THE JSE STOCK EXCHANGE NEWS SERVICE:

The Impact of SENS Announcements on Trading Activity on the JSE Securities Exchange.

PRESENTED TO THE

DEPARTMENT OF ACCOUNTING

UNIVERSITY OF CAPE TOWN

IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE

MASTER OF COMMERCE (FINANCIAL MANAGEMENT)

By

RENEN WATERMEYER

Supervisor: Professor Carlos Correia

June 2011

1 Contents

2 List of Figures and Tables

4 Introduction

Almost all models of market behaviour in some way or another, suppose some causality between news or information, and market prices. This study seeks to explore the relationship between information and the behaviour of investors. Specifically, it will examine the impact of Stock Exchange News Service Announcements (SENS Announcements) on trading volumes.

5 Declaration

I declare that this paper is my own work except where indicated otherwise and that all references that were used have been accurately recorded in this paper.

6 Background and Literature Review

In order to appreciate how information may impact the market, it is necessary to review existing models of investor behavior and, in particular, the Efficient Market Hypothesis. This discussion should lead the reader to realize that investor sentiment should impact the market. It should also become apparent that information (news) is one of the key drivers of investor valuations, and, hence, that the impact of information that modifies investor perceptions should be discernable in the market.

6.1 The Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH), introduced by Fama in 1970, has dominated the field of Financial Economics. The hypothesis defines an efficient market as one in which security prices always, instantaneously and fully, reflect all relevant available information. It states that equity markets conform to this definition. (Shleifer, 2000: 1; Blake, 1990: 243)

Until relatively recently the hypothesis stood unopposed: significant empirical evidence had been found supporting it, and the theory's adoption had been widespread. In 1978 a prominent EMH economist Michael Jensen claimed: "There is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis" (Jensen, 1978 in Lo & MacKinlay, 1988: 42).

However, subsequent to Jensens' boast, the EMH has been questioned, challenged and empirically undermined (See Roll, 1988; Shleifer 2000; Lo & MacKinlay 1988; Ferreira & Smith, 1999; Cottle, 1987: 27).

The EMH is underpinned by three arguments (Shleifer 2000: 2):

- Investors are assumed to act and take decisions rationally. In particular, they will value securities in a rational manner.
- Irrational decisions by some investors will be offset by the decisions made by other irrational investors.
- If the irrational investors decisions do not net each other off, rational arbitrageurs will capitalize on the deviation from the rational equilibrium, and hence restore that equilibrium.

6.2 Problems with the EMH

In his book, "Inefficient Markets," Shleifer (2000) draws on many authors to show comprehensively that these assumptions cannot hold.

6.2.1 Rationality of Investors

Shleifer notes that individual investors frequently do not conduct themselves rationally. He draws on Fischer and Black (1986), Kahneman and Riepe (1998), Odean (1998) and others to make this

point. He also references Kahneman and Tversky (1979) who show comprehensively that people tend to conduct themselves irrationally, and irrationally in the same manner. That is, their random deviations from fundamental values are not normally distributed and hence will not net each other off. (Shleifer, 2000: 10-12; his inferences from these authors works are corroborated in Traverso, 2000: 17).

But, it is not just individual investors that Shleifers' discussion addresses. He also explores the rationality of professional and institutional investors. Again, he references a wide range of authors who show that this category of investors also indulge in "noise" trading. Principally these criticisms relate to how the performance of these traders is assessed. Professional investors are judged by the market on their performance relative to each other, as well as relative to the major indexes. As such, the fund managers tend to mimic each other's portfolios, and the indexes. They indulge in window dressing, and buy stocks that have recently performed well. (Shleifer, 2000: 12-13).

In a later chapter, Shleifer (2000: 112-145) establishes a model of investor sentiment that builds on the psychological traits of "conservatism" and "representativeness." He is able to plausibly model sentiment (Shleifer, 2000: 141-143). He also references several different models that variously, and effectively, model sentiment in different ways.

Other authors attest to different manifestations of the same irrationality:

- Nofsinger (2001: 1354) refers to a "disposition effect" where individuals hold "loser" shares too long, and sell "winners" too soon.
- Chang (1998) discusses day-of-the-week effects.

Clearly investors are not rational in the manner assumed by the EMH.

6.2.2 The Impossibility of Arbitrage

Shleifers' argument does not dwell on the rationality of investors. In terms of the EMH, even if investor-trading patters are irrational and correlated (i.e. impacted by sentiment), the existence of arbitrageurs in the market should force prices back to their fundamental values.

Arbitrageurs are specialist traders who profit from the deviations in stock prices, from the fundamental values of those shares (Blake, 1990: 9). Sharpe and Alexander in Shleifer (2000: 3) define arbitrage: "the simultaneous purchase and sale of the same, or essentially similar, security in two different markets at advantageously different prices." Shleifer (2000: 3-4) explains how Fama (1965) and Friedman (1953) use this definition to show how the EMH will hold in the face of shifts in market sentiment.

Shleifer (2000: 13-16) shows that perfect substitutes do not generally exist in the market (this is corroborated, if indirectly, by other authors. For example, Roll (1988: 565). Even when they do, arbitrageurs do not necessarily take advantage of the opportunities. The companies Royal Dutch and Shell merged on a 60:40 basis in 1907 and today their shares are traded on nine exchanges. Royal Dutch is a member of the S&P 500 index, and Shell a member of the LSE FTSE. In an efficient market, Royal Dutch should trade at 1.5 times the value of Shell. However, as the graph in Figure 1 below indicates, this is definitely not the case. (Foot and Dabora (1998) in Shleifer 2000: 29-31).

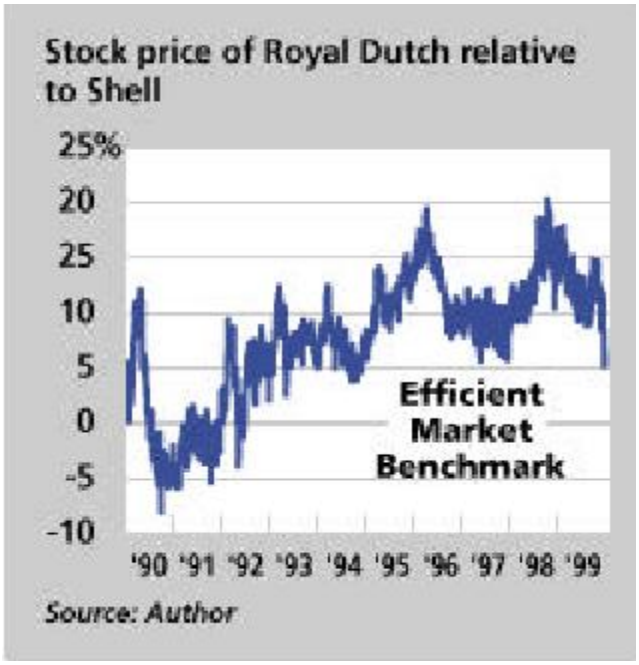


Figure 1 Royal Dutch and Shell

In his argument, Shleifer (2000: 33-52; 89-111) shows the existence of irrational individuals (noise traders) in the market creates risk, both for themselves, and for arbitrageurs.

His assumptions are that arbitrageurs':

- Invest within finite horizons;
- Generally invest other peoples' money.

And that:

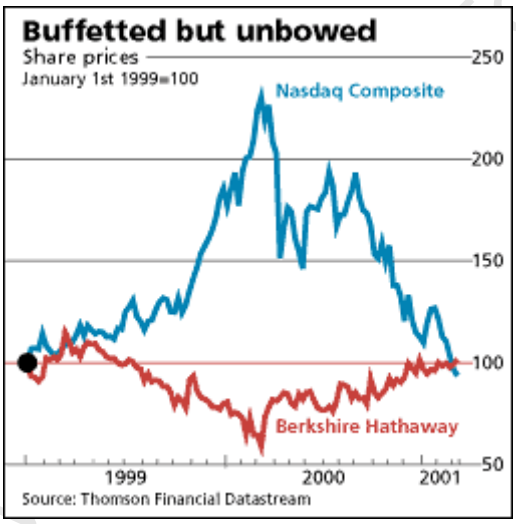
- Market sentiment (or, the perceptions of noise traders) is random.

This last assumption implies that whenever an arbitrageur takes a position in response to a deviation from fundamental values, it is possible that the situation becomes "more extreme" before it reverts to the fair value. In some instances (for example, the Internet bubble), a reversion can take several

years to occur. But, at some point in the future, the arbitrageur will have to report on his performance, to his investors.

This need to report, coupled to the risk that the arbitrage opportunity may widen before it narrows, limits the arbitrageurs' ability to take long-term positions, and, indeed, to trade in the face of the market. Riskless arbitrage is thus not possible.

This is perhaps borne out in the following diagram from the Economist (2001):



Very few arbitrageurs have the resources to fly in the face of investor sentiment for as long as Mr Buffet.

Shleifer builds on the agency relationship between the arbitrageur and his investors and defines a model that essentially de-links the demand for equities by arbitrageurs, from the expected return on the asset.

Shleifer also examines the relationship between creditors and arbitrageurs. Hedge funds utilise significant leverage in their dealings. If there is a significant negative shift in prices before there is an improvement, the value of the shares held as collateral may decline to the point where there is a significant incentive for banks to call the loan. This threat will also mitigate against long-term arbitrage.

It is apparent that arbitrage does not occur in the manner predicted by the EMH.

6.2.3 Random Walks

Blake (1990: 243-245) models the EMH using a fair game model:

$$r_{i,t+1} = \mathrm{E}(r_{i,t+1} \mid \Omega_t) + \varepsilon_{i,t+1} \qquad (1)$$

Where:

$r_{i,t+1}$	The actual return on share i in period $t+1$.
Ω_t	Represents the information available in period t.
$\mathrm{E}(r_{i,t+1} \mid \Omega_t)$	The expected return on share i in period $t+1$, given the information available in period t.
$\varepsilon_{i,t+1}$	A normally distributed random error term for share i in period $t+1$.

It follows from the EMH, that share prices should always impound all available information about the share price. In other words, the best estimate of the future share price is the current share price (Blake, 1990: 245; Roll, 1988: 541). As such (Blake, 1990: 245):

$$E(r_{i,t+1} \mid \Omega_t) = r_{i,t} \qquad (2)$$

Substituting (2) into (1) gives:

$$r_{i,t+1} = r_{i,t} + \varepsilon_{i,t+1} \qquad (3)$$

Essentially, this states that the best estimator of tomorrows share price (as one's returns are determined by the change in share price), is the price today, plus an indeterminable amount (ε) that is a function of the information that becomes available between now and then. Of course this is unknowable.

The formula given in (3) defines a random walk (Blake, 1990: 245). As such, we should expect prices to move in accordance with this random walk function (Blake, 1990: 245; Shliefer 2000: 2; Lo and MacKinlay, 1988: 44) and it should not be possible now, to predict the change in the share price in the future. Note that Shleifer (2000: 2) states that Samuelson and Mandelbrot proved the idea of a random walk as a theorem in 1965 and 1966 respectively.

However, in a paper published in 1988, Lo and MacKinlay show that share prices do not follow a random walk (However, they very elliptically stop short of rejecting the EMH. On page 42 they state: "…our test results may be interpreted as a rejection of *some* economic model of efficient price formation…").

Interestingly, Traverso (2000: 16) states that Fama (the originator of the EMH) in collaboration with French, have questioned his earlier findings.

Again, we can conclude that the EMH does not hold.

6.3 Ramifications

The ramifications of the failure of the EMH are pronounced. Notably, the Modigliani-Miller models are significantly undermined. In a paper published in 1958, Modigliani-Miller asserted that the capital structure of a firm does not matter (Brigham, 1996: 365). The proof of this relies on the concept of riskless arbitrage (Brigham, 1996: 366; Shleifer, 2000: 184). We have seen above that riskless arbitrage is not possible. Therefore, capital structure and dividend policy definitely matter.

Another key part of corporate finance theory that is jeopardized is the Black and Scholes option pricing model: "One specific implication of our empirical findings is that the standard Black-Scholes pricing formula for stock index options is mis-specified." (Lo & MacKinlay 1988: 61).

Shleifer concludes:

> "As soon as arbitrage is limited, investor sentiment and conduct begin to matter and it no longer suffices to focus only on cash flows and news. The world of finance becomes much more difficult and less elegant, but perhaps more accurate as well. In this world, different investors form different models of the future and trade with each other. Trading volume is substantial, especially when different models lead to similar predictions, investors try to buy the same securities at the same time, thereby driving up prices without any fundamental news." (Shleifer, 2000: 183).

It is the relationship between this trading volume and investor sentiment ("models" in Shleifer's text) that this paper seeks to explore.

6.4 Information and Markets

Numerous studies suggest that information does indeed impact the market (Karpoff, 1987; Nofsinger, 2001; Roll, 1988; Ferreira & Smith, 1999; McQueen & Roley, 1993; Shleifer, 2000).

The literature is less clear on the details of this relationship. Karpoffs' survey mentions several possible linkages (Karpoff, 1987: 113-117):

- Copeland's "sequential arrival of information" which postulated that information flows from one trader to the next.
- Epps and Epps' "Mixture of Distributions Hypothesis (MDH)" This model suggests that price changes are a function of the with-in day information arrivals.
- Clark, Tauchen and Pitts, and Harris build on the MDH suggesting that the transaction time intervals are variable.
- Pleiderer speculates that private information is only partially aggregated by the market because of noise emanating from life cycle trading.

Of these explanations, it would seem that the MDH carries the most weight and seems to correspond best with observed data. Interestingly, none of the models imply a relation between the observed relationship between volume and price change (Karpoff, 1987: 116).

This author postulates that it is more relevant to focus on the impact of information within the market, rather than the mode of dissemination. The latter is a complex subject that is both empirically very difficult to quantify, or to measure. However, almost all models, in some way or another, suppose some causality between news or information, and market prices. These linkages are examined briefly below:

- **EMH**

  From Random Walks (page 11,), Equation (1):

$$r_{i,t+1} = \mathrm{E}(r_{i,t+1} \mid \Omega_t) + \varepsilon_{i,t+1} \qquad (1)$$

  In this equation, Ω_t represents the information available in period t. We can see the presumed relevance of information in the model.

- **Shleifers' Model of Investor Sentiment**

  Shleifer (2000: 114-127) finds evidence for under-reaction and over-reaction to news announcements. He has established a model that describes this. Importantly, his model is founded on the impact of information.

- **The Selection Problem**

  In a discussion on asymmetric information in financial markets, Hillier explores the credit markets' response to information asymmetries. He is able to explain both the credit market, and the need for equity markets in terms of these asymmetries. The models hinge on the availability of information. In his model, it is the knowledge of the probability of the success or failure of a venture that is pertinent (in this case, the entrepreneur is presumed to have a better understanding than the banks). (Hillier, 1997: 7-35.)

- **Macroeconomic News and the Stock Market**

  McQueen (1993: 685) presents a model, "conditional on information available at time t" based on the Dividend Discount Model.

6.5 What constitutes information?

The models described above offer some suggestions as to what constitutes information.

Hillier's discussion ("The Selection Problem") on the role of information in financial markets begins (Hillier, 1997: 8):

$$E(R_i) = \rho_i R_i^s + (1 - \rho_i) K \qquad (4)$$

Where:

$E(R_i)$	The expected return of all projects (average).
ρ_i	The probability of the project succeeding.
R_i^s	Project specific return on project i.
K	The return in the event the project fails.

Information constitutes anything that causes us to revise our assessment (or perception) of any of these variables.

This model accords with Shleifers' Model of Investor Sentiment (2000: 178) which suggests that anticipated future earnings must be higher, or perceived risk lower, for stock prices to rise.

Blake (1990: 134) gives the established (Cottle, 1987: 565) Dividend Discount Model as follows:

$$P_0 = \sum_{t=1}^{\infty} \frac{E(d_t)}{(1+r)^t} \qquad (5)$$

Where:

P_0	Fair price of the share.
$E(d_t)$	Expected dividends per share in year t.
r	Cost of capital for a firm in this risk category or the "required rate of return on a firm of this risk class."

Both the "required rate of return" and the "expectation" above implicitly incorporate the investors assessment of information and again we may assert that information is anything that causes an investor's assessment of these variables (Equation 5) to change.

6.6 Information and the EMH

The EMH requires that the market responds instantaneously and immediately to new information. Against this theory, it is difficult to meaningfully assess volume and price changes that occur over time. However, this paper has shown that there are considerable shortcomings with the EMH (indeed, information is not assimilated in the manner assumed by the EMH (Roll, 1988: 558; Karpoff, 1987: 116; McQueen, 1993: 694; Ferreira, 1999)).

By stepping back from the EMH, we can examine other phenomena within the market and so attempt to better our understanding of markets.

The remainder of this section examines how the assimilation of information can impact the market.

6.7 How does the impact of new information manifest itself in the market?

It is commonly held that a price change is reflection of the market changing its expectations of the value of a share. The associated volume is felt to be an indication of the extent to which individual investors interpret the information differently. (Karpoff, 1987: 110).

Specifically, Karpoff (1987: 120) argues that:

- There is a correlation between v (volume) and $|\Delta\rho|$ (the absolute value of a change in price).

- The correlation is between ν (volume) and $\Delta\rho$ (the change in price).
- ν is higher when prices increase than when prices decrease.

It has been shown that the market does in fact react to information. For example, McQueen & Roley (1993) show that prices react to macro-economic news.

Further, it is interesting to note that several authors have found that "stale information" impacts on share prices:

- Ferreira & Smith (1999) examine how shares react to articles based on older, publicly available information.
- Shleifer (2000: 115-117) discusses a study by Bernard (1992) in which stocks are shown to take up to sixty days to incorporate earnings announcements into their prices.
- Several authors have detected autocorrelation or lagged relationships in share prices histories (Nofsinger, 2001: 1342; Shleifer, 2000: 121).

6.8 Previous Studies

6.8.1 The impact of public information on investors

Nofsinger (2001) examines the trading behavior of individual and institutional investors in reaction to company specific news as published in the Wall Street Journal. News articles were collected for a three-month period. They were classified on a variety of characteristics, including length. Abnormal returns and abnormal trading volumes were identified and then correlated to the news articles.

6.8.2 Stock price reactions to recommendations in the Wall Street Journal "Small Stock Focus" column

Ferreira (1999) et al explore the impact of editorial articles on investor sentiment. They categorize the articles over a six-month period. Abnormal returns were determined using a standard event study methodology. They then test for abnormal returns in these stocks, and also explore possible relationships to trading volume and article type. An eleven-day event window was used.

6.8.3 Market Efficiency in Real-Time

Busse (2002: 416) shows that positive news impacts prices on the NASDAQ and NYSE, within seconds, for up to between one (positive news) and fifteen minutes (negative news).

6.8.4 Testing for the Johannesburg Stock Exchange as an Efficient Market

Traverso (2000) attempts to find evidence of abnormal returns on the JSE by forming portfolios based on Value (as per Gordon) and Contrarian investment strategies. He also tests for mean reversion.

He finds that neither of these strategies provides conclusive evidence (Traverso, 2000: 65; 108). Despite this conclusion, they do suggest "inefficiencies were present on the JSE for the 1988-1998 period" (Traverso, 2000: 110).

In his discussion on mean reversion, Traverso's draws on Bradfield and Ardington. They examined the period 1980 to 1996 and found some evidence of market inefficiencies (Traverso, 2000: 111). However, Traverso (2000: 126) was not able to reproduce this for longer periods of observation. But, he does find evidence in shorter periods (Traverso, 2000: 126).

Traverso (2000: 126) is quick to criticize Bradfield and Ardington on the size of their sample. However, despite suggesting that he is drawing on the entire set of listed companies (Traverso, 2000: 52), he never comprehensively describes his data, and his sample for testing "Value Strategies" would appear to be relatively small (Traverso, 2000: 56). His Contrarian investigation uses a sample of 200 companies, but again the data are not detailed (Traverso, 2000: 89).

6.8.5 The Impact of public news regarding potential take-overs on the share price behavior of target companies

In a study published in 1999, Bhana (1999A) examines the impact of information on the JSE. In particular, his paper examines the reaction of shares before and after the first public disclosure of a merger. He finds that the share price starts rising approximately twenty days before the public disclosure of the merger. His sample included 37 companies that undertook mergers, and 97 that did not. He uses daily returns and constructs a portfolio study spanning the period January 1985 to December 1996.

6.8.6 The share price reaction on the Johannesburg Stock Exchange for special (extra) dividend announcements

Bhana (1998) examined the JSE for the twenty year period from 1975 to 1994 and found that share prices react positively to announcements by companies that they will be paying a special dividend (this accords with the predictions of the Dividend Discount Model described on page 16). For an event window of forty days prior to the announcement through to one day after the announcement abnormal returns are calculated. He examined 338 announcements by 100 randomly selected companies.

6.8.7 Other Studies

Several other authors (Van der Merwe (1996); Page (1992); Muller (1999); Henn (1997); Bhana (1999B)) have examined the impact of information and market efficiencies on the JSE.

6.9 Testable Metrics

6.9.1 Abnormal Returns

These are calculated in several pertinent studies (Nofsinger, 2001; Shleifer, 2000: 122; Ferreira, 1999; Bhana (1998)). These can be calculated using the following formula (De Bondt and Thaler in Traverso, 2000: 20):

$$R_t = r_{j,t} - r_{m,t} \qquad (6)$$

Where:

R_t Abnormal return in period *t*.

$r_{j,t}$ The return on stock *j* in period *t*.

$r_{m,t}$ The return on the market in period *t*.

The results of such an examination allow us to establish if the markets' expected return has changed. This follows from equations (4) and (5) on page 15.

6.9.2 Volumes

Given the strong relationship between volume and information assimilation (Karpoff, 1988; discussed: page 17) Nofsinger (2001: 1347) defines a measure of abnormal individual trading volume (see page 29). Abnormally high volumes imply that investors are assimilating new information.

6.9.3 The Order Book

It would seem that the order book (or "market depth") can provide meaningful clues as to how investor sentiment is changing.

7 Formulation of a Null Hypothesis

7.1 Information and the JSE

There is: "a general duty for companies to disclose circumstances, events or new developments that could have a material effect on their financial position or share prices" (JSE, 2003C). Conveniently for this study, the JSE listing requirements require companies to publish "SENS announcements" disclosing price-sensitive information through the JSE Stock Exchange News Service (SENS). Further, the information may not be disclosed publicly or to any individual or group, until it has been published through the SENS system. (JSE, 2003C).

Consequently, SENS announcements should catalyze a reassessment by individual investors, of their perception of $E(R_i)$ or P_0 (Equations 4 and 5 respectively).

7.2 How does the impact of new information manifest itself in the market?

As discussed above, it can be seen that a price change reflects a change in the market's assessment of the variables that drive $E(R_i)$ or P_0 in Equations 4 and 5 on page 16.

For example (with reference to Figure 2 below and to Equation 5 on page 16), assume that an investor believes that a share is correctly valued at its current equilibrium price of P_1. If the investor then receives information that causes him to believe that the dividends that the investment will

generate, will increase, he will increase his valuation of the share to P_2. If the share remains priced at P_1, the investor will engage in arbitrage until the share is correctly priced at P_2. (This behavior can be observed, in an uncontrolled environment, by watching the currency crosses as Mr Greenspan pronounces on US interest rates). In effect, the supply and demand curves have shifted as illustrated below:

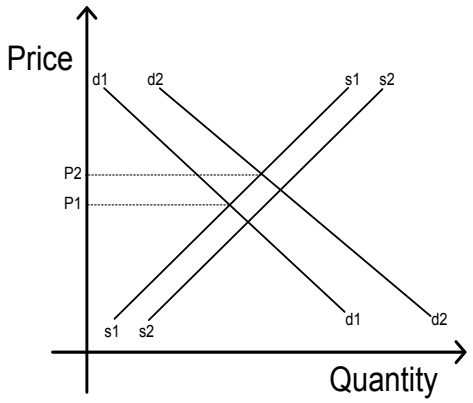


Figure 2 Changing Market Equilibriums

Karpoff (1987: 110) suggests that the volume generated in reaction to such a price change is an indication of the extent to which individual investors interpret the information differently.

It is also possible that investors' perceptions may change without there being a change in the equilibrium share price, as illustrated below:

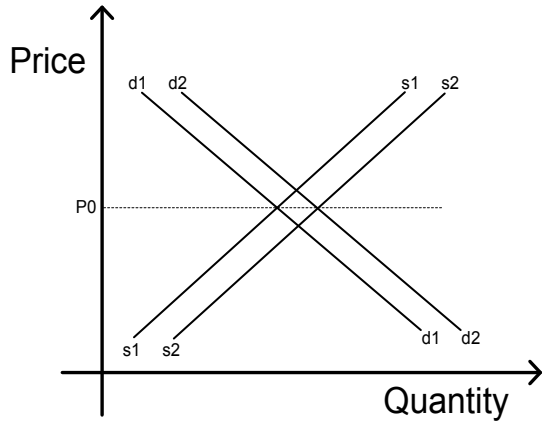


Figure 3 Demand and Supply Changes without a change in the Equilibrium price

Even in this scenario, the changing assumptions of the individual investors will result in buying and selling of shares as the investors shift their positions on the supply and demand curves until a new equilibrium is established. Thus, we should expect to see an increase in volumes traded in reaction to SENS announcements. It is the existence of these volumes that this paper seeks to explore.

Importantly, however, Shleifer (2000: 183) suggests that it is possible for prices to change, without news (see page 13). This agrees with Karpoff (1987) as discussed on page 17. As already noted, this study will only concern itself with the impact of news in the market. It does not attempt to assess the behavior of participants in the market or the mechanism whereby information is propagated through the market (see page 14) .

7.3 Null Hypothesis

From the preceding discussion, we can formulate a null hypothesis (H_0): Firm specific SENS announcements have no impact on stock exchange trading volumes on the JSE.

8 Methodology

8.1 Introduction

Studies have shown that news can have a discernable impact on volumes in the market within very short (seconds) timeframes (Busse (2002: 416)).

This author did not encounter any prior studies of news and market efficiency on the JSE that have considered intraday trade information. Inevitably, closing price information is used (for example, Bhana (1999A; 1999B)), and frequently, index data is used rather than actual share data (for example van der Merwe (1996); Henn (1997)).

This propensity to utilise closing price data is also apparent in overseas studies, and Nofsinger (2001:1342) notes that relatively few authors explore trade at an intraday level (although he does cite some exceptions). Many studies do, however, view the market from a longer term perspective. Notably:

- Ferreira (1999) et al explore the impact of the editorial articles on investor sentiment using an eleven-day event window.
- Roll (1988: 541) looks at both daily and monthly timeframes.
- Shleifer (2000: 115-117) discusses a study by Bernard (1992) in which stocks are shown to take up to sixty days to incorporate earnings announcements into their prices.

Closing price data is probably used, because:

- it is more readily available,
- it provides a natural set of periods in which to assess the information; and

- the smaller volume of data is significantly more manageable.

However, there are meaningful drawbacks to this approach. Blume and Stambaugh (1983: 389-391) in Page (1992), state that: "the use of closing prices contains a bias due to the 'bid-ask' effect and 'non synchronous trading'." Indeed, if it were possible to use closing price data to assess the impact of news on a trading day, intuitively it would seem that the announcements would have to occur nearer the start of the day, or, at worst, to be normally distributed through the day. Figure 5 below, reflecting the distribution of SENS announcements during the trading day, clearly suggests that this is not the case:

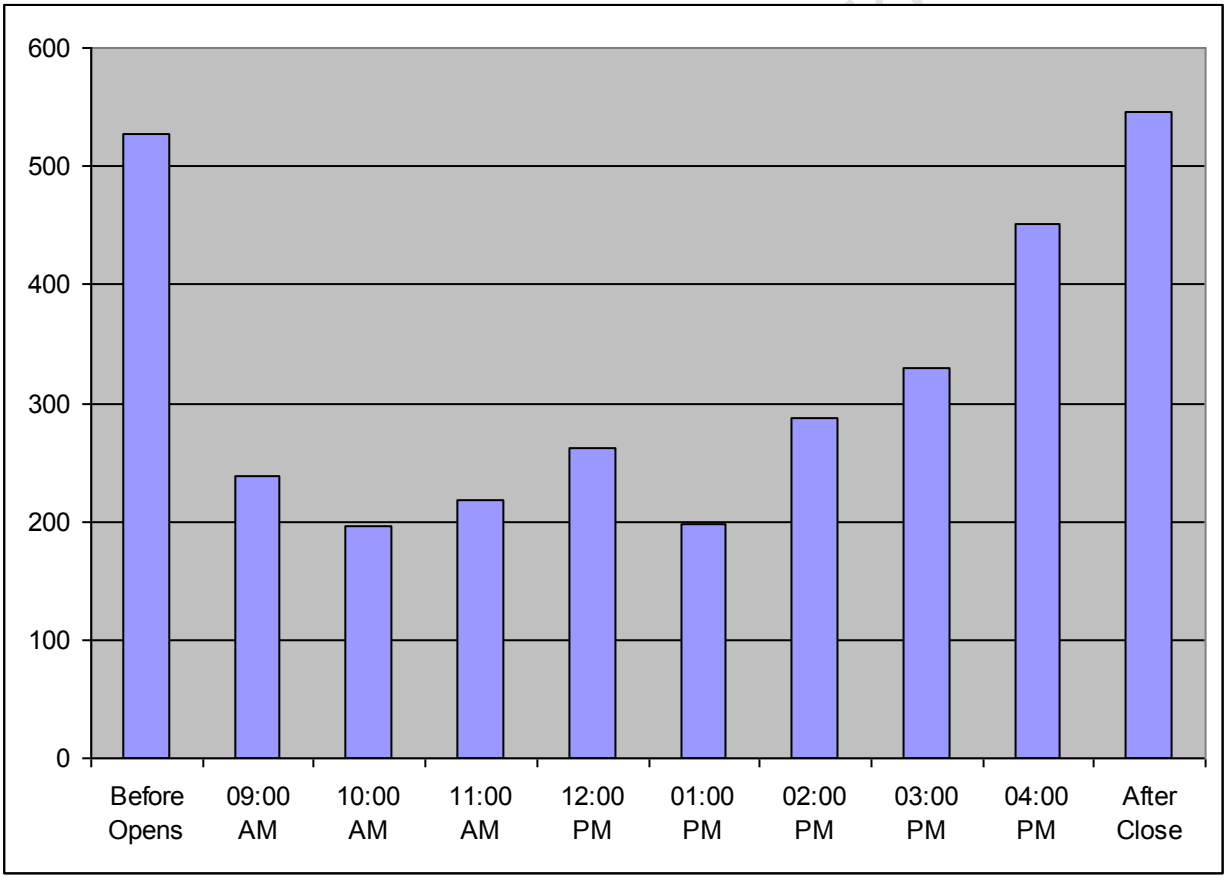


Figure 4 Hourly distribution of announcements during trading day

More practically, in a study such as this one, blindly accepting closing price information will implicitly mask the time that announcements or trades occur. While in other studies this may be

beneficial and even necessary (for example, it may be unclear when information contained in a newspaper article was released or published), Figure 4 clearly suggests that masking the time of the announcement would be inappropriate in this analysis as many announcements occur after the market has closed. These announcements can not impact volume on that trading day. If the announcement caused a reaction, it could only manifest itself on the following trading day.

The precise time that a SENS announcement was published is known. Furthermore, the trades that took place after the announcement was made can easily be identified. It is therefore possible to relatively easily construct experiments that consider the impact of news much more directly. This is the approach that this study will adopt.

8.2 The Aim

We wish to construct an experiment or experiments that allow us to assess our null hypothesis (that firm specific SENS announcements have no impact on stock exchange trading volumes on the JSE).

The timing of SENS announcements is shown in Figure 4 above and the distribution may be summarised as follows:

Before the market opens	528
First half of trading day (9 AM to 1 PM)	914
Middle of the trading day (11 AM to 3 PM)	966
Last half of trading day (1 PM to 5 PM)	1 267
After the market closes	597

Figure 5 Distribution of announcements within the trading day

As the impact of announcements is not known, five independent tests will be constructed, each testing one of these relatively arbitrary groupings. Specifically, the five independent series ("experiments") will be defined by grouping the data into periods in the following manner:

- For announcements falling before the opening of the market, or after the close of the market on the preceding day ("Trading Day" experiments)
    - all trades on that day will be assessed;
    - all trades between 9 AM and 1 PM will be assessed.
- Additionally, the trading day will be broken into three segments and periods defined accordingly ("Intraday" experiments):
    - 9 AM to 1 PM (deliberately excluding all announcements made while the market was closed);
    - 1 PM to 5 PM; and
    - 11 AM to 3 PM.

Periods in which an announcement is made in the first half of the "Intraday" period, or while the market is closed in the case of the "Trading Day" experiment, will be declared "News" periods (see "Categorisation of Periods" on page 48 for specifics).

To ensure that the volumes measured in a period are reasonable, if an announcement occurs for a company, in the second half of any period, that period will be discarded for that experiment, for that share, for that trading day. Further, if an announcement occurs in the two hours preceding an "Intraday" period, that period will be discarded. For the "Trading Day" experiment, days on which a SENS announcement occurs while the market was open, will be rejected.

This study will assess the entire market. It will then repeat the assessment for the following JSE defined groupings of shares:

- Top Companies Banding ("ZA01")
- Medium Liquid Banding ("ZA02")
- Less Liquid Banding ("ZA03")
- Financial 15 ("J212")
- Top 40 ("J200")
- Industrial 25 ("J211")
- Resource 20 ("J210")

8.3 Why not order book information?

The markets' order book also provides clear indications of changes and differences in investor sentiment. However, the order book suffers from some limitations:

- Orders are free to place and may simply be speculative or opportunist.
- It does not include all orders. For example, fill or kills orders will never be reflected in the market depth.

For these reasons, this study will adopt a trade driven metric.

8.4 A Testable Metric

Nofsinger (2001: 1346) defines a measure of standardized, individual trading volume:

$$IndividualTradingVolume_{i,t} = \frac{VolumeInPeriod_{i,t}}{\frac{1}{T}\sum_{t=1}^{T} VolumeInPeriod_{i,t}} \qquad (7)$$

Where:

i	Company number
t	Period
T	Total number of periods in sample (one period is required for each day, and on page 41, 162 days are identified for inclusion in the study)
$VolumeInPeriod_{i,t}$	The number of shares of company i traded in period t.

Restated, this equation defines a standardized trading volume for each share, for each period, by dividing the volume in a period, by the average volume traded in each period, for each equity. If this value is greater than one, the share experienced abnormal trading on that day. If it is less than one, it experienced unusually little trade.

Certain macro-economic events or announcements (as well as day-of-the-week or seasonal events) will impact all shares equally. To eliminate this concern, a cross sectional average (across all the companies), is calculated for each period:

$$E\left(IndividualTradingVolume_{i,t}\right) = \frac{1}{I}\sum_{i=1}^{I} IndividualTradingVolume_{i,t} \qquad (8)$$

Where:

I	Number of companies in sample (441 companies were eventually included in the sample. See page 38.)

Note that the average of these values (Equation 4) should again be 1.

Finally, abnormal trading volumes are defined as:

$$AbnormalIndividualTradingVolume_{i,t} = IndividualTradingVolume_{i,t} - E(IndividualTradingVolume_{i,t}) \quad (9)$$

It should thus be apparent that the average $AbnormalIndividualTradingVolume_{i,t}$ should be 0.

The results will be collated for each equity, for each period (71 442 periods per experiment). As discussed on page 28, each period will then be categorised as a "News" or "No News" period, or it may be rejected (please also see "Categorisation of Periods" on page 48).

8.5 A Testable Hypothesis

Initially we stated our null hypothesis as: Firm specific SENS announcements have no impact on stock exchange trading volumes on the JSE. We may now restate this as: The mean level of abnormal trading should be higher in samples where announcements have been made, than in samples where no announcements have been made.

Which we may state more formally:

(10)

Specifically, for each experiment, we will construct a set of comparable $AbnormalIndividualTradingVolume_{i,t}$ values (from Equation 9), categorised into "news" and "no news" groupings. The mean of these $AbnormalIndividualTradingVolume_{i,t}$ values will be calculated for each category. Finally these means will be compared using a statistical Z-test (required given the large sample size).

The experiments will then be repeated for each of the groupings of shares identified on page 29.

8.6 Formal Methodology

8.6.1 Step 1

(10)

8.6.2 Step 2

We will use a one tailed test of significance, at the 1% level:

8.6.3 Step 3

$$z = \frac{\left(\overline{x_{NoNews}} - \overline{x_{News}}\right)}{\sigma_{\overline{x_{NoNews}} - \overline{x_{News}}}} \qquad (11)$$

$$\sigma_{\overline{x_{NoNews}} - \overline{x_{News}}} \approx \sqrt{\frac{s_{NoNews}^2}{n_{NoNews}} + \frac{s_{News}^2}{n_{News}}} \qquad (12)$$

Where:

$\overline{x_{NoNews}}$	Mean of the "No News" sample.
s	Standard deviation of sample.
n	Number of elements in sample.
$\sigma_{\overline{x_{NoNews}} - \overline{x_{News}}}$	Standard error of the differences of sample means (the standard deviation of the differences of the sample means).

8.6.4 Step 4

Reject H_0 if $z < -2.326$.

8.6.5 Step 5

Calculate Z.

8.6.6 Step 6

Reject or accept H_0.

9 Data

9.1 Introduction

Nofsingers' (2001: 1342 - 1343) study was based on a collection of New York Stock Exchange trades know as the Torq dataset. From this dataset he extracted all the trades for the period of his study: 1 November 1990 through to 31 January 1991. He then:

- Grouped all the shares in the dataset, by market capitalisation, into ten sorted pools.
- Thereafter, fifteen stocks were randomly selected from each of the ten groups of shares;
- This sample of 150 shares was reduced by six stocks that ceased trading during the study.
- "Market order" trades where both the buyer and the seller type (institutional or individual investor) could be identified were selected.
- This resulted in a pool of 921 400 trades, from an initial population of 1.78 million trades. Only the volume component was assessed.

In contrast, very few studies of the JSE have had this depth of data to draw on. Further, the relatively small number of companies listed on the JSE and the relatively low liquidity of the market, also results in a "survivorship bias", where many companies from an initial sample are eliminated because they de-list, or cease to trade (see Page, 1992). The largest studies are seldom able to consider more than two hundred shares (for example, Muller (1999) and Traverso, (2000: 89)), and more generally, consider far fewer (Bhana's (1999B) uses a sample of one hundred shares; Traverso's sample in his test of "Value Strategies" would appear to be relatively small (Traverso (2000: 56))). Sometimes, the eventual sample size is not disclosed (for example, Traverso, 2000: 56).

9.2 The Data

This study uses data sourced from Moneymax, a division of McGregorBFA. The data consists of the raw data feeds covering the period 15 November 2002 (data prior to this date did not include SENS records) through to 31 July 2003 (inclusive), or 175 trading days. In order to make the dataset more manageable, only SENS Announcement and trade report information was obtained from the provider. This initial sample included 2 239 541 data points.

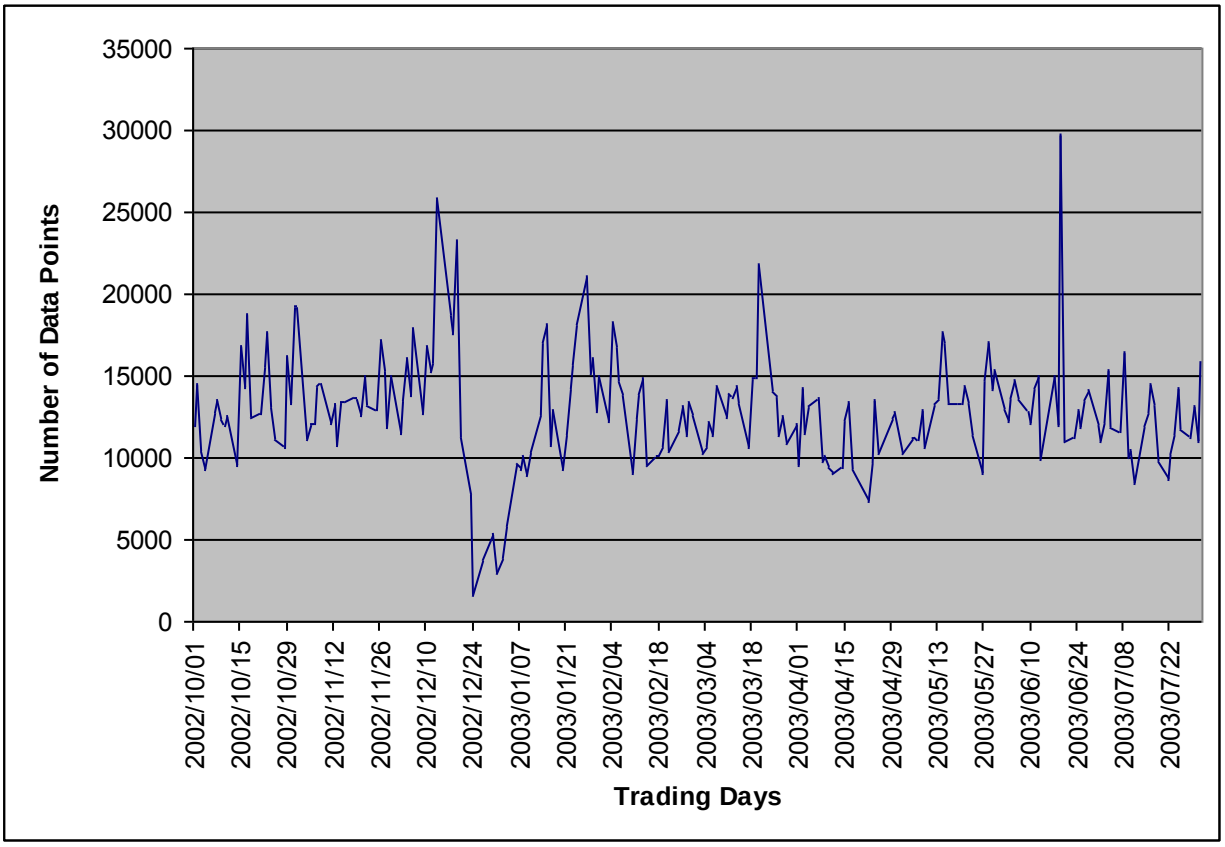


Figure 6 Data Points Per Trading Day in initial unfiltered 175 day dataset

The eventual size of the sample reduced to 441 companies, who traded 1 795 810 times and issued 3 255 announcements (see page 38 as well as Figure 7 on page 36 which summarizes the data).

	Sample Population		Market Segments			Key Indexes			
	Unfiltered Initial Sample	Extracted Population	Top Companies	Medium Liquid	Less Liquid	Financial 15	Top 40	Industrial 25	Resource 20
Number of Companies Trading	1 157	437	40	84	313	15	41	24	20
Number of Trades	2 145 801	1 795 810	1377508	293793	124509	412748	1398792	438696	628678
Volume	30 236 722 244	15 173 561 553	7359159755	3980773780	3833628018	3272349346	7391701309	3244706530	1414731273
Number of Companies making announcements	450	393	40	80	273	15	41	24	20
Number of Announcements	4 210	3 255	767	750	1789	244	805	303	426

Figure 7 Summary of Data

9.3 Companies

The study is concerned with the impact of News (SENS Announcements), on companies listed on the JSE. To ensure that meaningful comparisons could be made across the entire duration of the study shares had to be listed for the entire period from 15 November 2002 to 31 July 2003. This was checked by comparing the JSE closing price file from 15 November 2002 (JSE, 2003A), to the equivalent file from 31 July 2003 (JSE, 2003B). On this basis, 1 158 equities were identified as being eligible to participate in the study. Notably, Telkom was excluded as it was not listed on 15 November.

Within the market, the JSE groups all instruments in five bandings:

- JSE Top Companies;
- Medium Liquid;
- Less Liquid;
- Special Products (warrants, waves and other derivative products); and,
- the NSX Market (Namibian Stock exchange).

The derivative market functions quite differently to the equities market. As such, all members of the Special Products banding were excluded. Unfortunately, during the period under review, the JSE reclassified warrants and waves from the liquidity bandings, to Special Products. Worse, a minority of equities appear not to have been reclassified. As such, a comprehensive list of all warrants and waves was obtained from SAWarrants (2003), and these were eliminated from the population.

Shares in the Namibian Stock Exchange banding (whose trade and other data was included in the dataset provided), were also rejected.

Effectively, to be included in the study, the shares had to be listed for the entire period, and included in the JSE Top Companies, Medium Liquid or Less Liquid bandings. Ultimately, 447 companies were eligible to be included in the study, of which 437 traded (1 795 810 times) and 393 companies published 3 306 announcements. Only 6 stocks neither traded, nor released an announcement, resulting in an effective population of 441 companies.

9.4 Additional Data

The provider supplied listings of the constituent shares within the:

- Financial 15 Index;
- Top 40 Index;
- Industrial 25 Index;
- Resource 20 Index; and
- the JSE Market Bandings

Subsequently, the detail (body text) of the SENS announcements assessed in the first part of the study, were supplied by Moneymax. Data on holdings, subsidiaries and investments was obtained again from Moneymax (but, in this case, ultimately from McGregor-BFA).

McGregor-BFA provided market capitalisations for fifteen randomly selected shares in each of the "Top Companies" and "Less Liquid" bandings.

9.5 Problems with the data

While the data provider could supply a checked closing price feed, they were not able to provide similar warranties for the raw feed. Therefore, the data was checked for reasonability and integrity using sequence information provided as part of the feed, by the JSE.

It was noted that certain days were missing data:

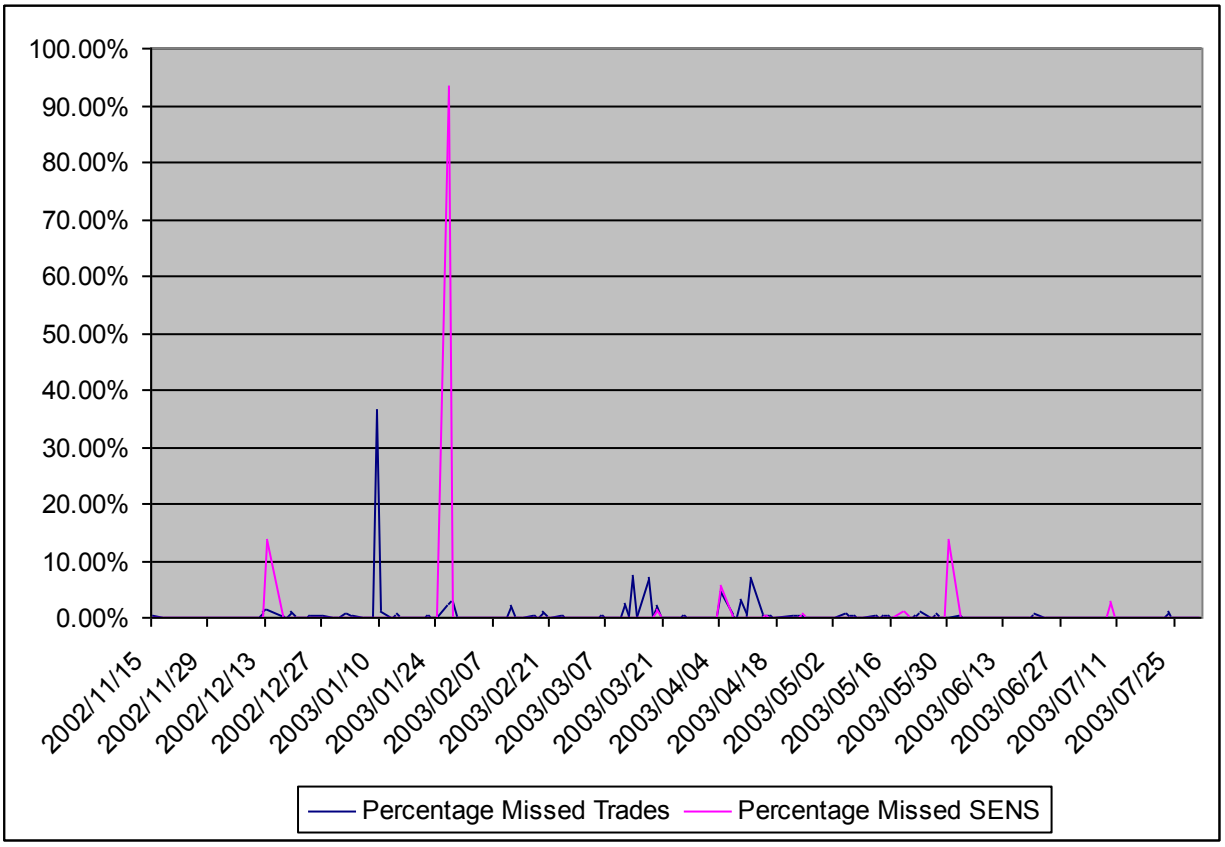


Figure 8 Percentage of missed entries for each record type

To compensate for this, all days on which more than 2% of either the trade or SENS information was missed, were ignored:

Trading Date	Total Data Points	Trades	SENS	Missed Trades	Missed SENS	Percentage Missed Trades	Percentage Missed SENS
13 Dec 2002	25 797	25 357	440	312	60	1.23%	13.64%
09 January 2003	8 863	8 652	211	3 155	-	36.47%	0.00%
27 January 2003	21 134	20 674	460	473	429	2.29%	93.26%
28 January 2003	15 140	14 706	434	410	-	2.79%	0.00%
11 March 2003	13 907	13 551	356	346	-	2.55%	0.00%
13 March 2003	14 334	13 986	348	1 015	-	7.26%	0.00%
17 March 2003	10 613	10 270	343	738	-	7.19%	0.00%
19 March 2003	14 907	14 438	469	323	7	2.24%	1.49%
04 April 2003	13 230	13 004	226	576	13	4.43%	5.75%
09 April 2003	10 123	9 650	473	302	-	3.13%	0.00%
11 April 2003	9 015	8 669	346	614	-	7.08%	0.00%
30 May 2003	15 358	14 624	734	21	101	0.14%	13.76%
09 July 2003	10 060	9 835	225	2	6	0.02%	2.67%
Overall Total	**2 239 541**	**2 145 801**	**93 740**	**10 903**	**631**		

Figure 9 Days excluded because of missing data points

In this manner, the thirteen trading days listed in Figure 9 above were eliminated.

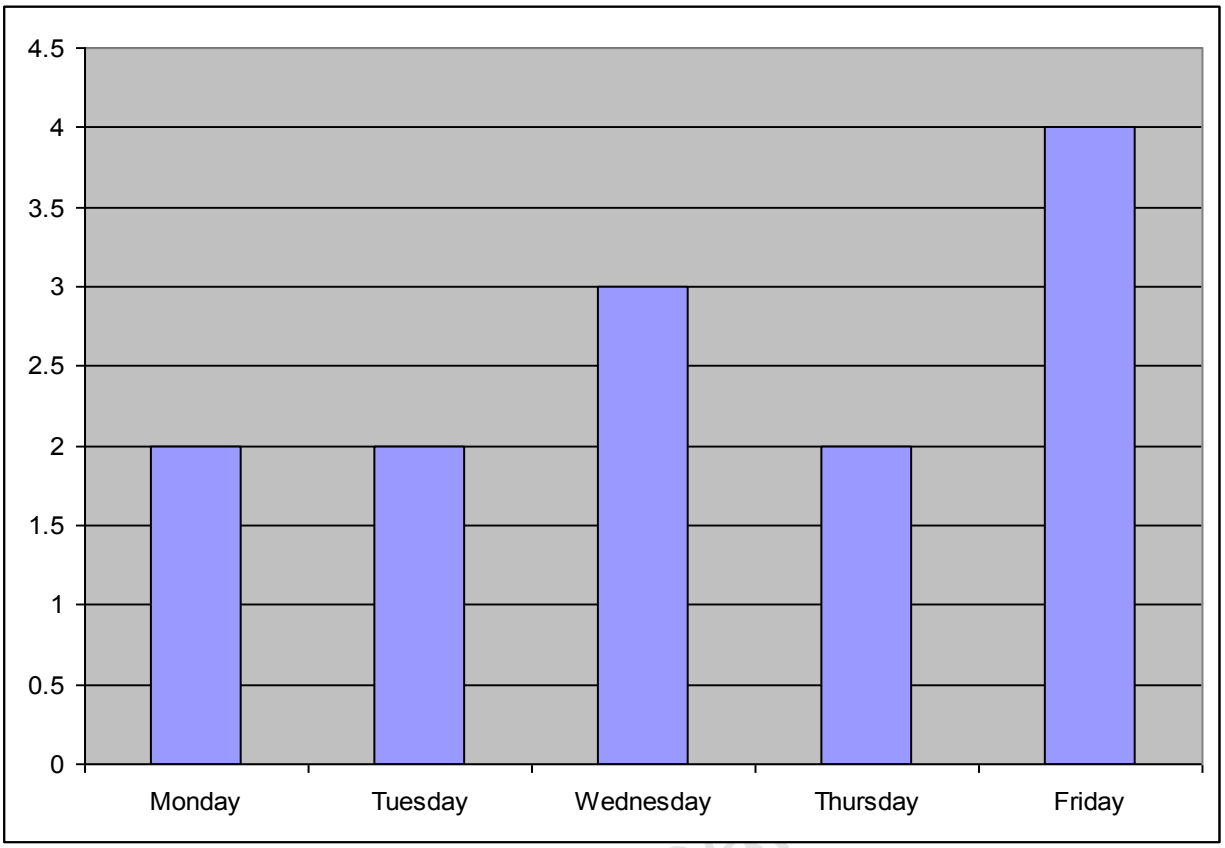


Figure 10 Day distribution of excluded days

Consequently, the number of days in the study reduced from 175 to 162, and the volume of raw data declined by 8% from 2 239 541 to 2 057 060 points. A further two data points (trades) were excluded because date abnormalities.

9.6 Trade information

9.6.1 Identification and Review of Trades

During the period under review, 97.6% of trades were either "Automated" or "Auction" trades. While these trades may not always result from orders entered in the JSE's order book (for example, "Fill or kill" orders), these trades have resulted from "normal" JSE trading. They reflect the result of orders placed by individuals and institutions in reaction to market conditions, and have been matched in the market.

The remaining 2.5% of trades (a staggering 29.6% by volume) are, for example, correcting entries, of exceptional size ("Off order book" or "Block: trades) or late trades. They do not impact the calculation of the day's high, low and close (Moneymax, 2003; JSE 2003C) and are frequently not matched in the market – occurring instead as the result of rights issues or takeovers. Furthermore, the price that these orders occur at are frequently dramatically different to the ruling price in the market on that day. Refer to "Trade Types" on page 73, in the Appendix, for a complete definition of trade types.

All trade data points in initial sample	Number of Trades	Volume
All trade types	2 145 801	30 236 722 244
AT and UT trades	2 094 982	22 586 609 229
	97.63%	**74.70%**

Data points for shares eventually included in "the sample" (see page 43)	Number of Trades	Volume
All trade types	1 841 208	21 538 730 973
AT and UT trades	1 795 810	15 173 561 553
	97.53%	**70.45%**

Figure 11 Automated and Auction Trades

This study concerns itself with the impact of news on investor sentiment. Investor sentiment will drive investor decisions, which, in turn, will be reflected in trades that match in the market. As "Automated" and "Auction" trades constitute trades initiated by investors during the normal course of trading, the study will restrict its analysis to trades of these types.

Trades were identified as follows:

- Trade details were extracted from the JSE Trade Report system for trades occurring between 15 November 2002 and 31 July 2003.
- This initial population consisted of 2 145 801 trades.
- 186 384 trades were rejected because they occurred on the thirteen days eliminated because of missing data (see Problems with the data, page 39). The sample reduced to 1 959 417 trades.

- Eliminating non "Automated" or "Auction" trades decreased the population by 46 342 (2.4%) to 1 913 075. (Note that this decrease is greater than the decrease implied in Figure 11 as the filters below have not yet been applied to this number.)
- Filtering out warrants further reduced this total to 1 852 479, and then removing the remainder of segment ZA04 (Special Instruments) as well as trades from shares not correctly allocated to a JSE market segment reduced the remainder to 1 828 428 trades.
- Removing all records pertaining to companies not listed at both 15 November 2002 and 31 July 2003 resulted in the deletion of 32 618 trade data points.
- Our resultant sample consisted of the company, volume and trade date and time for 1 795 810 trades in 437 equities (unless otherwise noted, this will be referred to as "the sample" or "the population".)

A brief analysis of the data would suggest that there is a "day-of-the-week" effect evident, with Monday and Friday attracting considerably fewer trades than Tuesday, Wednesday and Thursday. This is illustrated in Figure 12 below.

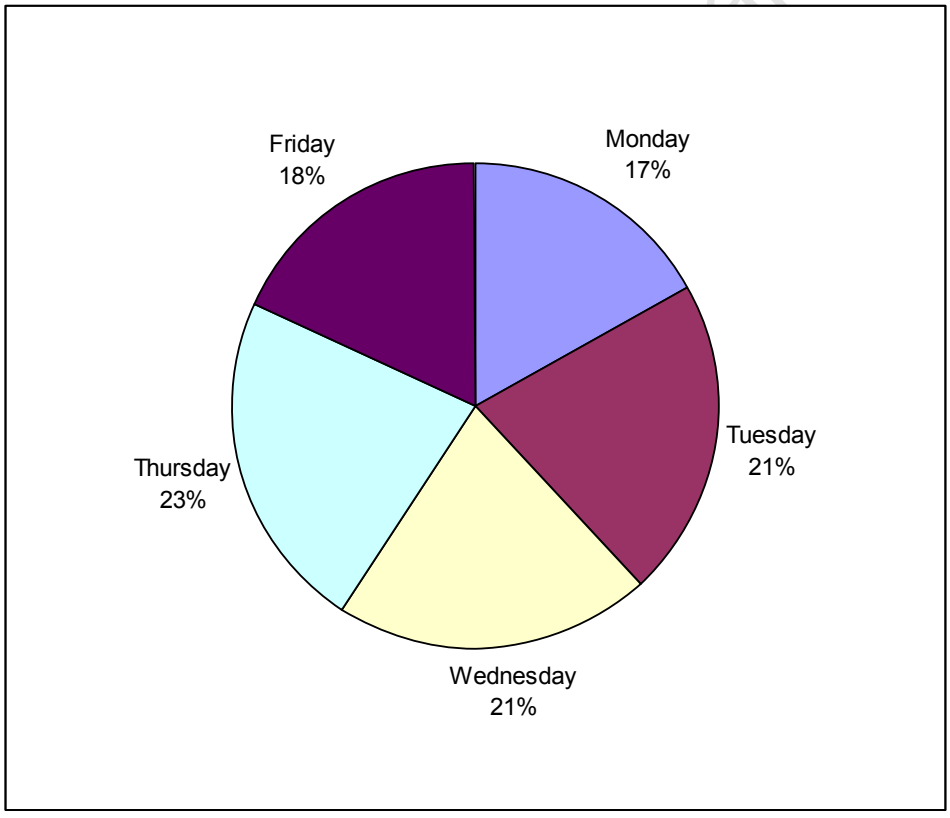


Figure 12 Day of week effect for trades

The data does not suggest seasonality or "day-of-the-month" effects (Figure 13 below). Two exceptions to this are clearly apparent: Christmas and Easter, with the Christmas period appearing as a massive trough in Figure 13.

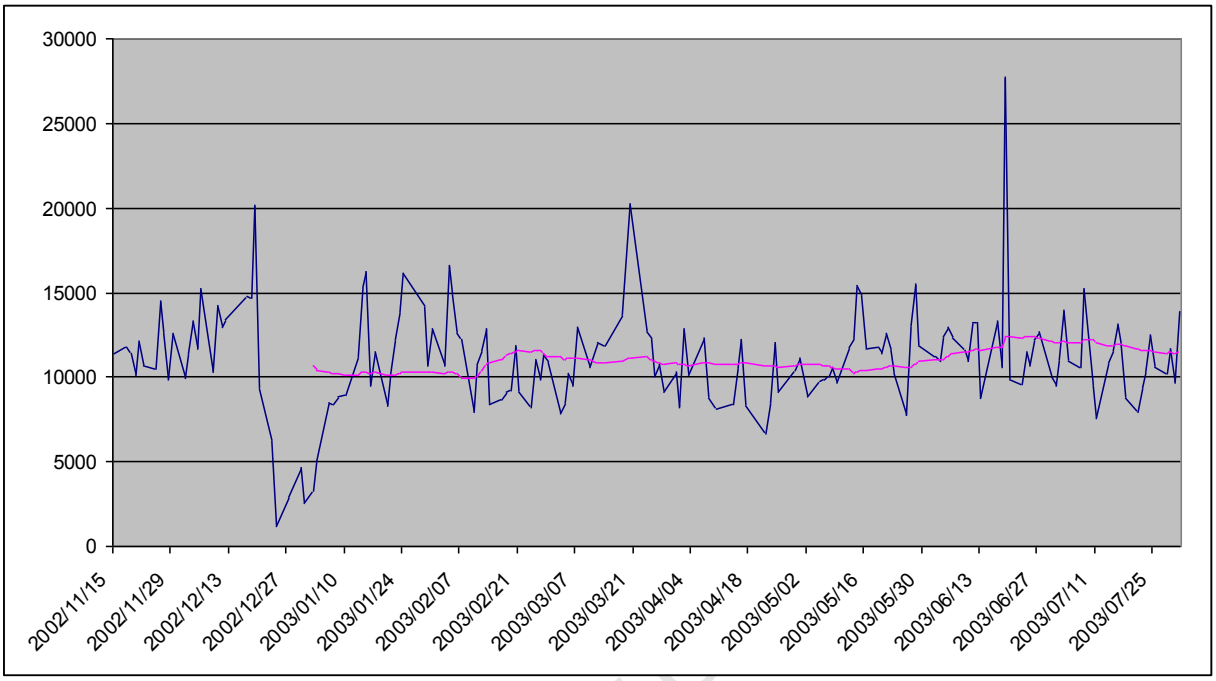


Figure 13 Number of trades per day and 30 day moving average

9.6.2 Transformation and Manipulation of Data

The metric defined in Equation 9 on page 31 adjusts for market-wide phenomena (for example Christmas) by incorporating an average volume level across all shares in each time period (the result of Equation 8). As such, the only further manipulation of this data will be to summarise the trade volumes per period for use in Equation 5.

9.7 SENS Announcements

9.7.1 Identification and Review of Announcements

SENS Announcements were imported as follows:

- The JSE News Control system was studied and 4 210 announcements were identified between 15 November 2002, and 31 July 2003 (inclusive).
- It was confirmed that all 4 210 announcements had a text or body part associated with them, implying that they were at least superficially valid SENS announcements).
- Many SENS announcements contain generic market information (for example, announcing a change to the interest rate applicable to funds held with the JSE) or pertain to more than one company. 359 announcements fell into this category and were removed.
- A further 277 were eliminated because they occurred on one of the thirteen days previously eliminated because of missing data (see Problems with the data, page 39).
- 24 Records pertaining to shares that were no longer correctly allocated to a market segment, or that were pertinent to shares on the Namibian exchange, were eliminated.
- Of the remaining announcements, companies not listed at both 15 November 2002 and 31 July 2003 contributed 244 publications.
- After the data had been adjusted (see "Transformation and manipulation of data" on page 47 below) to take cognisance of whether the market was open or closed, 47 records moved onto the thirteen rejected days, and four announcements moved into August 2003.
- This left 3 255 SENS announcements made by 393 companies.

It is interesting to note that, while Anglo American posted the largest number of announcements, no company is individually responsible for more than 3% of SENS postings. However, the distribution is not even. Figure 14 below reflects the cumulative contribution of SENS announcements by companies, when ordered by number of announcements. It is apparent that 185 companies contributed the first 20% of announcements, while only eighteen companies (amongst them, Anglo American) contributed the final 20% of announcements.

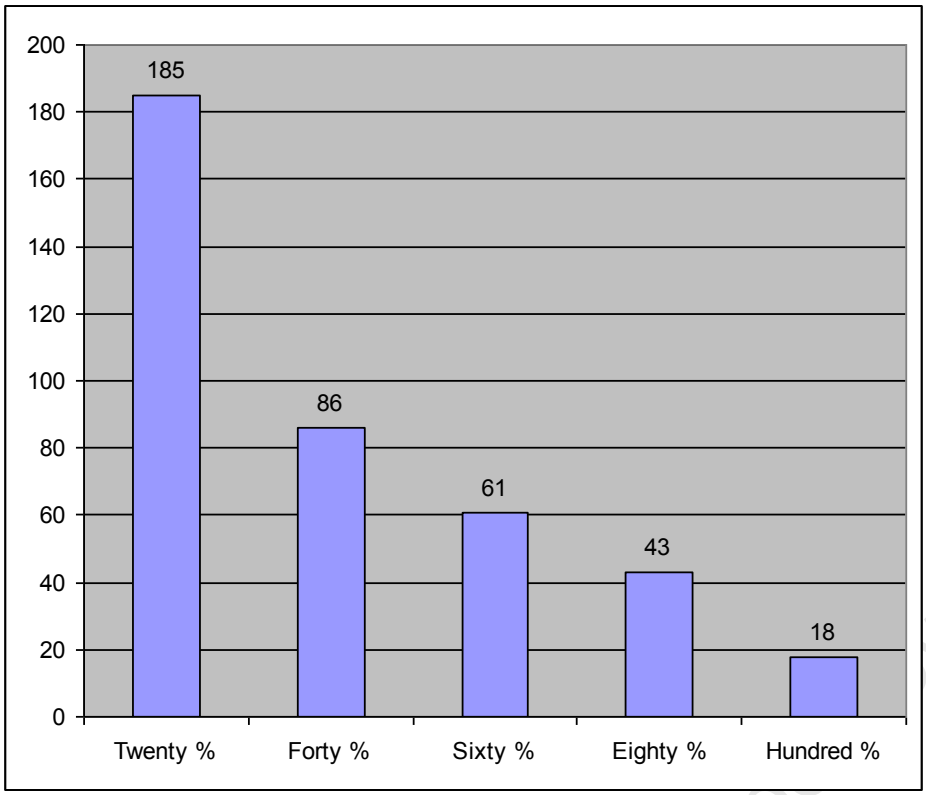


Figure 14 Histogram reflecting fraction of SENS announcements contributed by Companies

Figure 15 (below) suggests that there is no meaningful day-of-the-week effect.

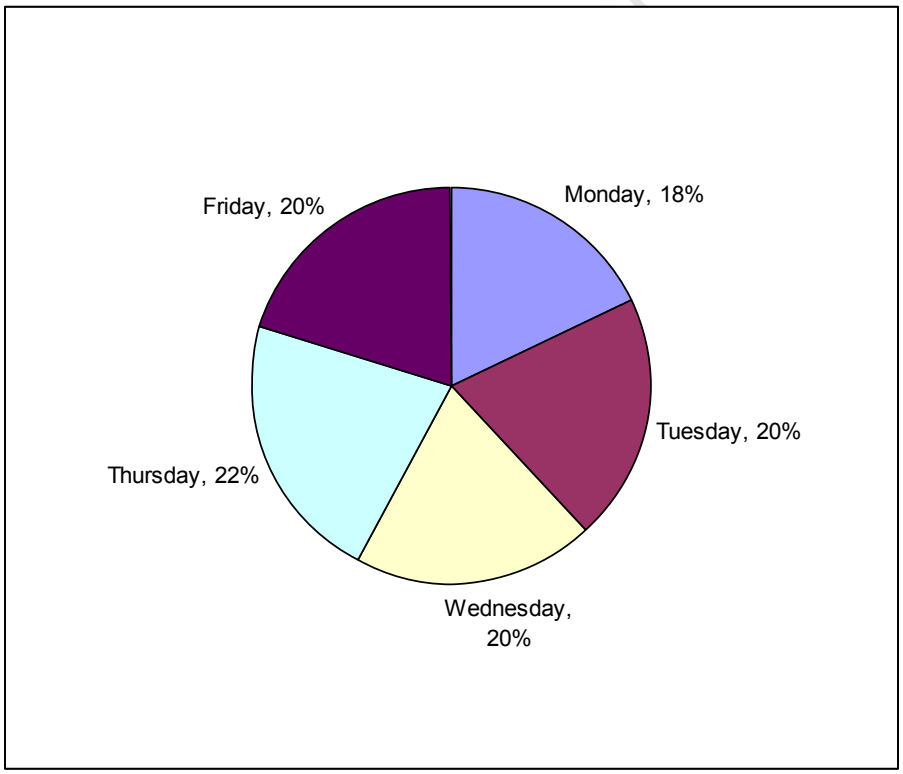


Figure 15 Distribution of announcements by weekday

However, the data below does indicate that the distribution of data during the trading day is skewed towards the latter half of the day:

Before the market opens		528	16%
First half of trading day (9 AM to 1 PM)		914	28%
Last half of trading day (1 PM to 5 PM)		1 267	38%
After the market closes		597	18%
SENS Announcements initially extracted		**3 306**	100%
Moved onto one of 13 rejected days (see below)	(47)		
Moved beyond 31 July 2003 (see below)	(4)		
Total after manipulation of announcement times		**3 255**	

Figure 16 Timing of announcements

It is hoped that the construction of the experiments (9 AM to 1 PM; 11 AM to 3 PM; 1 PM to 5 PM) will control for these distributions.

9.7.2 Transformation and manipulation of data

If an announcement was made while the market was closed, its impact on supply and demand curves can only manifest itself once the market opens. Thus, SENS announcements that occurred after the close of the market were considered to have been made at 8:20 AM on the following trading day. Similarly, all announcements that took place before the market opened, were considered to have been published at 8:30 AM.

1 125 of the 3 306 announcements occurred while the market was closed. Of these, 597 occurred in the evening, and had to move to the following trading day (in only eighteen instances was there a

public holiday on what would have been the following trading day. 91 of the announcements happened after the market closed on a Friday).

9.7.3 Categorisation of Periods

As discussed on page 28, periods were assessed and categorised as follows:

- As a "News" period if an announcement occurred before the midpoint of "Intraday" periods, or before the market opens for full "Trading Day" periods.
- As a "Rejection" in the event that an announcement was made for this company after the midpoint in "Intraday" periods, or during the trading day for "Trading Day" periods.
- As a "Rejection" if a SENS was published within two hours of the start of an intraday period (periods starting at 9 AM will be rejected if an announcement was made before the market opened, or after the market closed on the preceding day).
- All remaining periods were classified as "No News" periods.

The results of this analysis are shown in Figure 17 below.

Trading Day: 9 AM through 1 PM		
Discard	860	1%
News	959	1%
No News	69623	97%
	71442	
Trading Day: 9 AM through 5 PM		
Discard	1992	3%
News	909	1%
No News	68541	96%
	71442	

9 AM through 1 PM		
Discard	1440	2%
News	379	1%
No News	69623	97%
	71442	
1 PM through 5 PM		
Discard	1184	2%
News	423	1%
No News	69835	98%
	71442	
11 AM through 3 PM		
Discard	858	1%
News	440	1%
No News	70144	98%
	71442	

Figure 17 Categorisation of periods

10 Results

10.1 Presentation

With reference to the formal methodology given in section 8.6, the results may now be reviewed.

10.1.1 Step 5

The Z Values are presented in Figure 18 on page 51.

	Entire Market	Top Companies (ZA01)	Medium Liquid (ZA02)	Less Liquid (ZA03)	TOP 40 (J200)	Industrial 25 (J211)	Resource 20 (J210)	Financial 15 (J212)
Trading Day: 9 am to 1 pm	-4.1406	-1.4712	-2.7170	-3.6930	-1.3981	-1.6030	-2.2190	-0.8039
Trading Day: 9 am to 5pm	-4.1485	-0.9322	-1.8342	-3.9640	-1.2050	-1.8030	-1.5474	-0.0912
9 am through 1 pm	-2.8368	-2.9405	-0.9186	-2.5011	-2.8368	-1.5738	-1.4421	-1.4859
1 pm through 5 pm	-2.5039	-1.6663	-0.8433	-2.3377	-1.7785	-1.7470	-1.6864	-0.3921
11 am through 3 pm	-2.0735	-0.6726	-1.6393	-1.7766	-1.1352	0.9522	-0.4765	-1.5039
Shares ignore because they did not trade	58	0	0	58	0	0	0	0

Figure 18 Z-Values

10.1.2 Step 6

In Figure 18, instances where we may reject the null hypothesis ($H_0 : \mu_{NoNews} = \mu_{Nerws}$; Firm specific SENS announcements have no impact on stock exchange trading volumes on the JSE) and accept the alternative hypothesis ( ) at the 1% level of significance, are shaded.

A subset of these results are shown below:

	Entire Market	Top Companies (ZA01)	Medium Liquid (ZA02)	Less Liquid (ZA03)	Top 40 (J200)
Trading Day: 9 AM through 1 PM	Reject H_0		Reject H_0	Reject H_0	
Trading Day: 9 AM through 5 PM	Reject H_0			Reject H_0	
Intraday: 9 AM through 1 PM	Reject H_0	Reject H_0		Reject H_0	Reject H_0
Intraday: 1 PM through 5 PM	Reject H_0			Reject H_0	

Figure 19 Subset of results

10.2 Discussion

It is apparent that the less liquid the sample, the more likely it is that SENS announcements have an impact on trading volumes. Notably, we could only reject the null hypothesis in one instance (between 9AM and 1PM for the Top 40 index) for the very liquid Top 40, Industrial 25, Resource 20 and Financial 15 indexes. The following section will speculate as to reasons for this.

11 Exploration of Results

The results of the experiment are superficially surprising. On reflection, it is perhaps an outcome that could have anticipated.

In this discussion, shares in the "Top Companies Banding" (ZA01) will be used as a proxy for highly liquid shares, and shares in ZA03 ("Less Liquid Banding") as a proxy for less liquid stocks.

11.1.1 Public interest

It is the author's perception that the larger, more highly liquid companies are generally more thoroughly analysed (in newspapers, magazines and online) and discussed than the less liquid companies.

At a one percentage level of significance:

- Shares in ZA01 are more diversified than shares in ZA03 (see "Diversification" on page 60).
- Shares in ZA01 publish more SENS announcements than the companies in ZA03 (see "Announcements" on page 64).
- Shares in ZA01 have larger market capitalisations than those in ZA03 (see "Market Capitalisation" on page 66).

Together, these three points would suggest strongly that the number of stakeholders in companies in ZA01 (be they employees, shareholders or even the government) is significantly larger than the number of stakeholders in the smaller members of ZA03. This, in turn, bears out the assertion that the level of interest, discussion and analysis of these companies is higher than that of companies in ZA03.

Hence, for highly liquid companies, the market will anticipate announcements (which, despite the best intentions of the JSE, would have been preceded by considerable rumour and discussion). Consequently, the impact of an announcement by a member of ZA01 will be slight.

This conclusion also accords with Jensen and Ruback (1983), The Securities and Exchange Commission (1987) and Comment (1986) (all in Bhana, 1999A) who suggest that publicly available information (rather than insider trading) is a significant driver of price run-ups in anticipation of merger announcements.

11.1.2 Types of SENS Announcement

A detailed review of the SENS data yielded surprising results. Most notably, there is a large volume of "noise" announcements. For example, many companies use the mechanism as a public relations channel:

- On 29 November 2002: "Harmony Directors Buy First ADRs On NYSE."
- On 18 November 2002: "Net1 Applied Technology Holdings Limited ("Aplitec") is pleased to announce that it has been selected as the exclusive provider of smart card based financial delivery systems, to showcase its desire and ability to partner with Commonwealth Governments..."
- On 1 April 2003: "Gold Fields to Extend Anti Retroviral Programme"
- On 21 July 2003: "ABSA Group Limited - ABSA leads fight against internet fraud"

Equally, the service is used to broadcast the dates of meetings and announcements. For example:

- On 6 February 2003: The Afrikander Lease Limited, "Notice of Shareholders Meeting"
- On 15 May 2003: Old Mutual: "Announcement of Trading Update and Analysts Conference Call"
- On 12 June 2003: AST: "Notice Of General Meeting"

Of course, all announcements contain content that may be crucial to an investor. However, this author would speculate that the announcement of a meeting or analysts conference call can frequently be anticipated by the market, and will often provide little information that is not already in the public domain (certainly, any information that was not in the public domain would have first to be published as a SENS announcement before it could be discussed with the analysts (JSE 2003C).

To explore this further, all the announcements were categorised into five groupings:

- News: Concerning the dates of meetings, press and media releases as well as announcements that would have been anticipated by the media, or that concerned the normal operation of a business (22 May 2003: "Strike Action At Drd'S Buffelfontein Mine"; 2 June 2003: "Ticor South Africa's Furnace Ramp-Up Ahead of Schedule").
- Financial: Including the publication of audited and un-audited financial results and trading updates, the raising of capital and debt and changes to the financial structure.
- Directors: Changes to management and the board of directors.
- Mergers and Acquisitions (M&A): Cautionaries, the withdrawal of cautionaries, and announcements detailing mergers, acquisitions, disposals and major partnerships.
- Remuneration: Dealings by directors, as well as changes to their option structures.

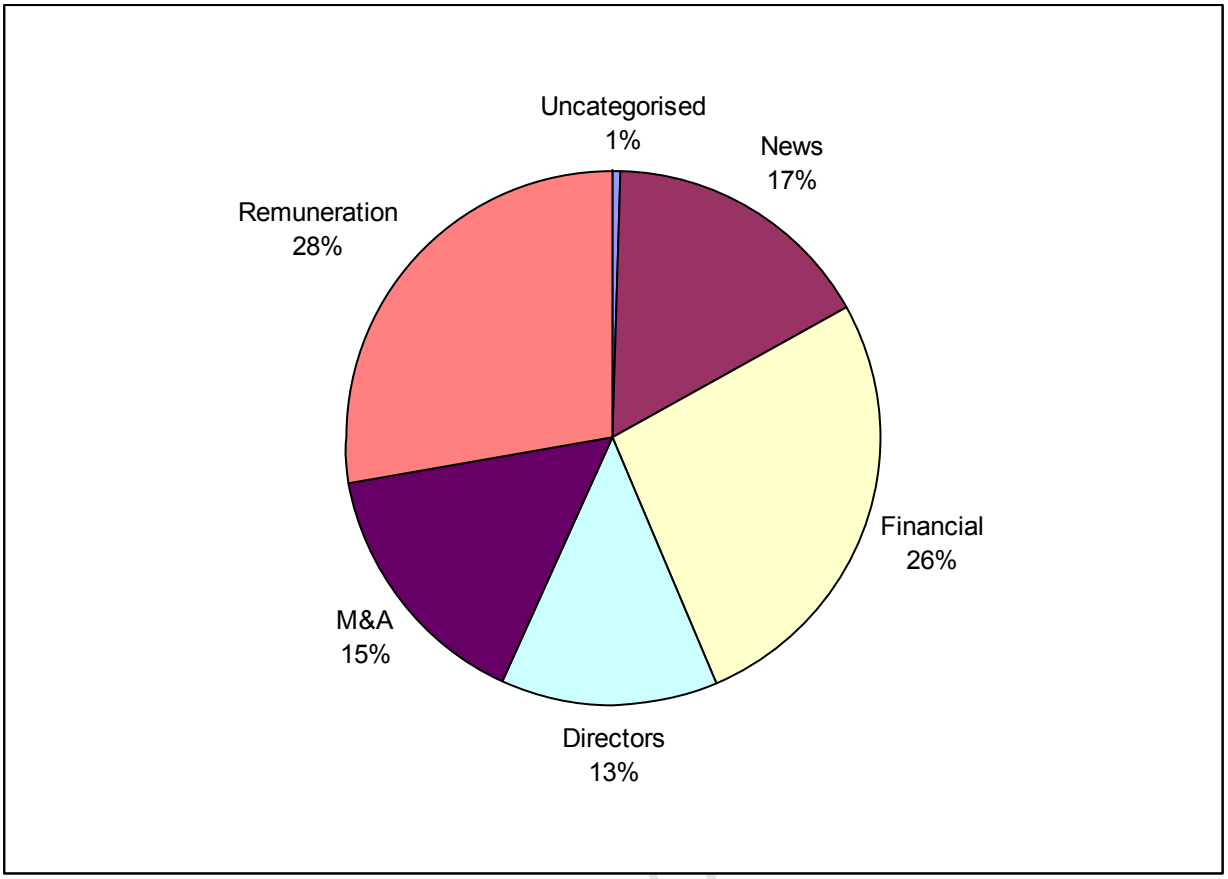


Figure 20 Categorisation of SENS Announcements

The experiments were then rerun and the news, no news means compared for each category. However, since it had already been established that less liquid shares react strongly to announcements, the experiments were only repeated for high liquidity stocks (members of the Top Companies banding). The experiment and results are set out formally in the appendix: " Analysis of the Categorisation of SENS Announcements" on page 69.

The results were extremely tepid with only three period categorisation pairs showing a distinction in the means at the 5% level (two at a 1% level). Again, the author speculates that this is a symptom of the much greater level of public interest in shares in ZA01.

12 Conclusion

Several information driven theoretical models were initially introduced. The role of information in the market and the practical impact of information on trading was discussed. Against this context, it was particularly apparent that, of all news types, SENS announcements should impact the market.

Curiously, it was observed that the market:

- Reacted strongly to announcements concerning small, thinly traded stocks; and,
- Did not discernibly react to announcements pertaining to large, heavily traded companies, irrespective of the type of the nature of the announcement.

This author postulates that this provides evidence (in the short term) of strong-form market efficiency amongst the more liquid stocks on the JSE, and to weak-form efficiency (in the short term), for smaller companies. These differences are, while perhaps to be expected, nonetheless extremely insightful:

- Smaller companies offer far greater opportunities for insider trading, which in turn increases the risks associated with trading these counters.
- Clearly information impacts the market. But, to the extent that big companies are diversified conglomerates of small companies, this author speculates that the impact of changes in perceptions is averaged away within larger companies. This effect may justify the "blue-chip" reputation of many South African corporations but it masks the true impact of information, creating significant challenges for researchers.
- Since trading volumes are synonymous with investors adjusting their expectations and perceptions, it is reasonable to assume that announcements by small companies contain relatively more information. In turn, this implies larger adjustments to ρ_i and $E(\cdot_t)$ (in

Equations 4 and 5 respectively) in reaction to new information. Which must result in greater variances in valuations built using either of these models. Hence, for low liquidity stocks, this author would question the use of Dividend Discount Model (or Discounted Cash Flow Model) as a valuation technique.

12.1 Areas for further study

12.1.1 The Impact of Price Changes

This study makes no statement about either the impact of news on prices, or the impact of price changes on trading volume. Karpoff notes (1987: 120):

- There is a correlation between ν (volume) and $|\Delta\rho|$ (the absolute value of a change in price).
- The correlation is between ν (volume) and $\Delta\rho$ (the change in price).
- ν is higher when prices increase than when prices decrease.

It would be interesting to explore these relationships in more detail.

12.1.2 Good and Bad News

Ferreira (1999) classifies news as either good (having a positive impact on price) or bad (the opposite). Perhaps buying and selling by directors could be used as a proxy for good and bad news, respectively.

12.1.3 Diversification

As noted previously, the diversification of companies may mask the impact of news within the market. It would be interesting to examine the relative levels of diversification of South African and American companies, and the impact of these differences with the South African market.

12.1.4 Factor Analysis

This study has only speculated as to the causes of the results. It may be possible to utilise factor analysis to build a more robust model explaining trading volumes.

13 Appendixes

13.1 Diversification

There is no single indicator of the level of diversification of a company. A proxy variable is required. To this end, the number of subsidiaries and holdings of companies will be used. Hence, we can construct H_0 and H_1:

H_0: Companies falling into the "Top Companies" (ZA01) JSE banding have the same level of diversification as companies in the "Less Liquid" (ZA03) banding.

H_1: Companies falling into the "Top Companies" (ZA01) JSE banding have a greater level of diversification than companies in the "Less Liquid" (ZA03) banding.

This can immediately be restated as:

H_0: Companies falling into the "Top Companies" (ZA01) JSE banding have the same number of holdings and investments as companies in the "Less Liquid" (ZA03) banding.

And, more formally:

$$H_0 : \mu_{ZA01} = \mu_{ZA03} \qquad (13)$$

13.1.1 Methodology

We will perform a one-tailed test of significance to explore whether the mean number of subsidiaries, investments and holding, per company, for companies in ZA01, differs from the mean number of subsidiaries per company, for companies in ZA03.

13.1.2 Data

As for the primary study, the data was provided by Moneymax. Only companies in the population of the primary study were examined.

This dataset included data on 455 companies. It details the percentage ownership of the parent company in the entity with which it has the relationship. The relationship is given as:

- Direct subsidiary
- Associate
- Indirect subsidiary
- Investment

The parent company may have more than one of these relationships with the same subsidiary, each with a different percentage ownership. Because of this confusion, the experiment was constructed to look at the average number of child entities per parent company.

Further, the child entities are frequently not listed companies.

	ZA01	ZA03
Initial number of parent companies	39	327
Initial number of child companies	1 950	4 254
Parent companies included in primary study	38	292
Child companies relevant to primary study	1 931	3 847

Figure 21 Summary of data

13.1.3 The Test

Step 1

$$H_0 : \mu_{ZA01} = \mu_{ZA03}$$
$$H_1 : \mu_{ZA01} > \mu_{ZA03} \qquad (14)$$

Step 2

We will use a one-tailed test of significance, at the 1% level: $\alpha = 0.01$.

Step 3

$$z = \frac{\left(\overline{x_{ZA01}} - \overline{x_{ZA03}}\right)}{\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}}} \qquad (15)$$

$$\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}} \approx \sqrt{\frac{s_{ZA01}^2}{n_{ZA01}} + \frac{s_{ZA03}^2}{n_{ZA03}}} \qquad (16)$$

Where:

$\overline{x_{ZA01}}$	Mean number of subsidiaries in the "ZA01" sample.
s	Standard deviation of sample.
n	Number of elements in sample.
$\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}}$	Standard error of the differences of sample means (the standard deviation of the differences of the sample means).

Step 4

Reject H_0 if z > 2.33.

Step 5: Calculate Z

Banding	ZA01	ZA03
Companies in sample (n)	38	292
Mean ($\overline{x}$)	51.5263	15.2603
Standard Deviation (s)	47.4437	14.73596

Figure 22 Summary statistics

From Equation 16:

$$\sigma_{\overline{x}_{ZA01}-\overline{x}_{ZA03}} \approx \sqrt{\frac{s_{ZA01}^2}{n_{ZA01}} + \frac{s_{ZA03}^2}{n_{ZA03}}} = \sqrt{\frac{47.4437^2}{38} + \frac{14.73596^2}{292}} = 7.744546 \qquad (17)$$

and hence (from Equation 15):

$$z = \frac{(\overline{x}_{ZA01} - \overline{x}_{ZA03})}{\sigma_{\overline{x}_{ZA01}-\overline{x}_{ZA03}}} = \frac{(51.5263 - 15.2603)}{7.744546} = 4.682779 \qquad (18)$$

Step 6

Z far exceeds 2.33. We are able to reject H_0, and accept H_1: $H_1 : \mu_{ZA01} > \mu_{ZA03}$.

13.1.4 Discussion

It is very clear from Step 6 that companies within the "Top Company" banding have very significantly more holdings and subsidiaries that their less liquid counterparts in ZA03. In so far as holdings are a proxy for the levels of diversification of companies, we may reject our original null

hypothesis and conclude that there is a greater level of diversification amongst companies within ZA01.

13.2 Announcements

It would seem that the more liquid "Top Companies" publish more announcements than the companies in the less liquid "Less Liquid" banding. We can construct null and alternative hypotheses as follows:

H_0: Companies falling into the "Top Companies" (ZA01) JSE banding publish as many SENS announcements as companies in the "Less Liquid" (ZA03) banding.

H_1: Companies falling into the "Top Companies" (ZA01) JSE banding publish more SENS announcements as companies in the "Less Liquid" (ZA03) banding.

Formally, this becomes:

$$H_0 : \mu_{ZA01} = \mu_{ZA03}$$
$$H_1 : \mu_{ZA01} > \mu_{ZA03} \qquad (19)$$

13.2.1 Methodology

Again, a one-tailed Z-test of significance will be employed to examine the difference between the means of the two populations.

13.2.2 Data

The same dataset will be employed as was used in the primary study.

13.2.3 The Test

Step 1

From above:

$$H_0 : \mu_{ZA01} = \mu_{ZA03}$$
$$H_1 : \mu_{ZA01} > \mu_{ZA03} \qquad (20)$$

Step 2

We will use a one-tailed test of significance, at the 1% level: $\alpha = 0.01$.

Step 3

$$z = \frac{\left(\overline{x_{ZA01}} - \overline{x_{ZA03}}\right)}{\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}}} \qquad (21)$$

$$\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}} \approx \sqrt{\frac{s_{ZA01}^2}{n_{ZA01}} + \frac{s_{ZA03}^2}{n_{ZA03}}} \qquad (22)$$

Where:

$\overline{x_{ZA01}}$	Mean number of SENS announcements made by companies grouped by the JSE into "ZA01".
s	Standard deviation of sample.
n	Number of elements in sample.
$\sigma_{\overline{x_{ZA01}} - \overline{x_{ZA03}}}$	Standard error of the differences of sample means (the standard deviation of the differences of the sample means).

Step 4

Reject H_0 if z > 2.33.

Step 5: Calculate Z

Banding	ZA01	ZA03
Companies in sample (n)	40	273

Mean ($\overline{x}$)	19	6.4249
Standard Deviation (s)	18.2588	4.5117

Figure 23 Summary statistics

From Equation 22:

$$\sigma_{\overline{x}_{ZA01}-\overline{x}_{ZA03}} \approx \sqrt{\frac{s_{ZA01}^2}{n_{ZA01}} + \frac{s_{ZA03}^2}{n_{ZA03}}} = \sqrt{\frac{18.2588^2}{40} + \frac{4.5117^2}{273}} = 2.8999 \qquad (23)$$

and hence (from Equation 21):

$$z = \frac{\left(\overline{x}_{ZA01} - \overline{x}_{ZA03}\right)}{\sigma_{\overline{x}_{ZA01}-\overline{x}_{ZA03}}} = \frac{\left(9 - 6.4249\right)}{2.8999} = 4.33645 \qquad (24)$$

Step 6

Again, z far exceeds 2.33. We are able to reject H_0, and accept H_1: $H_1 : \mu_{ZA01} > \mu_{ZA03}$.

13.2.4 Discussion

As we had intuitively anticipated, companies within ZA01 publish far more announcements than companies within ZA03.

13.3 Market Capitalisation

It would seem reasonable to presume that the highly liquid members of ZA01 have larger market capitalisations than the members of ZA03.

To test this, the following hypotheses were formulated:

H_0: There is no difference in the market capitalisations of ZA01 and ZA03.

H_1: The market capitalisation of ZA01 shares exceeds the market capitalisation of shares in ZA03.

Formally:

$$H_0 : \mu_{ZA01} = \mu_{ZA03}$$
$$H_1 : \mu_{ZA01} > \mu_{ZA03} \qquad (25)$$

13.3.1 Methodology

Since the dataset (below) is relatively small, a one-tailed T-test of significance will be employed to examine the difference between the means of the two populations.

13.3.2 Data

Fifteen stocks were randomly selected and McGregor-BFA were requested to provide market capitalisations:

ZA01	
Company	Market Cap Rm
ABI	9 274.21
ANGLO	195 934.07
BHPBILL	120 075.35
INVLTD	3 839.95
INVPLC	7 426.06
ISCOR	9 053.23
KUMBA	9 799.77
LIBINT	23 709.09
MTN	28 323.00
OLDMUTUAL	42 154.86
RICHEMONT	73 654.20
SAB	53 835.52
SANLAM	19 909.28
STANBANK	42 795.02
WOOLIES	5 846.92

ZA03	
Company	Market Cap Rm
COPI	1 669.92
CULIN55%P	0.30
DORBL55%P	1.09
DORBYL	522.27
DORBYL5%P	0.70
EERSLNG	2.79
EUREKA	36.00
FORIM	41.50
FREDDEV	92.24
HUDACO	580.51
HYPROP	1 059.21
INMINS	53.79
ITLTILE	1 214.02
JASCO	64.15
Z-C-I	189.30

Figure 24 Sample Market Capitalisations of ZA01 and ZA03

Step 1

$$H_0 : \mu_{ZA01} = \mu_{ZA03}$$
$$H_1 : \mu_{ZA01} > \mu_{ZA03} \qquad (26)$$

Step 2

A one-tailed test will be employed at the 1% level of significance ($\alpha = 0.01$).

Step 3 and 4

A package will be employed to analyse the numbers.

Step 5

$t = 3.13$.

Degrees of freedom: 28.

$P = 0.0041$.

Step 6

We may reject H_0.

13.3.3 Discussion

Again, the result accords with our intuition. Unsurprisingly, companies included the JSE Top Companies banding have greater market capitalizations than those in the less liquid banding.

13.4 Analysis of the Categorisation of SENS Announcements

Intuitively, it would seem that announcements about mergers and acquisitions would cause dramatically greater trading volumes than announcements about the date of an Annual General Meeting or presentation. Although such differences, if they exist, would be irrelevant if neither category differed materially from non-news averages.

In order to establish if trading volumes are impacted more dramatically by one type of SENS, the announcements were grouped into five categories:

- News: Concerning the dates of meetings, press and media releases as well as announcements that would have been anticipated by the media, or that concerned the normal operation of a business (22 May 2003: "Strike Action At Drd'S Buffelfontein Mine"; 2 June 2003: "Ticor South Africa's Furnace Ramp-Up Ahead of Schedule").
- Financial: Including the publication of audited and un-audited financial results and trading updates, the raising of capital and debt and changes to the financial structure.
- Directors: Changes to management and the board of directors.

- Mergers and Acquisitions (M&A): Cautionaries, the withdrawal of cautionaries, and announcements detailing mergers, acquisitions, disposals and major partnerships.
- Remuneration: Dealings by directors, as well as changes to their option structures.

The result of this assessment is presented numerically below, and graphically in Figure 20 on page 56.

	ZA01	ZA02	ZA03	Entire Market
Remuneration	222	184	502	908
M&A	91	107	301	499
Directors	91	95	244	430
Financial	158	228	476	862
News	188	123	227	538
Unclassified	10	4	4	18
	760	**741**	**1 754**	**3 255**

Figure 25 Result of SENS Categorisation

In the same manner that the null and alternate hypotheses were constructed for the primary experiments in this study (see section 8.6 on page 31 describing the formal methodology employed), null and alternate hypotheses were constructed for each category:

The mean level of abnormal trading should be greater in samples where announcements of a particular type were made, when compared with samples where no announcements of that type were made.

Or, formally:

(10)

13.4.1 Methodology

A single-tailed Z-test of significance will be employed to examine the difference between the means of the two populations (see page 32).

13.4.2 Data

The same dataset will be employed as was used in the primary study. However, as strong results have already been obtained for less liquid stocks, only the constituents of the JSE Top Companies banding ("ZA01") were considered.

13.4.3 The Test

Step 1

(10)

Step 2

We will use a single tailed test of significance, at the 5% level: $\alpha = 0.05$.

Step 3

$$z = \frac{\left(\overline{x_{NoNews}} - \overline{x_{News}}\right)}{\sigma_{\overline{x_{NoNews}} - \overline{x_{News}}}} \qquad (11)$$

$$\sigma_{\overline{x_{NoNews}} - \overline{x_{News}}} \approx \sqrt{\frac{s_{NoNews}^2}{n_{NoNews}} + \frac{s_{News}^2}{n_{News}}} \qquad (12)$$

Where:

$\overline{x_{NoNews}}$	Mean of the "No News" sample.
s	Standard deviation of sample.
n	Number of elements in sample.
$\sigma_{\overline{x_{NoNews}}-\overline{x_{News}}}$	Standard error of the differences of sample means (the standard deviation of the differences of the sample means).

Step 4

Reject H_0 if z < -1.645.

Step 5: Calculate Z

	Remuneration	M&A	Directors	Financial	News
Trading Day: 9 am to 1 pm	1.0188	-1.2319	-1.4424	-1.3572	-0.1859
Trading Day: 9 am to 5pm	1.1123	-0.9320	-1.5183	-1.5488	-0.4344
9 am through 1 pm	-1.6582	0.6476	-0.8522	-1.5383	-2.4334
1 pm through 5 pm	-0.7422	0.0611	-1.4027	-1.3898	-0.8637
11 am through 3 pm	-0.3331	-0.2244	-2.8156	0.3180	-1.5563

Figure 26 Z-Values for Categorised SENS Announcements

Step 6

At the 95% confidence level, we only reject our null hypothesis in three instances. These are highlighted in Figure 26 above. At a 99% level (-2.326), we only reject it twice.

13.4.4 Discussion

This relatively weak result corroborates our earlier findings. It suggests that, irrespective of the nature of the SENS announcement, trade in high liquidity companies is not impacted.

13.5 Trade Types

Source: Moneymax (2003).

Only **Automated Trades (AT)** and **Auction Trades (UT)** constitute high, low and close. All trade types contribute to the volume, number and value of trades.

AT	**Automated Trade**	A transaction matched automatically in the JSE trading system during continuous trading.
UT	**Auction Trade**	A transaction matched automatically in the JSE trading system during price determination in an auction.
PF	**Portfolio Trade**	A transaction where a broker member (equities) trades as an agent in a portfolio.
BT	**Block Trade**	A transaction where a broking member (equities) trades as an agent in a single security where the transaction ♦ has a minimum value of R5 million, and ♦ comprises at least 100% of the average daily value.
OP	**Off Order Book Principal Trade**	A transaction where a broking member (equities) trades as a principal in a single security where the transaction ♦ has a minimum value of R500.00, and ♦ comprises at lease six times the normal market size (NMS), except where the transaction is with a foreign professional market participant in which case no minimum value or quantity of security applies. This trade type replaces both the arbitrage and the overseas counterparty

		trades used previously. Delayed publication rules apply, depending on NMS.
LT	**Late Trade**	A transaction where broking member (equities) traded after hours with a professional market participant, as agent or principal, in fulfilment of ♦ an order already entered into the JSE trading system which reflects a reasonable price at which a client wishes to trade, ♦ an order received prior to the end of the closing auction call period, the price of which could only be established after the closing auction call period, or ♦ order received after hours.
CT	**Contra Trade**	A transaction that is equal and opposite to a previously matched automated or auction trade that is entered on the same day as the original trade. Both parties to the trade are involved and will have to flag the trade as "CT" which will then be matched by the system.
PC	**Post Contra Trade**	A transaction that is equal and opposite to a previously matched automated or auction trade that is entered on the day following the original trade.

13.6 Descriptive Statistics

Experiment	Category	Number	Mean	Standard Deviation
Entire Market				

Trading Day: 9 am to 1 pm	News	948	1.4724	11.0834
Trading Day: 9 am to 1 pm	No News	68 019	-0.0205	5.3884
Trading Day: 9 am to 5pm	News	903	1.4795	10.8450
Trading Day: 9 am to 5pm	No News	67 745	-0.0197	4.9211
9 am to 1 pm	News	377	1.2916	8.8802
9 am to 1 pm	No News	67 859	-0.0072	5.4789
1 pm to 5 pm	News	421	0.9711	7.9947
1 pm to 5 pm	No News	67 739	-0.0060	5.7398
11 am to 3 pm	News	436	0.8266	8.3658
11 am to 3 pm	No News	67 076	-0.0054	5.6467

Top Companies (ZA01)

Trading Day: 9 am to 1 pm	News	225	0.0984	1.0123
Trading Day: 9 am to 1 pm	No News	6 053	-0.0037	1.2422
Trading Day: 9 am to 5pm	News	205	0.0481	0.7476
Trading Day: 9 am to 5pm	No News	5 842	-0.0017	0.8419
9 am to 1 pm	News	92	0.4052	1.3330
9 am to 1 pm	No News	6 053	-0.0062	1.2415
1 pm to 5 pm	News	89	0.1650	0.9420
1 pm to 5 pm	No News	6 145	-0.0024	0.8718
11 am to 3 pm	News	96	0.0797	1.1687
11 am to 3 pm	No News	6 183	-0.0012	1.2218

Medium Liquid (ZA02)

Trading Day: 9 am to 1 pm	News	222	0.6241	3.4615
Trading Day: 9 am to 1 pm	No News	13 203	-0.0105	2.7730
Trading Day: 9 am to 5pm	News	211	0.3009	2.4086
Trading Day: 9 am to 5pm	No News	12 952	-0.0049	1.9789
9 am to 1 pm	News	76	0.2601	2.4733

9 am to 1 pm	No News	13 203	-0.0015	2.7997
1 pm to 5 pm	News	87	0.1516	1.6779
1 pm to 5 pm	No News	13 240	-0.0010	2.2229
11 am to 3 pm	News	97	0.5037	3.0397
11 am to 3 pm	No News	13 336	-0.0037	2.6586

Less Liquid (ZA03)

Trading Day: 9 am to 1 pm	News	501	2.4475	14.9734
Trading Day: 9 am to 1 pm	No News	48 763	-0.0251	6.1760
Trading Day: 9 am to 5pm	News	487	2.5946	14.5767
Trading Day: 9 am to 5pm	No News	48 951	-0.0258	5.6865
9 am to 1 pm	News	209	2.0245	11.7453
9 am to 1 pm	No News	48 603	-0.0087	6.2851
1 pm to 5 pm	News	245	1.5452	10.3878
1 pm to 5 pm	No News	48 354	-0.0078	6.6794
11 am to 3 pm	News	243	1.2477	10.9939
11 am to 3 pm	No News	47 557	-0.0064	6.5351

Top 40 (J200)

Trading Day: 9 am to 1 pm	News	233	0.0924	1.0231
Trading Day: 9 am to 1 pm	No News	6 196	-0.0035	1.1554
Trading Day: 9 am to 5pm	News	212	0.0622	0.7649
Trading Day: 9 am to 5pm	No News	5 976	-0.0022	0.7740
9 am to 1 pm	News	98	0.3722	1.3113
9 am to 1 pm	No News	6 196	-0.0059	1.1546
1 pm to 5 pm	News	91	0.1756	0.9503
1 pm to 5 pm	No News	6 292	-0.0025	0.8282
11 am to 3 pm	News	99	0.1323	1.1699
11 am to 3 pm	No News	6 332	-0.0021	1.0702

Industrial 25 (J211)

Trading Day: 9 am to 1 pm	News	73	0.3885	2.0988
Trading Day: 9 am to 1 pm	No News	3 726	-0.0076	1.6366
Trading Day: 9 am to 5pm	News	71	0.2569	1.2154
Trading Day: 9 am to 5pm	No News	3 619	-0.0050	1.0372
9 am to 1 pm	News	43	0.3357	1.4037
9 am to 1 pm	No News	3 726	-0.0039	1.6417
1 pm to 5 pm	News	38	0.4286	1.5239
1 pm to 5 pm	No News	3 732	-0.0044	1.0681
11 am to 3 pm	News	43	-0.1498	1.0292
11 am to 3 pm	No News	3 759	0.0017	1.5921

Resource 20 (J210)

Trading Day: 9 am to 1 pm	News	138	0.3394	1.8291
Trading Day: 9 am to 1 pm	No News	3 002	-0.0156	2.0149
Trading Day: 9 am to 5pm	News	124	0.1568	1.1354
Trading Day: 9 am to 5pm	No News	2 906	-0.0067	1.4919
9 am to 1 pm	News	44	0.5077	2.3555
9 am to 1 pm	No News	3 002	-0.0074	2.1326
1 pm to 5 pm	News	42	0.4655	1.8039
1 pm to 5 pm	No News	3 079	-0.0063	1.5803
11 am to 3 pm	News	46	0.0673	0.9427
11 am to 3 pm	No News	3 094	-0.0010	1.9513

Financial 15 (J212)

Trading Day: 9 am to 1 pm	News	77	0.0952	1.0590
Trading Day: 9 am to 1 pm	No News	2 289	-0.0032	0.9699
Trading Day: 9 am to 5pm	News	70	0.0084	0.7860

Trading Day: 9 am to 5pm	No News	2 220	-0.0003	0.6859
9 am to 1 pm	News	27	0.2840	0.9994
9 am to 1 pm	No News	2 289	-0.0034	0.9709
1 pm to 5 pm	News	28	0.0402	0.5415
1 pm to 5 pm	No News	2 321	-0.0005	0.8284
11 am to 3 pm	News	32	0.3330	1.2656
11 am to 3 pm	No News	2 337	-0.0046	0.8670

Remuneration (ZA01)

Trading Day: 9 am to 1 pm	News	60	-0.0989	0.7498
Trading Day: 9 am to 1 pm	No News	6 365	0.0009	1.2310
Trading Day: 9 am to 5pm	News	55	-0.0934	0.6236
Trading Day: 9 am to 5pm	No News	6 278	0.0008	0.8342
9 am to 1 pm	News	28	0.5471	1.7516
9 am to 1 pm	No News	6 365	-0.0024	1.2288
1 pm to 5 pm	News	43	0.0833	0.7373
1 pm to 5 pm	No News	6 359	-0.0006	0.8727
11 am to 3 pm	News	25	0.0959	1.4429
11 am to 3 pm	No News	6 381	-0.0004	1.2143

M&A (ZA01)

Trading Day: 9 am to 1 pm	News	29	0.3464	1.5188
Trading Day: 9 am to 1 pm	No News	6 419	-0.0016	1.2345
Trading Day: 9 am to 5pm	News	28	0.1868	1.0638
Trading Day: 9 am to 5pm	No News	6 397	-0.0008	0.8318
9 am to 1 pm	News	15	-0.1007	0.6006
9 am to 1 pm	No News	6 419	0.0002	1.2367
1 pm to 5 pm	News	9	-0.0087	0.4275
1 pm to 5 pm	No News	6 440	0.0000	0.8718

11 am to 3 pm	News	17	0.0777	1.4297
11 am to 3 pm	No News	6 439	-0.0002	1.2110

Directors (ZA01)

Trading Day: 9 am to 1 pm	News	21	0.2892	0.9191
Trading Day: 9 am to 1 pm	No News	6 436	-0.0009	1.2318
Trading Day: 9 am to 5pm	News	21	0.2330	0.7039
Trading Day: 9 am to 5pm	No News	6 393	-0.0008	0.8344
9 am to 1 pm	News	7	0.2472	0.7673
9 am to 1 pm	No News	6 436	-0.0003	1.2317
1 pm to 5 pm	News	12	0.3409	0.8426
1 pm to 5 pm	No News	6 421	-0.0006	0.8743
11 am to 3 pm	News	16	-0.3211	0.4533
11 am to 3 pm	No News	6 445	0.0008	1.2114

Financial (ZA01)

Trading Day: 9 am to 1 pm	News	59	0.1331	0.7507
Trading Day: 9 am to 1 pm	No News	6 379	-0.0012	1.2379
Trading Day: 9 am to 5pm	News	59	0.1200	0.5954
Trading Day: 9 am to 5pm	No News	6 344	-0.0011	0.8335
9 am to 1 pm	News	29	0.3826	1.3429
9 am to 1 pm	No News	6 379	-0.0017	1.2390
1 pm to 5 pm	News	10	0.6067	1.3822
1 pm to 5 pm	No News	6 434	-0.0009	0.8723
11 am to 3 pm	News	11	-0.0741	0.7724
11 am to 3 pm	No News	6 428	0.0001	1.2108

News (ZA01)

Trading Day: 9 am to 1 pm	News	77	0.0192	0.9066

Trading Day: 9 am to 1 pm	No News	6 351	-0.0002	1.2389
Trading Day: 9 am to 5pm	News	75	0.0403	0.8079
Trading Day: 9 am to 5pm	No News	6 303	-0.0005	0.8317
9 am to 1 pm	News	22	0.5181	0.9994
9 am to 1 pm	No News	6 351	-0.0018	1.2367
1 pm to 5 pm	News	23	0.2502	1.3932
1 pm to 5 pm	No News	6 400	-0.0009	0.8658
11 am to 3 pm	News	28	0.3301	1.1243
11 am to 3 pm	No News	6 405	-0.0014	1.2125

13.7 Shares and Market Segments

Segment	JSE Ticker	JSE Short Name	Long Name
ZA01	ABI	ABI	AMALGAMATED BEVERAGE IND
	ASA	ABSA	ABSA GROUP LIMITED
	ANG	ANGGOLD	ANGLOGOLD LTD
	AGL	ANGLO	ANGLO AMERICAN PLC
	AMS	ANGLOPLAT	ANGLO AMERICAN PLATINUM
	AVG	AVGOLD	AVGOLD LTD
	BAW	BARWORLD	BARLOWORLD LTD
	BIL	BHPBILL	BHP BILLITON PLC
	BVT	BIDVEST	BIDVEST LTD ORD
	FSR	FIRSTRAND	FIRSTRAND LTD
	GFI	GFIELDS	GOLD FIELDS LTD
	HAR	HARMONY	HARMONY G M CO LTD
	IPL	IMPERIAL	IMPERIAL HOLDINGS LTD
	IMP	IMPLATS	IMPALA PLATINUM HLGS LD
	INL	INVLTD	INVESTEC LTD
	INP	INVPLC	INVESTEC PLC
	ISC	ISCOR	ISCOR LTD
	KMB	KUMBA	KUMBA RESOURCES LTD
	LBT	LIB-INT	LIBERTY INTERNATIONL PLC
	LGL	LIBERTY	LIBERTY GROUP LTD
	MTN	MTN GROUP	MTN GROUP LTD
	NPK	NAMPAK	NAMPAK LTD ORD
	NPN	NASPERS-N-	NASPERS LTD -N-
	NED	NEDCOR	NEDCOR LTD
	NTC	NETCARE	NETWORK HEALTHCARE HLDGS
	OML	OLDMUTUAL	OLD MUTUAL PLC
	PIK	PICKNPAY	PIK N PAY STORES LTD
	PPC	PPC	PRETORIA PORT CEMNT

	REM	REMGRO	REMGRO LTD
	RCH	RICHMON DR	RICHEMONT SECURITIES DR
	RMH	RMBH	RMB HOLDINGS LTD
	SAB	SAB	SABMILLER PLC
	SLM	SANLAM	SANLAM LTD
	SAP	SAPPI	SAPPI LTD
	SOL	SASOL	SASOL LTD
	SBK	STANBANK	STANDARD BANK GROUP LTD
	SHF	STEINHOFF	STEINHOFF INTERNTL HLDGS
	TBS	TIGBRANDS	TIGER BRANDS LTD ORD
	VNF	VENFIN	VENFIN LTD
	WHL	WOOLIES	WOOLWORTHS HOLDINGS LTD
ZA02	AFE	A E C I	A E C I LTD ORD
	AVI	A V I	A V I
	ABL	ABIL	AFRICAN BANK INVESTMENTS
	ADR	ADCORP	ADCORP HLDGS LTD ORD
	AFL	AF LEASE	AFRIKANDER LEASE LTD
	AFR	AFGRI	AFGRI LTD
	AFI	AFLIFE	AFRICAN LIFE ASSURANCE
	AFX	AFROX	AFRICAN OXYGEN LTD ORD
	AFB	ALEXFBS	ALEXANDER FORBES LTD
	ALT	ALTECH	ALLIED TECHNOLOGIES
	ATNP	ALTRON PP	ALLIED ELECT COR PARTPRF
	APB	APEXHI B	APEXHI PROPERTIES -B-
	APL	APLITEC	NET 1 APPLIED TECHNOLOGY
	AOD	ARMGOLD	ARMGOLD
	APN	ASPEN	ASPEN PHARMACARE HLDGS
	ARL	ASTRAL	ASTRAL FOODS LTD
	AEG	AVENG	AVENG LTD
	AVS	AVIS	AVIS SOUTHERN AFRICA LTD
	AIN	AVMIN	ANGLOVAAL MINING LTD
	BAT	BRAIT	BRAIT S.A.
	CPT	CAPTALL	CAPITAL ALLIANCE HLDG LD
	CPX	COMPAREX	COMPAREX HOLDINGS LTD
	CPA	CORPCAP	CORPCAPITAL LTD
	DTC	DATATEC	DATATEC LTD
	DUR	DBN DP	DURBAN ROODEPT DEEP
	DEL	DELTA	DELTA ELECRICAL IN
	DDT	DIDATA	DIMENSION DATA HLDGS PLC
	DSY	DISCOVERY	DISCOVERY HOLDINGS LTD
	ECO	EDCON	EDGARS CONS STORES LTD
	ELH	ELERINE	ELLERINE HOLDINGS LTD
	ENR	ENERGY	ENERGY AFRICA LTD
	FOS	FOSCHNI	FOSCHINI LTD ORD
	GRY	GRAYPROP	ALLAN GRAY PROPERTY TRST
	GNK	GRINTEK	GRINTEK LTD
	GRT	GROWPNT	GROWTHPOINT PROP LTD
	HVL	HIVELD	HIVELD STEEL AND VANADUM
	ILV	ILLOVO	ILLOVO SUGAR LTD

	JDG	JDGROUP	JD GROUP LTD
	JCM	JOHNCOM	JOHNNIC COMMUNICATIONS
	JNC	JOHNNIC	JOHNNIC HOLDINGS LTD
	KER	KERSAF	KERSAF INVESTMENTS LTD
	LBH	LIB HOLD	LIBERTY HOLDINGS LTD ORD
	LON	LONMIN	LONMIN P L C
	MUR	M&R HLD	MURRAY AND ROBERTS H ORD
	MTP	MARTPROP	MARTPROP PROPERTY FUND
	MSM	MASSMART	MASSMART HOLDINGS LTD
	MDC	MEDCLIN	MEDI-CLINIC CORP LTD ORD
	MTC	METCASH	METRO CASH AND CARRY
	MNS	MNET/SS	ELEC MEDIA NTW AND SUPSP
	MPC	MR PRICE	MR PRICE GROUP LTD
	NAC	NAC	NEW AFRICA CAPITAL LTD
	NAN	NAIL -N-	NEW AFRICA INVESTMNT-N-
	NHM	NORTHAM	NORTHAM PLATINUM LTD
	NCL	NUCLICKS	NEW CLICKS HLDGS LTD
	PEP	PEPKOR	PEPKOR LTD ORD
	PGR	PERGRIN	PEREGRINE HOLDINGS LTD
	PWK	PIKWIK	PIK N PAY HOLDINGS LTD
	PMN	PRIMEDIA -N-	PRIMEDIA LTD -N-
	PIM	PRISM	PRISM HOLDINGS LTD
	PSG	PSG	PSG GROUP LIMITED
	RAH	RA HOLD	REAL AFRICA HLDGS LTD
	RBV	REBSERV	REBSERV HLDGS LTD
	RDF	REDEFINE	REDEFINE INCOME FUND LTD
	RLO	REUNERT	REUNERT ORD
	SCE	SACHROME	SOUTH AFRICAN CHROME
	SGG	SAGE	SAGE GROUP LTD
	SNT	SANTAM	SANTAM LTD
	SHP	SHOPRIT	SHOPRITE HLDGS LTD ORD
	SIS	SISA	SUN INTERNATIONAL (SA)LD
	SFT	SOFTLINE	SOFTLINE LTD
	SPG	SUPRGRP	SUPER GROUP LTD
	SYC	SYCOM	SYCOM PROPERTY FUND
	TIW	TIWHEEL	TIGER WHEELS LTD
	TNT	TONGAAT	TONGAAT-HULETT GROUP ORD
	TDH	TRADEH	TRADEHOLD LTD
	TSX	TRNSHEX	TRANS HEX GROUP LTD
	TRU	TRUWTHS	TRUWORTHS INTERNATIONAL
	USV	UNISERV	UNITED SERV TECHNOLOGIES
	UTR	UNITRAN	UNITRANS LTD
	WAR	W AREAS	WESTERN AREAS LTD
	WBO	WBHO	WILSON BAYLY HLM-OVC ORD
	WET	WETHLYS	WETHERLYS INVESTMENT LTD
	WLO	WOOLTRU	WOOLTRU LTD ORD
	WLN	WOOLTRU-N-	WOOLTRU LTD-N-
ZA03	ARP	A-PROP	ARNOLD PROPERTY FUND

APS	ABCPLUS	ABC CASH PLUS LTD
ACP	ACUCAP	ACUCAP PROPERTIES LTD
ACY	ACUITY	ACUITY GROUP HOLDINGS
ADL	ADMIRAL	ADMIRAL LEISURE WORLD LD
ADO	ADONIS	ADONIS KNITWEAR HOLDINGS
ADH	ADVTECH	ADVTECH LTD
AFEP	AECI 5,5%P	A E C I 5,5% CUM PREF
AOO	AF & OVR	AFR AND OSEAS ENTER ORD
AON	AF & OVR -N-	AFRICAN AND OVERSEAS -N-
AOVP	AF&OVR 6%PP	AFR AND OSEAS ENT 6PRTPR
AFG	AFGEM	AFRICAN GEM RESOURCES
AGI	AGI	AG INDUSTRIES LTD
AHH	AHEALTH	AFROX HEALTHCARE LTD
ALY	ALACRITY	ALACRITY FINANCIAL SERVI
ALX	ALEXWYT	ALEX WHITE HOLDINGS LTD
ALN	ALIANCE	ALLIANCE PHARMACEUTL ORD
ACN	ALIANCE -N-	ALLIANCE PHARMACEUTL -N-
ALJ	ALL JOY	ALL JOY FOODS LTD
ATN	ALTRON	ALLIED ELECTRONICS CORP
ALD	ALUDIE	ALUDIE LTD
AMA	AMAPS	AMALGAMATED APPL HLD LTD
AMB	AMB	AMB HOLDINGS LTD
AME	AME	AFRICAN MEDIA ENTERTAIN
AEC	ANBEECO	ANBEECO INVESTMENT HLDGS
APA	APEXHI A	APEXHI PROPERTIES -A-
APE	APS-TECH	APS TECHNOLOGIES LTD
AQU	AQUA	AQUA ONLINE HOLDINGS LTD
AQL	AQUILA	AQUILA GROWTH LTD
ART	ARGENT	ARGENT INDUSTRIAL LTD
ASG	ASSMANG	ASSMANG LTD
ASR	ASSORE	ASSORE LTD
AAA	AST GROUP	AST GROUP
APK	ASTRAPAK	ASTRAPAK LTD
ATS	ATLAS	ATLAS PROPERTIES LTD
AVA	AVASA	AVASA HOLDINGS LTD
AWT	AWETHU	AWETHU BREWERIES LTD ORD
BNX	BARNEX	BARNATO EXPLORATION LTD
BPL	BARPLAT	BARPLATS INVESTMENTS ORD
BAWP	BARWORLD 6%P	BARWORLD LTD 6%CUMPRF
BSR	BASREAD	BASIL READ HLDGS LTD
BRM	BEARMAN	BEARING MAN LTD
BEG	BEIGE	BEIGE HOLDINGS LTD
BEL	BELL	BELL EQUIPMENT LTD
BIC	BICAF	BICC CAFCA LTD
BJM	BJM	BARNARD JACOBS MELLET
BNT	BONATLA	BONATLA PROPERTY HLDGS
BCF	BOWCALF	BOWLER METCALF LTD
BRC	BRANDCO	BRANDCORP HOLDINGS LTD
BDS	BRIDGESTN	BRIDGESTN FIRESTN MAXIPR

BRN	BRIMSTN-N-	BRIMSTONE INVESTMENT -N-
BRT	BRIMSTON	BRIMSTONE INVESTMNT CORP
BRY	BRYANT	BRYANT TECHNOLOGY LTD
BTG	BTG	BYTES TECHNOLOGY GRP LTD
BDM	BUILDMAX	BUILDMAX LTD
BUR	BURLINGT	BURLINGTON IND LTD ORD
BSB	BUSBY	THE HOUSE OF BUSBY LTD
CDZ	CADIZ	CADIZ HOLDINGS LTD
CAE	CAPEMP	CAPE EMPOWERMENT TRUST
CPL	CAPITAL	CAPITAL PROPERTY FUND
CPI	CAPITEC	CAPITEC BANK HLDGS LTD
CRG	CARGO	CARGO CARRIERS LTD
CSY	CASEY	CASEY INVESTMENT HLDGS
CSB	CASHBIL	CASHBUILD LTD
CCG	CCG	CCG
CMT	CEMENCO	CEMENTATION CO AFR LTD
CMTP	CEMENCO 6%P	CEMENTATION CO 6%CUMPREF
CMG	CENMAG	CENMAG HOLDINGS LTD
CRM	CERAMIC	CERAMIC INDUSTRIES LTD
CFC	CFC	COMMERCIAL FIN CO LTD
CHE	CHEMSVE	CHEMICAL SERVICES ORD
CLH	CITYLDG	CITY LODGE HTLS LTD ORD
CLE	CLIENTL	CLIENTELE LIFE ASSURANCE
CMH	CMH	COMBINED MOTOR HLDGS LTD
COM	COMAIR	COMAIR LTD
CMA	COMMAND	COMMAND HOLDINGS LTD
CPSD	COMPASS D	COMPASS PROP HLDG DEB
CCL	COMPCLEAR	COMPU CLEARING OUTS LTD
CNX	CONAFEX	CONAFEX HLDGS SOCIE ANON
CNC	CONCOR	CONCOR LTD RCON
CNF	CONFED	CONGELLA FEDERATION LTD
CNFP	CONFED 6%P	CONGELLA FED 6% CUM PREF
CCT	CONNECT	CONNECTION GROUP HLDGS
CNL	CONTROL	CONTROL INSTRUMENTS GRP
CAN	COPI	CANADIAN OSEAS PACK ORD
CRW	CORWIL	CORWIL INVESTMENTS LTD
CKS	CROOKES	CROOKES BROS LTD
CSH	CSHOLDING	CS COMPUTER SERVICES HLD
CUL	CULINAN	CULLINAN HOLDINGS ORD
CULP	CULINAN5,5%P	CULLINAN HLDG5,5%CUMPREF
CYD	CYCAD	CYCAD FINANCIAL HLDGS LD
DAW	DAWN	DISTRIBUTION AND WAREHSG
DCT	DCENTRIX	DATACENTRIX HOLDINGS LTD
DEC	DECILLION	DECILLION LTD
DECD	DECILLION CD	DECILLION LTD CONV DEB
DGC	DIGICOR	DIGICORE HOLDINGS LTD
DST	DISTELL	DISTELL GROUP LTD
DNA	DNA SUP	DNA SUPPLY CHAIN INVESTM

DON	DON	DON GROUP LTD
DLV	DORBYL	DORBYL LTD ORD
DLVP	DORBYL 5%P	DORBYL LTD 5% CUM PREF
DLP1	DORBYL 5,5%P	DORBYL LTD 5,5% CUM PREF
ECH	EC-HOLD	EC-HOLD LTD
ECOP	EDCON 6%P	EDGARS CONS 6% CUMPREF
ETH	EDUTECH	NOVA EDUC AND TECH HLDS
ESL	EERSLNG	EERSTELING GOLD MIN CO
ELR	ELBGROUP	ELB GROUP LTD ORD
ELX	ELEXIR	ELEXIR TECHNOLOGY HLDGS
ENV	ENSERV	ENVIROSERV HOLDINGS LTD
EOH	EOH	ENTERPRISE OUTSOURCING H
ERM	ERM	ENTERPRISE RISK MNGMENT
ERP	ERP.COM	ERP.COM HOLDINGS LTD
EUR	EUREKA	EUREKA IND LTD ORD
EXL	EXCELL	EXCELLERATE HLDGS LTD
EPL	EXPLORER	EXPLORER CORPORATION HLD
FVT	FAIRVEST	FAIRVEST PROPERTY HLDGS
FLC	FALCON	FALCON INV HLDG SOC ANON
FRT	FARITEC	FARITEC HOLDINGS LTD
FOM	FORIM	FORIM HOLDINGS LTD
FOSP	FOSCHNI6,5%P	FOSCHINI LTD 6,5%CUMPREF
FRE	FREDDEV	F STATE DEV AND INV ORD
FRO	FRONTRNGE	FRONTRANGE LIMITED
GMF	GENCOR	GENCOR LTD
GLB	GILBOA	GILBOA
GMB	GLENMIB	GLENRAND M.I.B. LTD
GDA	GLODINA	GLODINA HOLDINGS LTD
GLT	GLOTEC	GLOBAL TECHNOLOGY LTD
GLL	GLOVIL	GLOVIL
GLE	GOLD EDGE	GOLD EDGE
GDF	GOLDREEF	GOLD REEF CASINO RESORTS
GDC	GOODCAP	GOOD CAPE LTD
GND	GRINDROD	GRINDROD LTD
GNN	GRINDROD -N-	GRINDROD LTD -N-
GRF	GROUP 5	GROUP FIVE LTD ORD
HCL	HERCOL	HERITAGE COLLECTION HLDG
HWN	HOWDEN	HOWDEN AFRICA HLDGS LTD
HDC	HUDACO	HUDACO INDUSTRIES LTD
HYP	HYPROP	HYPROP INVESTMENTS LTD
IDI	IDION	IDION TECHNOLOGY HLDGS
IFR	IFOUR	IFOUR PROPERTIES LTD
ILA	ILIAD	ILIAD AFRICA LTD
IMR	IMR	IMR INVESTMENTS LTD
ICT	INCENT	INCENTIVE HOLDINGS LTD
IDQ	INDEQTY	INDEQUITY GROUP LTD
IND	INDFIN	INDEPENDENT FINANCIAL SE
IFW	INFOWAVE	INFOWAVE HOLDINGS LTD
INM	INMINS	INMINS LTD ORD
INS	INSURE	INSUR OUTSOURCNG

		MANAGER
ITG	INTEGREAR	INTEGREAR LTD
ITV	INTERVID	INTERVID LTD
ITR	INTRADING	INTERTRADING LTD
IVT	INVICTA	INVICTA HOLDINGS LTD
ILT	ISOLUTION	INTERCONNECTIVE SOLUTION
IST	IST	IST GROUP LTD
ITE	ITLTILE	ITALTILE LTD
JSC	JASCO	JASCO ELECTRONICS HLDGS
JCD	JCI	JCI LTD
JCDD	JCI CONV DEB	JCI LTD S R CONV DEB
JGS	JIGSAW	JIGSAW HOLDINGS LTD
KIR	KAIROS	KAIROS INDUSTRIAL HLDGS
KLG	KELGRAN	KELGRAN LTD
KGM	KGMEDIA	KAGISO MEDIA LTD
KNG	KINGCO	KING CONSOLIDATED HLDGS
KNGD	KINGCO14%CD	KINGCO14%CD
KOS	KOLOSUS	KOLOSUS HOLDINGS LTD
KR	KR	KRUGER RAND
KRHT	KR HALF	KRUGER RAND HALF
KRQT	KR QUARTER	KRUGER RAND QUARTER
KRTT	KR TENTH	KRUGER RAND TENTH
KWV	KWV BEL	KWV BELEGGINGS BEPERK
LAR	LA GROUP	LA GROUP LTD ORD
LAN	LA GROUP -N-	LA GROUP LTD -N-
LAB	LABAT	LABAT AFRICA LTD
LBHP	LIB HOLD 11P	LIBERTY HLDGS 11C CUMPRF
LAF	LONAFRIC	LONRHO AFRICA PLC
LNF	LONFIN	LONDON FIN INV GRP PLC
LYS	LYONS	LYONS FIN SOLUTIONS HLDG
MAF	M & F	MUTUAL AND FEDERAL INS
MRN	MARSHAL-N-	MARSHALLS LTD -N-
MSS	MARSHALLS	MARSHALLS LTD
MAS	MASNITE	MASONITE AFRICA LTD ORD
MTO	MATHOMO	MATHOMO GROUP LTD
MTZ	MATODZI	MATODZI RESOURCES LTD
MEC	MAXTEC	MAXTEC LTD
MCC	MCCAR	MCCARTHY LTD
MCCD	MCCAR CD	MCCARTHY LTD SCD
MCCP	MCCAR CP	MCCARTHY LTD COMCONPREF
MCU	MCUBED	M CUBED HLDGS LTD
MTL	MERCANTIL	MERCANTILE LISBON BANK H
MES	MESSINA	MESSINA LTD
MTA	METAIR	METAIR INVESTMENTS ORD
MTX	METOREX	METOREX LTD
MPL	METPROL	METBOARD PROPERTIES LTD
MGX	MGX	MGX HOLDINGS LTD
MLL	MILLAIR	MILLIONAIR CHARTER LTD
MMG	MMG	MICROMEGA HOLDINGS LTD
MOB	MOBILE	MOBILE INDUSTRIES ORD

MBN	MOBILE -N-	MOBILE INDUSTRIES -N-
MOBD	MOBILE 6%CD	MOBILE IND 6% CONV DEB
MNY	MONEYWB	MONEY WEB HOLDINGS LTD
MTE	MONTE	MONTEAGLE SOCIETE ANONYM
MRB	MORIBO	MORIBO LEISURE LTD
MUM	MOULDMED	MOULDED MEDICAL SUPPLIES
MST	MUSTEK	MUSTEK LTD
MVL	MVELA RES	MVELAPHANDA RESOURCES LD
NAI	NAIL	NEW AFRICA INVEST LD ORD
NPKP	NAMPAK 6% P	NAMPAK LTD 6% CUMPREF
NPP1	NAMPAK 6,5%P	NAMPAK LTD 6,5% CUMPREF
NMS	NAMSEA	NAMIBIAN SEA PRODUCTS LD
NCS	NICTUS	NICTUS BEPERK
NWL	NUWORLD	NU-WORLD HOLDINGS LTD
OKF	OAKFLDS	OAKFIELDS THOROUGHBREDS
OCE	OCEANA	OCEANA GROUP LTD
OCT	OCTODEC	OCTODEC INVEST LTD
OMN	OMNIA	OMNIA HOLDINGS LTD
OLG	ONELOGIX	ONELOGIX GROUP LTD
OSI	OSI	OSI
PAC	PACHOLD	PACIFIC HLDGS LTD
PAM	PALAMIN	PALABORA MINING CO ORD
PAL	PALS	PALS HOLDING LTD
PAP	PANPROP	PANGBOURNE PROP LTD
PCN	PARACON	PARACON HOLDINGS LTD
PRA	PARAPROP	PARAMOUNT PROP FUND LTD
PSC	PASDEC	PASDEC RESOURCES SA LTD
PET	PETMIN	PETRA MINING LTD
PHM	PHUMELELA	PHUMELELA GAME LEISURE
PNC	PINNACLE	PINNACLE TECH HLDGS LTD
POTP	PORT 5,5%P	BRIAN PORTER 5,5%CUMPREF
PMM	PREMIUM	PREMIUM PROPERTIES LTD
PRM	PRIMA	PRIMA PROPERTY TRUST
PMA	PRIMEDIA	PRIMEDIA LTD
PMG	PRIMEGRO	PRIMEGRO
PMV	PRIMESERV	PRIMESERV GROUP LTD
PRO	PROPER	PROPER GROUP LTD
PTC	PUTCO	PUTCO LTD
PPR	PUTPROP	PUTCO PROPERTIES LTD
QUY	QUYN	QUYN HOLDINGS LTD
RBW	RAINBOW	RAINBOW CHICKEN LTD
RNG	RANGOLD	RANDGOLD AND EXP CO
RCO	RARECO	RARE EARTH EXTRACTION CO
RLY	RELYANT	RELYANT RETAIL LTD
RNT	RENTSUR	RENTSURE HOLDINGS LTD
RLZP	REUNERT5,5%P	REUNERT 5,5%CUM PREF
RTO	REX TRUE	REX TRUEFORM CLOTH ORD
RTN	REX TRUE -N-	REX TRUEFORM CL CO -N-
RTOP	REX TRUE 6%P	REX TRUEFORM 6% CUM

		PREF
RPR	RLPROPS	RAND LEASES PROP LTD
SJL	S&JLAND	S AND J LAND HOLDINGS
SAE	SA EAGLE	SA EAGLE INSURANCE CO
SRL	SA RETAIL	SA RETAIL PROPERTIES LTD
SBL	SABLE	SABLE HLDGS LTD ORD
SBV	SABVEST	SABVEST LTD
SVN	SABVEST -N-	SABVEST LTD -N-
SIR	SAIL GROUP	SAIL GROUP LTD
SAL	SALLIES	SALLIES LTD
SMR	SAMRAND	SAMRAND DEVELOP HLDGS LD
SAM	SAMROC	SA MINERAL RESOURCES COR
SSA	SASANI	SASANI LTD
SFN	SASFIN	SASFIN HOLDINGS LTD
SCN	SCHAMIN	SCHARRIG MINING LTD
SER	SEARDEL	SEARDEL INVEST CORP LTD
SRN	SEARDEL-N-	SEARDEL INVST CORP -N-
SKJ	SEKUNJALO	SEKUNJALO INVESTMENTS LD
SLO	SELCO	SOUTHERN ELECTRICITY CO
STO	SETHOLD	SETPOINT TECHNOLOGY HLDG
SHP2	SHOPRIT 5%P	SHOPRITE 5% PREF
SHP1	SHOPRIT 6%P	SHOPRITE 6% PREF
SFA	SHOPS	SHOPS FOR AFRICA LTD
SHP3	SHPRT 2ND5%P	SHOPRITE 2ND 5% PREF
SHP4	SHPRT 3RD5%P	SHOPRITE 3RD 5% PREF
SIM	SIMMERS	SIMMER AND JACK MINES
SMC	SMC	SOUTHERN MINING CORP LTD
SOV	SOVFOOD	SOVEREIGN FOOD INVEST LD
SPA	SPANJAARD	SPANJAARD LTD
SPE	SPEARHD	SPEARHEAD PROP HLDGS LTD
SUM	SPECTRUM	SPECTRUM SHIPPING LTD
SPS	SPESCOM	SPESCOM LTD
SUR	SPURCORP	SPUR CORPORATION LTD
SQE	SQONE	SQUARE ONE SOLUTIONS GRP
SBKP	STANBANK6,5%P	STD BANK GROUP LTD 6,5%P
STE	STEERS	STEERS HOLDINGS LTD
SLL	STELLA	STELLA VISTA TECHNOL LTD
STI	STILFTN	STILFONTEIN G M CO LTD
STA	STRATCORP	STRATCORP LTD
SBN	SUB N	SUB NIGEL GOLD MINING CO
SNG	SYNERGY	SYNERGY HOLDINGS LTD
TRX	TEREXKO	TEREXKO LTD
TBX	THABEX	THABEX EXPLORATION LTD
TBSP	TIGBRANDS5,5%P	TIGER BRANDS 5,5%CUMPREF
TSC	TISEC	TISEC LTD
TRT	TOURVST	TOURISM INV CORP LTD
TMT	TREMATON	TREMATON CAPITAL INV LTD
TRE	TRENCOR	TRENCOR LTD
TED2	TRENCOR 6%CD	TRENCOR LTD 6%CONV DEB

TPC	TRNPACO	TRANSPACO LTD
UCS	UCS	UCS GROUP LTD
VLT	VALAUTO	VAALAUTO LTD
VCR	VALCAR	VAALTRUCAR LTD
VLE	VALUE	VALUE GROUP LTD
VTL	VENTEL	VENTER LEISURE AND COMM
VST	VESTA	VESTA TECHNOLOGY HOLDNGS
VKG	VIKING	VIKING
VIL	VILLAGE	VILLAGE MAIN REEF G M CO
WAN	WANKIE	WANKIE COLLIERY LD ORD
WBH	WBHOLD	W B HOLDINGS LTD
WES	WESCOB	WESCO INVESTMENTS LTD
WNE	WINECORP	WINECORP LTD
WNH	WINHOLD	WINHOLD LTD ORD
WLP1	WOLTRU6,75%P	WOOLTRU LTD 6,75% PREF
WLOP	WOOLTRU 6%P	WOOLTRU LTD 6%CUM PREF
YRK	YORKCOR	YORK TIMBER ORG
YHK	YTHRK	Y3K GROUP LTD
ZPT	ZAPTRONIX	ZAPTRONIX LTD
ZRR	ZARARA	ZARARA
ZCI	ZCI	ZAMBIA COPPER INV LD ORD
ZLT	ZELTIS	ZELTIS HOLDINGS LTD
ZNT	ZENITH	ZENITH CONCESSIONS ORD

14 Bibliography

Blake, D, 1990, Financial Market Analysis. McGraw-Hill.

Bhana, N, 1998, The share price reaction on the Johannesburg Stock Exchange for special (extra) dividend announcements. *The Investment Analysts Journal*, Volume 47: Part 1.

Bhana, N, 1999A, The Impact of public news regarding potential take-overs on the share price behaviour of target companies. *The Investment Analysts Journal*, Volume 50: Part 2.

Bhana, N, 1999B, Share price reaction to announcements of equity financing by companies listed on the Johannesburg Stock Exchange. *The Investment Analysts Journal*, Volume 48: Part 3.

Busse, JA & Clifton Green, T, 2002, Market Efficiency in Real-Time. *Journal of Financial Economics*. Volume 65: 415-437,

Cottle, S & Nurray RF, Block, FE, 1987, Graham and Dodd's Security Analysis. 5th Edition. McGraw-Hill.

2001. *The Economist.* 15 March 2001

Ferreira EJ & Smith, SD, 1999, Stock price reactions to recommendations in the Wall Street Journal "Small Stock Focus" column. *The Quarterly Review of Economics and Finance,* Volume 39, 1999: 379–389.

Henn, J & Smit, E, 1997, The influence of economic news events on share market activity in South Africa. *The Investment Analysts Journal*, Volume 46: Part 2.

Hillier, B, 1997, The Economics of Asymmetric Information. Macmillan Press Ltd.

The JSE, 2003 (A), Closing Price Definitions for 15 November 2002.

http://www.jse.co.za/downloads/closing_prices/history/20021115-closing_prices.txt.

The JSE, 2003 (B), Closing Price Definitions for 31 July 2003.

http://www.jse.co.za/downloads/closing_prices/history/20030731-closing_prices.txt.

The JSE, 2003 (C), SENS Abbreviated Guidelines.

http://www.jse.co.za/informational/sens/2_abbguide.jsp.

Karpoff, JM, 1987, The Relation between Price Changes and Trading Volume: A Survey. *Journal of Financial and Quantitative Analysis*, March, Volume 22, Number 1: 109-126.

McQueen, G & Roley, VV, 1993, Stock Prices, News, and Business Conditions. *The Review of Financial Studies*, Volume 6, Number 3: 683-707.

Lo, AW & MacKinlay, CA, 1988, Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test. *The Review of Financial Studies*, Volume 1, Number 1: 41-66.

Moneymax, 2003, Definition of high, low and close.

http://www.moneymax.co.za/tools/snapshot/trade_types.asp.

Muller, C, 1999, Investor overreaction on the Johannesburg Stock Exchange. *The Investment Analysts Journal*, Volume 49: Part 1.

Nofsinger, JR, 2001, The impact of public information on investors. *Journal of Banking & Finance*. 2001, Volume 25: 1339-1366.

Page, MJ & Way, CV, 1992, Stock Market Over-reaction: The South African Evidence. *The Investment Analysts Journal*, Volume 36: Part 4.

Roll, R, 1988, R^2. *The Journal of Finance*, Volume XLIII, Number 2, July 1988: 541-566.

SAWarrants, 2003, Warrant Definitions. http://www.moneymax.co.za/sawarrants

Shleifer, A, 2000, Inefficient Markets: An Introduction To Behavioral Finance. Oxford University Press.

Traverso, ABA, 2000, Testing for the Johannesburg Stock Exchange as an Efficient Market. Thesis submitted in fulfillment of Masters degree in Commerce in the Department of Economics, UCT.

Van der Merwe, R & Smit, E, 1996, The influence of political news events on share market activity in South Africa. *The Investment Analysts Journal*, Volume 44: Part 1.