in the hands of a few players. A number of studies have been carried out on the effectiveness of SNDs;

however, these have concentrated on European and US markets simply because these markets are the deepest.

Equity Markets

While the focus has been on SNDs there has been a growing amount of discussion on the potential of equity markets in disciplining banks (Basel Committee, 2003), (Flannery and Nikolova, 2004). The major advantages equity markets hold over SNDs is that of data availability and data quality. More financial institutions are listed on stock exchanges than those that issue SNDs especially in developing countries. Secondly, as a result of the greater number of investors and analysts in equity markets the data quality is greater. Finally, equity prices reflect a bank's current condition and can help predict future default. The available studies have found equity markets rapidly incorporate new information such as credit ratings and supervisory actions (Flannery and Nikolova, 2004).

However, again as with SNDs, the interpretation of this data is difficult because of a plethora of influences at play. This is evidenced by the amount of research attempting to model market behaviour. Secondly, the distorted incentive structure faced by equity holders, where there is a positive correlation between risk and return, makes it difficult for regulators to observe when the bank is in trouble by analysing its share price.

The information content of bank data that is availed to markets is critical to the efficiency and effectiveness of the mechanism. Studies such as Curry, Fissel, and Hanweck, (2003) have used various categories of equity data to investigate whether they add value to models that are used to predict changes in the central bank ratings assigned to banks. Curry et al (2003) find that the variables "...add statistically and economically meaningful value to models" indicating that the markets were able to extract valuable information from equity data.

In a study of the Asian crisis, Hosono, Iwaki and Tsuru (2005) found the ability of markets to discipline banks changed significantly after a crisis, as depositors became acutely aware of a bank's default risk after the shock. However, this was the case if the

disciplining mechanism was weak before the crisis and there was no *credible* deposit protection scheme to cushion depositors. In a study of Argentina, Chile and Mexico, Martinez-Peria and Schmukler (1999) draw similar conclusions, finding the lack of a credible deposit insurance scheme meant depositors had to increase their monitoring efforts.

Event Studies on the Impact of Earnings Announcements on Equity Prices

From the initial work of Fama, Fisher, Jensen and Roll (1969), there has evolved a considerably large body of literature using event study methodology in economics and finance. The study by Fama et al looked at the reaction (or, more specifically, the dividend implication) of securities prices to stock splits, finding that the information these announcements contained was factored into prices "almost immediately" after the announcement date. Closely tied to the development of this literature is the evolution of the Efficient Market Hypothesis, introduced by Fama in his 1970 dissertation. Since then the EMH has evolved from being defined as, "... a market that adjusts rapidly to new information" (Fama et al (1969)), to:

There are three forms of EMH:

1. *Weak Form Efficient* – With this form of efficiency the share prices include all past (historical) price information and technical analysis is ineffective.
2. *Semi-Strong Form Efficient* – Asserts that all information that is available publicly is fully incorporated into the share price.
3. *Strong Form Efficient* – In this case historical, public and insider information is incorporated into the share price.

No market is perfectly efficient, rather all markets can be placed somewhere along a continuum with inefficiency at one end and perfect efficiency at the other - with the markets of the more developed countries being found nearer the 'efficient' end. A 1970 study by Fama led to the conclusion that there was strong empirical support for the existence of weak-form efficiency in equity markets. Indeed during the 1970s and 80s there was strong support for this view. However, more recent studies have found anomalous behaviour that appears to undermine the efficient market hypothesis,

although the question being raised is whether the underlying theory is incorrect or the existing models are inadequate (Dimson and Mussavian, 2000).

Ball and Brown (1968) approached the issue of market efficiency by investigating the informational content of earnings announcements. They conclude that final reports are not the best indicators of the state of a firm, but rather agents use other media sources (e.g. interim reports), as they are timelier. A drawback with their study is the use of monthly returns. Events occur on a given day, and there is the possibility of the market reacting to other information within the same month making it difficult to isolate the impact of the event itself.

Brown and Warner (1980) assess the various market performance measurements in an attempt to (1) find which model best predicts 'normal' returns and (2) whether it is important to know the event date. They found no significant difference in the predictive power of the models but found that the probability of rejecting the null hypothesis of no abnormal returns was reduced significantly if the event day was not known. The use of daily return date has brought the added advantage of being able to more accurately investigate abnormal returns around the event day. However, a number of issues arise from the use of daily returns data. Using daily returns data Brown and Warner (1985) find although there are unique problems presented by daily returns data they are easily overcome.

Using confidential regulatory information along with market information, Berger, Davies and Flannery (2000) attempt to find which party knows what and when? They use two measures of supervisory information, the BOPEC rating and the frequency of on-site inspections. From the market they take four measures, abnormal stock returns; Moody's ratings of outstanding debentures; the proportion of outside equity owned by corporate insiders and the proportion owned by institutional investors. Using Granger causality tests the authors find the Moody ratings and supervisory assessments Granger cause each other inversely with the lag size. However, the causality between supervisory assessments and equity markets is at the most very weak. They explain this through the differing incentives of the two. Supervisors, like rating agencies, are

concerned with the default risk of banks, whereas equity markets look more to assessing and predicting the future performance of the bank. The evidence suggests that supervisors, rating agencies and equity markets all produce valuable information that complements the efforts of the others. Furthermore, Berger et al find that supervisory ratings are only useful for a limited time frame, after which they become 'stale'. This is probably due to the discrete and infrequent nature of ratings. Comparing three market indicators: accounting data, share prices and credit ratings (all of which can be calculated from publicly available information) Bongini, Laeven and Majnoni (2001) find that none of the measures had any predictive power prior, ex post, to the Asian crisis. Furthermore each indicator followed a different pattern, possibly related to the differing transaction costs associated with each. However, Krainer and Lopez (2001) find that equity markets send a clear signal well in advance of a ratings change, while Muslumov (2003), in a study focused on the Turkish banking sector, finds equity markets adjusting several weeks before a bank is placed under curatorship indicating private agents' awareness of a problem.

Market Efficiency in Developing Markets

Studies conducted on the efficiency of African Markets are few, with the majority focused on the JSE, primarily because there is limited data available to researchers in other African countries, although the situation is improving. Of the studies conducted, the general conclusion is that the African markets are weak-form efficient (Dickinson and Muragu (1994); Magnusson and Wydick (2000); and Adelegan (2003)). Dickinson and Muragu (1994) fail to find evidence that "[does] not contradict the weak form of the EMH" on the Nairobi Stock Exchange. Following on from Dickinson and Muragu (1994) and comparing 8 stock exchanges through out Africa, Magnusson and Wydick (2000) find all except Ghana, Nigeria and Zimbabwe to be weak form efficient. Mlambo, Biekpa and Smit (2003) tested for weak-form efficiency in selected African markets and again found this form of efficiency to be present in only a few of them. The authors, because of the non-normality of the data, recommended non-parametric tests for further studies as these would give less biased results. These studies aside, there is little evidence as to research on the responsiveness of African bank stocks to earnings announcements, stock splits or the passing of new banking laws and regulations.

However, all authors make a common caveat that more studies need to be completed before any solid conclusions can be drawn about African stock markets, individually or in general. Event Studies on JSE listed entities are substantially more and Bhana (1995) found that information is incorporated slowly into share prices and that the market does not react efficiently to publicly available information. Using an Abnormal Index on the returns of JSE listed companies Philpott and Firer (1995) found there were persistent abnormal returns that could not be explained by a liquidity premium. The abnormality could be due to a significant premium attached by investors where due to delays in information dissemination losses could be incurred.

Adelegan (2003) tests for semi-strong form efficiency in the Nigerian Stock market using daily returns data and finds insufficient evidence of the semi-strong form of market efficiency. Two of the problems Adelegan (2003) identifies are common through developing countries - Insider Trading and Poor Communication Infrastructure. Bhattacharya, Daouk, Jorgenson and Kehr (2000) use an event study approach used by Brown and Warner (1985) and the Corrado (1989) rank correlation test to test the Mexican Stock Exchange (Bolsa Mexicana de Valores) for market efficiency. Using corporate news announcements the authors find a lack of news impact on the share price of the company concerned. They give two reasons for the lack of responsiveness around the event data. Firstly, there is the likelihood of insider trading and secondly the lack of responsiveness is restricted to a particular class of shares, A-shares, which only citizens may hold. Non-citizens may hold only B-class shares that were found to display a significantly greater responsiveness to news as it released.

Market Efficiency and Modelling Returns Volatility

Although in finance the standard model for event studies has been the market model, its suitability has been questioned (Shiller (1981a), Shiller (1981b), LeRoy and Porter (1981)). The smoothing properties of existing models do not allow for the variation shown by actual prices to accurately model price behaviour.

Using a simple efficient markets model Shiller (1981a)[1] defines its structure as:

[1] See Shiller (1981a) for a full discussion of the model and derivation of the inequalities

$$p_t = \sum_{k=0}^{\infty} \gamma^{k+1} E_t d_{t+k} = E_t p_t^*$$

Where:

P_t = price or yield

$p_t^* = \sum_{k=0}^{\infty} \gamma^{k+1} E_t d_{t+k}$ is a perfect foresight or rational price (yield) not known at time *t*.

$\gamma \equiv \frac{1}{1+r}$ where r (constant) is the discount rate.

An implication of the above model is that innovation in price (the left-hand side of the equation below) which cannot be forecast can be restated as below.

$$\overline{\Delta}_{t+1} p_{t+1} = \Delta p_{t+1} + d_t - rp_t$$

Giving:

$$E_t\left(\Delta p_{t+1} + d_t - rp_t\right) = 0$$

The above expression may not hold exactly if changes in p reflect other market driving forces such as fads or waves of market optimism or pessimism to the extent that Δp_{t+1} swamps $(rp_t - d_t)$.

Shiller (1981a) derives three inequalities that must hold:

$$\sigma(p) \leq \sigma(p^*) \qquad \text{(I-1)}$$

$$\sigma(\Delta p) \leq \frac{\sigma(d)}{\sqrt{2r}} \qquad \text{(I-2)}$$

$$\sigma(\Delta p) \leq \frac{\sigma(\Delta d)}{\sqrt{\frac{2r^3}{(1+2r)}}} \qquad \text{(I-3)}$$

Of the three inequalities I-1 and I-2 are violated. Using Standard & Poors data from the period 1871 – 1979, the estimate of σ(p) is found to be 45 times greater than that of

$\sigma(p^*)$ and $\sigma(\Delta p)$ is 6 times larger than $\sigma(d)/\sqrt{(2r)}$. For I-2 to hold the standard deviation of the dividend series would have to be 7.3 instead of 1.28.

Secondly, Shiller (1981a) highlights the lack of observed variation in the dividend time series that would be necessary to compensate for the lack of variation in Δp. Attempts to reconcile the data with empirical evidence have suggested a random walk model for d_t, large movements in the ex ante interest rate or that markets are irrational and subject to fads. Another explanation for the behaviour of dividends is that dividends at times represent changes in the firm's policy for earnings retention (Copeland, 1983).

Criticism of Shiller (1981a) by Flavin (1983) along with Marsh and Merton (1984) centred on the small sample properties of volatility tests and their bias toward finding excess volatility. This led Mankiw, Romer and Shapiro (1985) to formulate a more robust set of volatility tests that took into account the criticisms. The authors nevertheless still find that the model fails to account adequately for movements in the stock price. In their conclusions Mankiw et al (1985) suggest that possible reasons could be that the null hypothesis of efficient markets could be true, and the violations of the inequalities could be statistically insignificant. Secondly, as suggested by Shiller (1981a), Mankiw et al (1985) propose the market fluctuations could be caused by changes in the discount rate induced by changes in the real interest rate. Finally, the markets could be driven by "animal spirits" or fads that restrict its ability to reflect market fundamentals. It certainly seems plausible that "something" more than fundamentals drives the market, since company announcements are not a daily, nor necessarily a weekly, occurrence yet shares are traded more frequently.

3. Methodology

Outline of the Data

The industry specific daily returns dataset used is from the period 1996 to 2004 for 7 South African Banks listed on the Johannesburg Stock Exchange (see Table 3 below). To qualify for inclusion in the dataset, a bank must have been listed for at least 4 years on the JSE and secondly the bank must not have extended periods of poor performance

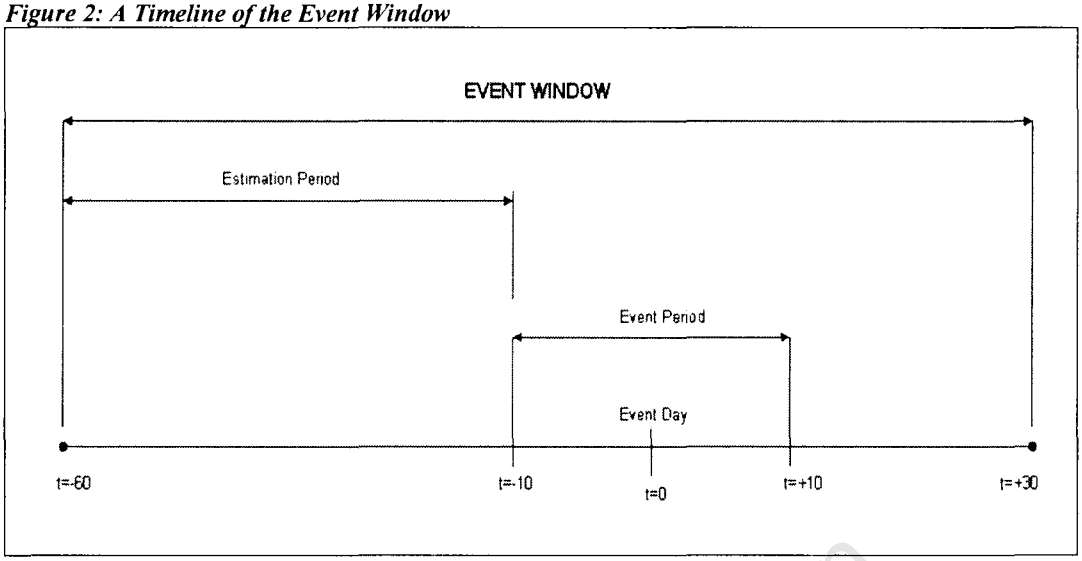
that drove down its share price. These two criteria excluded Capitec Bank that was listed in 2002 and only had 2 events that qualified for the data set; and Mercantile Lisbon Bank. Mercantile Bank was listed on the JSE on the 12th August 1998 with a share price of R4.00 (400 cents) and by the 5th of July 2002 the share price had dropped sharply to R0.07 (7 cents) per share.

Table 3: List of Banks Used In the Analysis

BANK	ABBREVIATION
AFRICAN BANK INVESTMENT LIMITED	ABIL
AMALGAMATED BANK OF SOUTH AFRICA	ABSA
FIRST NATIONAL BANK	FNB
INVESTEC LIMITED	INVL
NEDCOR	NEDR
RAND MERCHANT BANK HOLDINGS	RMBH
STANDARD BANK	STAN

The data is sourced from McGregor's and to be included in the study each earnings announcement was treated as an event and each event had to have 60 days of daily returns prior to the earnings announcement and 30 days of returns after the announcement (see Figure 2 for the Event timeline). Earnings announcement dates are taken as the *Event Day* where $t=0$. Dividends were declared at the same time. Daily returns for the 90-day period surrounding the *Event Day* make up the *Event Window* ($t=-60, \ldots, +30$). The *Event Period* is a sub-sample of the *Event Window* and is represented by days $t=-10, \ldots, +10$. The decision on the size of the event window is ad hoc and is designed so as to provide enough data to run the regression models, without including periods in which quarterly and semi annual announcements are made. In choosing the event period, days either side of the event day were chosen so as to capture the initial changes in investor behaviour pre and post the event or announcement day. The data on event days $t=-60, \ldots, -11$ make up the *Estimation Period.* Fama et al (1969) explain well the reasoning behind the estimation period data not including the returns close to the event day. In the period close to and around the event day returns are expected to be abnormal, therefore including these in the estimations of α and β will lead to misspecification of the coefficients and the model.

Figure 2: A Timeline of the Event Window



Description of the Model

There are a number of models used in event study analysis, and comparisons on the strengths of each one are well dealt with in papers such as Bowman (1983), Brown and Ball (1980), MacKinlay (1997). The study uses the Sharpe (1964) *Market Model* and follows the standard event study procedures as outlined in MacKinlay (1997) and Serra (2002) The market model proceeds by regressing the returns of a security *i*, against the contemporaneous returns of the market. Abnormal returns are calculated using the coefficients from the model.

Firstly, returns are calculated as the relative increase in price of security i from period t-1 to period t. This can be expressed as equation (1) below:

$$R_{it} = \frac{(P_{t-1} - (P_t + D_t))}{P_{t-1}} \qquad (1)$$

Where:

R_{it} = Return on Security *i* in period *t*;

P_t = Price of security i in period *t*;

P_{t-1} = Price of Security *i* in period *t-1*;

D_t = Dividend return for security i in period *t*;

$i = 1, 2,...,N$ *(where N=7)*

$t = -60,-59, ...,+30$

Dividends were announced simultaneously and the dividend amount was spread out over the year by dividing the dividend amount by 360 so as to obtain the dividend per day. Without doing so the dividend would distort the Average Abnormal Returns on the event day, along with the cumulative returns after the event day, resulting in a significantly higher number of abnormal returns.

The Market Model is given as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad (2)$$

Where:

R_{it} = Return on Security i in period t;

R_{mt} = Return on the market index in period t;

α_i = Constant;

β_i = Coefficient estimate;

ε_{it} = Disturbance term;

$i = 1,2,...,N$ *(where N=7)*

$t = -60,-59,...-11$

However, because the shares analysed are for a specific sector equation (2) has to be adjusted to accommodate industry effects, in this case Bank effects. Requiring the addition of a Bank Index to give equation (3) below:

$$R_{it} = \alpha + \beta_i R_{mt} + \lambda_i R_{bt} + \varepsilon_{it} \qquad (3)$$

Where:

R_{bt} = Return on the bank index in period t;

λ = Coefficient estimate for the Bank index

Calculating Abnormal Returns

To proceed, the abnormal returns are calculated by first estimating the coefficients α, β for each individual security by regressing the estimation period returns (*t=-60, ..., -11)* on the bank industry proxy. The abnormal return is then the difference between the *observed* and the *predicted* return i.e.:

$$AR_{it} = R_{it} - (\alpha + \lambda_i R_{bt}) = \varepsilon_{it} \qquad (4)$$

The expected value of the residual is zero and any value ≠ 0 is classified as an abnormal return (AR) where:

$$\varepsilon_{it} = 0 \qquad \sigma(\varepsilon_{it}, \varepsilon_{jt}) = 0 \qquad \forall\ i \neq j \qquad (5)$$

Average Abnormal Returns

The Average Abnormal Returns (AAR) are derived by averaging the abnormal returns across common event time during the event period:

$$AAR_t = \frac{1}{N}\sum_i^N AR_{it} \qquad for\ t = -10,\ldots,+10 \qquad (6)$$

To test H_0 of no abnormal returns, Cumulative Average Abnormal Return (CAAR) are calculated. The strategy assumed under this test is one of purchasing an asset in one period and holding it until the end of another, thus measuring the capital gain in holding the security over or through and event (Kothari and Warner, 2004).

The CAAR is obtained by cumulating the average residuals over a period of L days around the event day:

$$CAAR_{(L1,L2)} = \sum_{L1}^{L2} AAR_t \qquad (7)$$

Testing the Significance of Abnormal Returns – Parametric Test

Both the AAR and CAAR are tested for significance (H_0: the AAR is equal to zero) using the standard t-statistic:

$$t = \frac{AAR_t}{S(AAR_t)} \tag{8}$$

Under the null hypothesis of no abnormal returns (8) is distributed with T-d degrees of freedom; and:

$$S(AAR_t) = \sqrt{\frac{\sum_{t=1}^{T}\left(\frac{\sum_{i=1}^{N} AR_{it}}{N} - \overline{AR}^*\right)^2}{T-d}} \tag{9}$$

$$\overline{AR}^* = \frac{\sum_{i=1}^{N}\left(\frac{\sum_{t=1}^{T} AR_{it}}{T}\right)}{N} \tag{10}$$

Because the returns are not independent in event time, the standard deviation must be adjusted in order to avoid errors in accepting or rejecting the hypotheses. In cases where cross-sectional independence is assumed in error the standard deviation estimation is lower than should be, resulting in an upward bias in the t statistic (Kothari and Warner, 2004).

Where $S(AAR_t)$ is an estimation of the standard deviation of AAR_t calculated using the estimation period data.

Non-Parametric Test

Parametric tests make distributional assumptions about the data – i.e. that the data is normally distributed. However, past research has found abnormal returns to be skewed right with fat tailed distributions. A further disadvantage of parametric tests is their bias against H_0 when testing for positive abnormal returns and towards H_0 when testing for

negative abnormal returns. In order to overcome the problem of violated normality assumptions, a number of non-parametric tests have been devised in the literature. Mainly three tests are used in event studies: The Generalised Sign Test, Wilcoxon Signed Rank Test and Corrado (1989) Rank Test.

The Corrado (1989) Test provides better specification and power than parametric tests if the return variance is unlikely to increase, but is misspecified if the return variance does increase over time (Serra, 2002). The Wilcoxon Test is generally viewed to be stronger than the Generalised Sign Test because of its greater sensitivity, and is used in this paper.

Calculating the Test Statistic

The returns are generated as per the market model and ranks assigned to the absolute value of the Abnormal Returns:

$$AR_i = |d_i| = y_i - \overline{y_i}$$

Values where $|d_i| = 0$ are ignored leaving $n' \leq n$ pairs.

The absolute differences are ranked for the smallest to the largest. In cases where ranks are tied the average of the ranks that would be assigned had no tie been present is assigned. Summing the positive ranks will give the test statistic

$$S_N = \sum_i r_i$$

The test statistic $S_N \sim N\left(\frac{n(n+1)}{4}; \frac{n(n+1)(2n+1)}{24}\right)$

Where:

$$Z = \frac{(S_N - 0.5) - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} \sim N(0;1)$$

4. Empirical Findings and Analysis

Preliminary Data Analysis

Table 4 below shows the properties of the time series' of the individual variables over the period January 1996 to December 2004, after having undergone a 1st differencing. From the table below it can be seen that the variables once transformed into returns are no longer heavily skewed right and fat-tailed as the original series, although the positive mean does indicate skewness. The differenced times series for all variables although not skewed (except RMBH which is slightly skewed), are leptokurtic. This is a characteristic of returns calculated using *daily* share price data, and non-parametric tests are suggested as they are not affected by the normality assumption as are the parametric tests.

Table 4: Descriptive Statistics for the Variables

	ABIL	ABSA	FNB	INVL	NEDR	RMBH	STAN
Mean	0.001014	0.000558	0.000837	0.000209	0.000454	0.000768	0.000546
Median	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Max.	0.170507	0.151807	0.148627	0.148564	0.167832	0.189055	0.147826
Min.	-0.260870	-0.164384	-0.110491	-0.132948	-0.134615	-0.169492	-0.169960
Std. Dev.	0.030651	0.026300	0.024518	0.021381	0.022177	0.026849	0.023930
Skewness	-0.064753	0.092252	0.465878	0.041828	0.284986	0.664134	-0.130831
Kurtosis	9.651195	7.454282	7.034513	8.199860	7.259497	10.02218	8.443158

The share price data are time series and possess a unique set of characteristics that must be addressed if forecasts are to be meaningful. One problem presented by time series is that of non-stationarity. A non-stationary time series possesses a Unit Root, and will suffer from permanent effects due to random shocks in the economy (Libanio, 2005) while also following a random walk. If the series has no Unit Root it is said to be stationary and exhibits mean reversion (Libanio, 2005). Testing for stationarity can be done using the Augmented Dickey-Fuller (ADF) Test and if the series has a unit root (established by failing to reject H_0: Series has Unit Root) the 1st difference can be taken to render it stationary.

Using the ADF test the raw share price data were found to possess Unit Roots,

suggesting first differencing to render the series stationary. However, Event Studies use returns that are calculated by taking the growth of the share price from one period to the next – i.e. the 1st difference. After first differencing all the variables, including the Market (ALSI) and Bank (BANK) Index variables reject H_0 in the ADF tests.

Estimation of the Coefficients

The first step in the analysis was the estimation of the coefficients α, β and λ, using equation (3) stated in the methodology. The All Share Index and the Bank Index in theory are highly correlated and as a result present the problem of multicollinearity. The variables have a correlation coefficient of 0.504935 which is high and the use of the two as dependant variables would introduce multicollinearity. The solutions are two fold. Either, attempting to eliminate multicollinearity by taking the first difference of the variables, i.e. the change in the share price regressed on the changes in the ALSI and BANK variables. This step is implicit in the methodology as the change in variable in each time period is same as the return and the correlation drops to 0.154434 after the calculation. The second and alternative step involves dropping one of the independent variables.

The returns for each bank were regressed on at first both the ALSI and BANK variables. However in all the regressions the ALSI variable was highly insignificant and was dropped from the models. In the second set of regressions with BANK as the only independent variable, the constant was insignificant and was dropped as well. Table 5 below presents the coefficients for α and λ in the final set of regressions. The Durbin-Watson statistic provided evidence that there was no Auto-correlation in any of the models except FNB.

Table 5: Coefficients of the Independent Variables

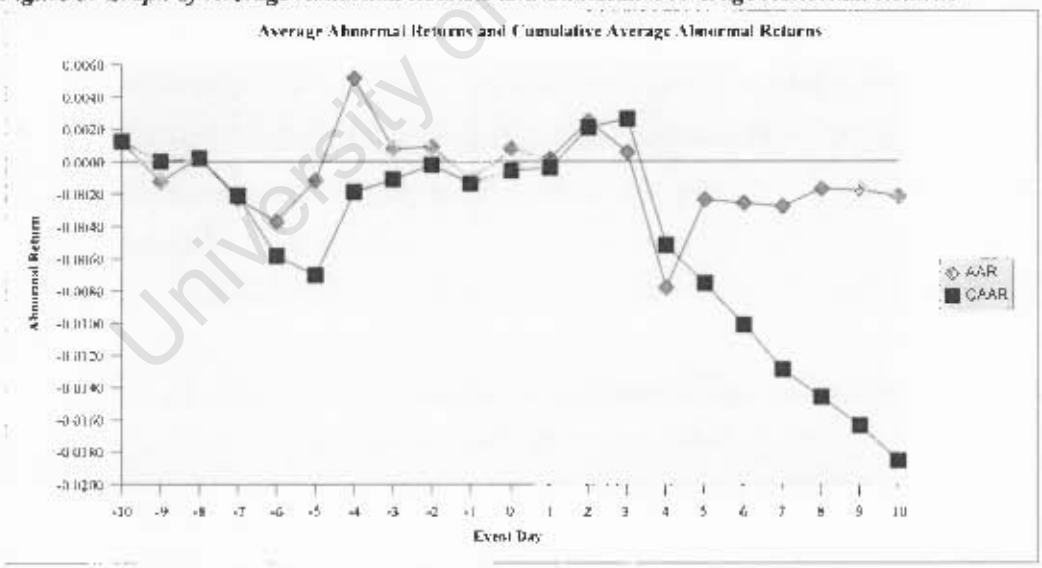
	DEPENDENT VARIABLE						
	ABIL	**ABSA**	**FNB**	**INVL**	**NEDR**	**RMBH**	**STAN**
α(Constant)	0	0	0	0	0	0	0
λ(BANK)	-0.555762 ***	-0.936090 ***	-0.968422 ***	-0.735550 ***	-0.875629 ***	-0.860396 ***	-0.972038 ***
'R2	0.163605	0.462116	0.589170	0.255335	0.577480	0.435655	0.697440
D-W	1.961660	2.127823	1.805817	1.875952	1.872262	1.876610	2.019692

*Note: The 1%, 5% and 10% levels of significance are represented by ***, ** and * respectively.*

The AARs for the banks combined (Figure 3 below) indicated banks experienced mixed returns for the 10 day period prior to the earnings announcement. The returns are negative from day -10 through to -5. On day -4 they turn positive and remain positive through to day −3, with day -1 experiencing the only negative returns in between. There is a notable drop in the rate of change from day -3 to day +3 for example AARs average 0.00065 between days -3 and +3 against an event period average of -0.00088.

Correspondingly the CAARs are decreasing from day -10 to -5, after which they rise from event day -5 to event day +3. The days -3 to 13 experience a relatively gradual rise in CAARs, and as reflected by the t values, these are driven by insignificant AARs (column 3 in Table 6 below). The lack of significance suggests this may be a period of uncertainty for investors as they adopt a wait and see approach to the news announcement. Such an approach would suggest an immediate adjustment once the announcement was made. However, the drift continues for a few days after the announcement day, meaning reaction to the news is slow, possibly as a result of poor information dissemination.

Figure 3: Graph of Average Abnormal Returns and Cumulative Average Abnormal Returns



This is similar to the conclusion drawn by Adelegan (2003) on the Nigerian Stock Exchange. Post day +3, AARs drop sharply, before holding at an average of -0.0022 to the end of the period. These negative AARs although not statistically significant

individually, contribute to give a highly significant CAAR (significant at the 1% level) over the period. The negative returns post event day +3 may be the result of shareholders offloading part or all of their holdings upon receiving and processing the information content of the announcements.

Table 6: AARs and CAARs for the Industry as a Whole

COMBINED INDUSTRY ANALYSIS						
DAY	**AAR**	**t-stat**	**signif**	**CAAR**	**t-stat**	**signif**
-10	0.0012	0.4925		0.0012	0.4925	
-9	-0.0012	-0.4960		0.0000	-0.0035	
-8	0.0002	0.0833		0.0002	0.0798	
-7	-0.0023	-0.9252		-0.0021	-0.8453	
-6	-0.0037	-1.4923		**-0.0058**	**-2.3377**	**
-5	-0.0012	-0.4712		**-0.0070**	**-2.8089**	***
-4	**0.0051**	**2.0514**	**	-0.0019	-0.7575	
-3	0.0008	0.3114		-0.0011	-0.4460	
-2	0.0009	0.3565		-0.0002	-0.0895	
-1	-0.0012	-0.4605		-0.0014	-0.5500	
0	0.0008	0.3211		-0.0006	-0.2289	
1	0.0002	0.0674		-0.0004	-0.1615	
2	0.0025	0.9937		0.0021	0.8321	
3	0.0006	0.2201		0.0026	1.0522	
4	**-0.0078**	**-3.1204**	***	**-0.0052**	**-2.0682**	**
5	-0.0024	-0.9468		**-0.0075**	**-3.0150**	***
6	-0.0026	-1.0287		**-0.0101**	**-4.0436**	***
7	-0.0028	-1.1118		**-0.0129**	**-5.1555**	***
8	-0.0017	-0.6810		**-0.0146**	**-5.8365**	***
9	-0.0018	-0.7077		**-0.0164**	**-6.5441**	***
10	-0.0022	-0.8695		**-0.0185**	**-7.4137**	***

*Note: *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*

Table 7: Non-Parametric Test Results

Wilcoxon Signed Rank Test: Output				
N	**S_{N+}**	**S_{N-}**	**Z**	**p-value**
1155	318222.50	349367.5	-1.3734	0.1696

The Wilcoxon Signed Rank Test was performed on the returns because of the non-normality of the data. The output in table 7 above fails to find that the returns are significantly different from zero. However, because the data sample lumps together announcements that may contain differing news it is worth investigating further. As the results displayed in table 6 above are for the banking industry as a whole, it suggests that over the period under analysis the banks have had predominantly bad announcements – the significant and negative CAARs. However, not all announcements are bad and it would be worth examining whether, the same pattern would be observed

if the earnings announcements were grouped into various 'News' categories.

Grouping Event Periods by News Category

The data was grouped into three "News" categories. Good News, No News and Bad News. The methodology for categorising consisted of visually analysing the graphical output per bank, of each announcement's event period CAARs. The trends before and after event day 0 were analysed so as to establish the direction of the CAARs, and these trends were used to classify the announcement events. They were classified as either, Bad News, No News or Good News. The Table below details both the AARs and CAARs for each News category over the event period.

Table 8: AAR and CAAR as per News Category

	Bad News		No News		Good News	
Day	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-10	0.0049879	0.0049879	-0.0015505	-0.0015505	0.0005295	0.0005295
-9	-0.0032553	0.0017326	0.0034320	0.0018815	-0.0046059	-0.0040765
-8	-0.0037132	-0.0019805	0.0034537	0.0053352	0.0005430	-0.0035335
-7	-0.0074852	-0.0094657	-0.0033369	0.0019983	0.0043627	0.0008292
-6	-0.0102958	-0.0197615	-0.0006947	0.0013036	-0.0003605	0.0004687
-5	-0.0004009	-0.0201624	-0.0000036	0.0013000	-0.0033850	-0.0029163
-4	0.0127371	-0.0074253	-0.0043474	-0.0030474	0.0082323	0.0053161
-3	-0.0000959	-0.0075212	0.0024801	-0.0005673	-0.0002954	0.0050207
-2	0.0007521	-0.0067691	0.0013627	0.0007954	0.0004862	0.0055069
-1	-0.0010433	-0.0078124	0.0004237	0.0012191	-0.0031211	0.0023858
0	-0.0074053	-0.0152177	0.0002303	0.0014493	0.0101691	0.0125549
1	-0.0049024	-0.0201201	-0.0026056	-0.0011563	0.0088017	0.0213566
2	-0.0012954	-0.0214155	-0.0031414	-0.0042976	0.0131101	0.0344666
3	-0.0074006	-0.0288162	-0.0023225	-0.0066202	0.0123499	0.0468165
4	-0.0174437	-0.0462599	-0.0053839	-0.0120041	-0.0004530	0.0463635
5	-0.0116706	-0.0579306	0.0029025	-0.0091016	0.0012790	0.0476425
6	-0.0050556	-0.0629861	-0.0019633	-0.0110649	-0.0006636	0.0469789
7	-0.0028632	-0.0658494	-0.0041457	-0.0152106	-0.0010903	0.0458887
8	-0.0065954	-0.0724447	0.0032611	-0.0119495	-0.0023655	0.0435232
9	-0.0085382	-0.0809830	-0.0000078	-0.0119573	0.0033217	0.0468449
10	-0.0062966	-0.0872796	-0.0036436	-0.0156009	0.0039154	0.0507603

In each category (except the No News category) there is a marked difference in the direction of the CAARs. The increase in cumulative abnormal returns is more pronounced for the Bad News, falling from +0.00499 on event day -10 to -0.08728 on event day +10. For the No News category the decline in cumulative returns is not as large (-0.0141), while the Good News category experiences a gain of +0.0502. The

graphs below compare first the AARs, and second, the CAARs of the differing categories.

Figure 4: Graph of AARs for the different News Categories

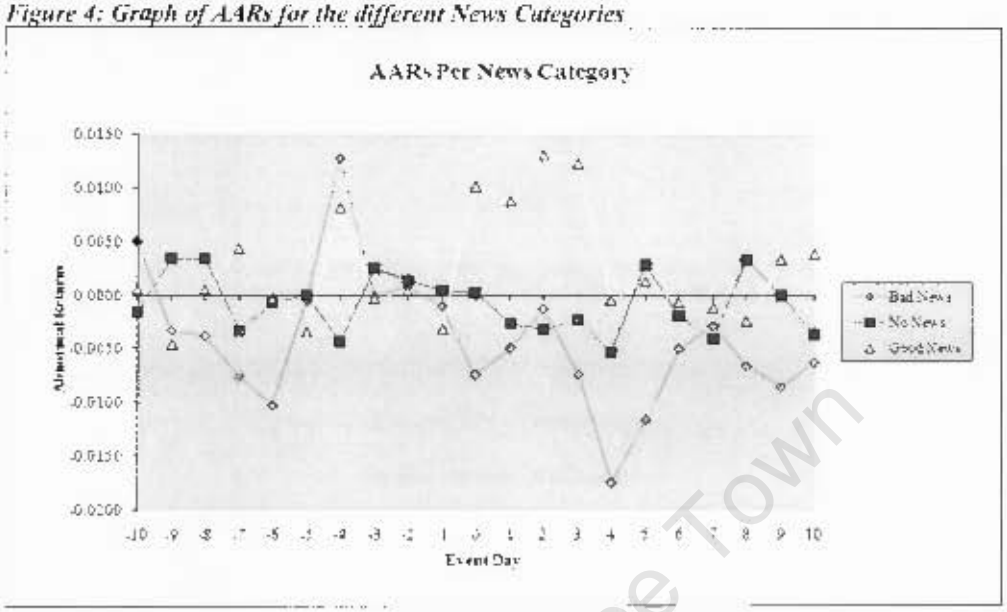
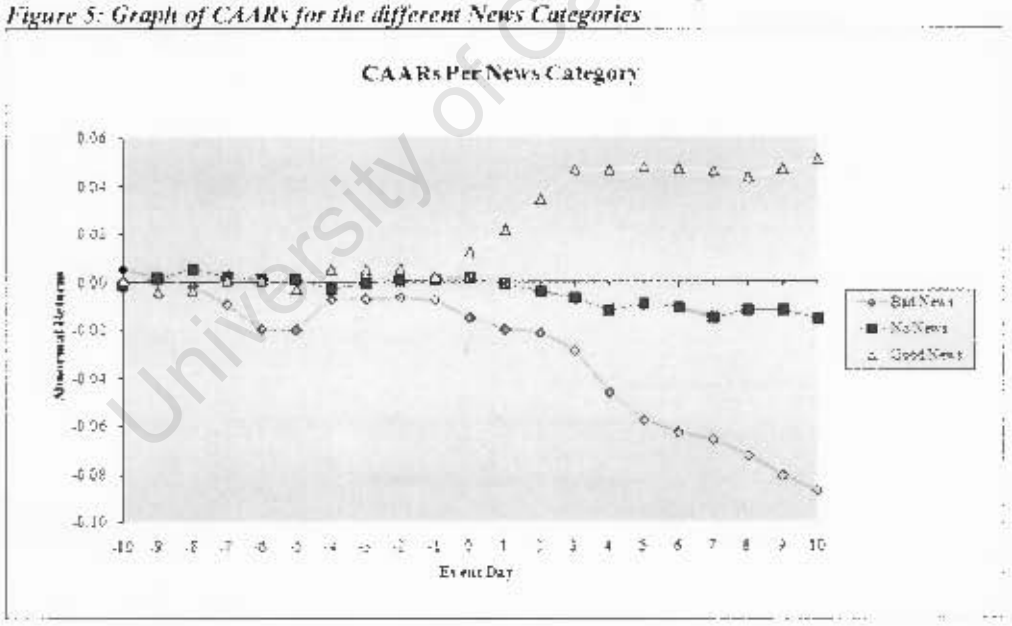


Figure 5: Graph of CAARs for the different News Categories



Looking at Figure 4 one can see a marked bias in the AARs for each category. Under the Good News category although there are a few negative AARs, those that are positive are large enough to swamp them. The pattern is reversed under Bad News,

while under the No News the AARs fluctuate around zero.

A notable observation while examining Figure 5 above, is the behaviour of the cumulative returns prior to event day 0. The CAARs for all three news categories seem to experience little change in the pre-event period relative to the post-event period. This is confirmed by the averages of the AARs in Table 9 below. For each news category the average of the AARs pre and post event is given. The figure for event day 0 is not included in the averages and is given separately for the purpose of comparison.

Table 9: Average AARs Pre and Post the Event Day 0

Ave AARs	Bad News	No News	Good News
Pre-Event	-0.0007812	0.0001219	0.0002386
Event Day 0	-0.0074053	0.0002303	0.0101691
Post-Event	-0.0072062	-0.0017050	0.0038205
Difference	-0.0064249	-0.0018269	0.0035820

The differences in the pre and post event averages are large as reflected in Table 9 above. In the Bad News category the post-event average is 9.2 times larger than the pre-event average, while in the Good News category the corresponding average is 16 times greater. Intuition would suggest there should be no substantial difference between the pre and post event averages for the No News category, however, there is a sizeable difference between pre and post-event averages. That said, the size of the No News average AARs, relative to the Good and Bad News categories, is small.

Significance of the Abnormal Returns under News Categories

When the results are split into the 3 news categories, the number of significant days increases. The increase can be explained as being the result of firstly, isolating the No News days which seemed to dampen the abnormal returns, prior to the announcement, in the other news categories. Secondly, the Bad and Good News abnormal returns would cancel each other out resulting in the average being closer to zero.

Under the News categories the CAARs on day +10 are substantially greater than those of the combined industry, except those of the No News category. The AARs and CAARs on day -10 are insignificant for both the No News and Good News categories. However, both are statistically significant for the Bad News. This suggests investors are

more sensitive to bad news, and is confirmed by the relatively large, and highly significant, CAARs from day -7 through to the end of the event period. Both the Bad and Good News events experience fewer significant AARs prior to the announcement day than after and the returns in this period lack a clear direction with changing signs indicating uncertainty amongst investors. The Bad News category experiences statistically significant AARs from event day 0, to the end of the period, with only 2 days (day +2 and +7) experiencing insignificant AARs.

Events falling under the Good News category experience significant AARs from day 0 to day +3. These result in the graph of Good News CAARs displaying the typical characteristics of cumulated returns. These are: no clear direction prior to the announcement, rapid assimilation of the news once the announcement is made and finally a levelling out.

Table 10: Results of Significance Tests for AARs as Per News Category

AVERAGE ABNORMAL RETURNS									
Day	**Bad News**	**t-stat**	**signif**	**No News**	**t-stat**	**signif**	**Good News**	**t-stat**	**signif**
-10	0.0050	**1.9937**	**	-0.0016	-0.6198		0.0005	0.2116	
-9	-0.0033	-1.3012		0.0034	1.3718		-0.0046	**-1.8410**	*
-8	-0.0037	-1.4842		0.0035	1.3805		0.0005	0.2170	
-7	-0.0075	**-2.9919**	***	-0.0033	-1.3338		0.0044	**1.7438**	*
-6	-0.0103	**-4.1153**	***	-0.0007	-0.2777		-0.0004	-0.1441	
-5	-0.0004	-0.1602		0.0000	-0.0014		-0.0034	-1.3530	
-4	0.0127	**5.0911**	***	-0.0043	**-1.7377**	*	0.0082	**3.2905**	***
-3	-0.0001	-0.0383		0.0025	0.9913		-0.0003	-0.1181	
-2	0.0008	0.3006		0.0014	0.5447		0.0005	0.1943	
-1	-0.0010	-0.4170		0.0004	0.1693		-0.0031	-1.2475	
0	-0.0074	**-2.9600**	***	0.0002	0.0920		0.0102	**4.0647**	***
1	-0.0049	**-1.9595**	*	-0.0026	-1.0415		0.0088	**3.5181**	***
2	-0.0013	-0.5178		-0.0031	-1.2556		0.0131	**5.2402**	***
3	-0.0074	**-2.9581**	***	-0.0023	-0.9283		0.0123	**4.9364**	***
4	-0.0174	**-6.9724**	***	-0.0054	**-2.1520**	**	-0.0005	-0.1811	
5	-0.0117	**-4.6648**	***	0.0029	1.1601		0.0013	0.5112	
6	-0.0051	**-2.0208**	**	-0.0020	-0.7847		-0.0007	-0.2653	
7	-0.0029	-1.1445		**-0.0041**	**-1.6571**	*	-0.0011	-0.4358	
8	-0.0066	**-2.6362**	***	0.0033	1.3035		-0.0024	-0.9455	
9	-0.0085	**-3.4128**	***	0.0000	-0.0031		0.0033	1.3277	
10	-0.0063	**-2.5168**	**	-0.0036	-1.4564		0.0039	1.5650	

*Note: *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*

Table 11: Results of Significance Tests for CAARs as Per News Category

CUMULATIVE AVERAGE ABNORMAL RETURNS									
Day	**Bad News**	**t-stat**	**signif**	**No News**	**t-stat**	**signif**	**Good News**	**t-stat**	**signif**
-10	0.0050	**1.9937**	**	-0.0016	-0.6198		0.0005	0.2116	
-9	0.0017	0.6925		0.0019	0.7520		-0.0041	-1.6294	
-8	-0.0020	-0.7916		0.0053	**2.1325**	**	-0.0035	-1.4123	
-7	-0.0095	**-3.7835**	***	0.0020	0.7987		0.0008	0.3315	
-6	-0.0198	**-7.8988**	***	0.0013	0.5211		0.0005	0.1874	
-5	-0.0202	**-8.0591**	***	0.0013	0.5196		-0.0029	-1.1657	
-4	-0.0074	**-2.9680**	***	-0.0030	-1.2181		0.0053	**2.1249**	**
-3	-0.0075	**-3.0063**	***	-0.0006	-0.2268		0.0050	**2.0068**	**
-2	-0.0068	**-2.7057**	***	0.0008	0.3179		0.0055	**2.2012**	**
-1	-0.0078	**-3.1227**	***	0.0012	0.4873		0.0024	0.9536	
0	-0.0152	**-6.0827**	***	0.0014	0.5793		0.0126	**5.0183**	***
1	-0.0201	**-8.0422**	***	-0.0012	-0.4622		0.0214	**8.5364**	***
2	-0.0214	**-8.5600**	***	-0.0043	**-1.7178**	*	0.0345	**13.7766**	***
3	-0.0288	**-11.5180**	***	-0.0066	**-2.6461**	***	0.0468	**18.7129**	***
4	-0.0463	**-18.4905**	***	-0.0120	**-4.7981**	***	0.0464	**18.5319**	***
5	-0.0579	**-23.1553**	***	-0.0091	**-3.6380**	***	0.0476	**19.0431**	***
6	-0.0630	**-25.1761**	***	-0.0111	**-4.4227**	***	0.0470	**18.7778**	***
7	-0.0658	**-26.3205**	***	-0.0152	**-6.0798**	***	0.0459	**18.3421**	***
8	-0.0724	**-28.9567**	***	-0.0119	**-4.7763**	***	0.0435	**17.3966**	***
9	-0.0810	**-32.3695**	***	-0.0120	**-4.7794**	***	0.0468	**18.7243**	***
10	-0.0873	**-34.8863**	***	-0.0156	**-6.2358**	***	0.0508	**20.2893**	***

*Note: *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*

The existence of abnormal returns before the event day may on the one hand suggest that investors are privy to information before it is made public (Insider Trading). However, if this were the case the share price would assimilate the new information to the point where the earnings announcement would be a "Non-Event" resulting in no significant price change after the announcement. The existence of abnormal returns post-event contradicts this and implies that even if investors were privy to inside information they were unable to gain from it, or there are other factors driving the persistent abnormal returns.

Table 12 below gives the results of the Wilcoxon Test performed on the different news categories and the results confirm those of the t tests above, in that there are significant abnormal returns around earnings announcements and depending on the news type these may be exploited by investors. A buy-and-hold strategy may work well if the investor correctly classifies an event as good news, while the bad news announcements may need the investor to sell shares and buy back when the CAARs bottom out. Given the trend in the Figure 5 this may occur weeks after the event.

Table 12: Non-Parametric Results For the News Categories

Wilcoxon Signed Rank Test: Output			
	Bad News	**No News**	**Good News**
N	378	420	357
S_{N+}	27263.00	41325.00	38124.50
S_{N-}	44368.00	47085.00	25778.50
Z	-4.0236	-1.1572	3.1633
p value	0.00005747	0.2474	0.00156

5. Conclusions

The paper tested for the semi-strong form of market efficiency in an attempt to establish the existence of a market disciplining mechanism for bank equity. The presence of which, would suggest the ability of investors to timeously acquire and process available information relevant to particular banks. Such a mechanism, if in place, can greatly enhance the overall regulatory efficiency, as the efforts of investors will compliment those of the Central Bank. The importance of complimentarity cannot be overstated for developing countries where the resources (time, and most importantly financial and human) are limited.

The results are consistent with existing literature on the efficiency of the JSE, which finds the market to be only weak-form efficient. The persistence of abnormal returns provides opportunities for investors to exploit the market with appropriate tools. This persistence is not a recent phenomenon, suggesting (a) the markets have failed to exploit the anomalies to the point where they disappear; and (b) the JSE is driven by much more than fundamentals. Secondly, the process of information dissemination is poor as indicated by the extended post-announcement drift. This would be of concern to the regulator looking to place some form of accountability on investors for their investment decisions. Further research as to the channels used, and their effectiveness would be informative.

None, except condition 8, of the necessary conditions for Market Discipline (Table 2 on page 3) are met. Indicating the markets do not provide clear signals because these under lying conditions are not in place. The premium that is present on the JSE means that

condition 8 is met, but whether or not this premium reflects bank-specific risks is a topic for further research.

In addition future research into the channels, procedures and the time it takes for investors to acquire information, process it and make a decision as to whether buy, sell or do nothing and actually have the decision acted upon would be insightful. In addition the question of how investors access the information is important (newspapers, brokers, live feeds, etc) may help explain the perceived delays in reacting to announcements.

Finally, the debate in modern market efficiency literature has been around the forecasting ability of models. With the existing models unable to replicate the large variations in the share price from period to period and coupled with the cost of information especially in developing countries it is difficult to conclusively state that the market is inefficient or not.

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