PRICE IMPLICATIONS OF BLOCK TRANSACTIONS ON QUOTED SHARES

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg

January, 2006

ABSTRACT

The purpose of this research was to investigate the impact of block transactions on security prices and on the price discovery process arising from such trades, with emphasis on actively traded JSE-listed securities. The focus was on the stock market's reaction immediately before and after the block trade. First, the researcher investigated whether, on average, block trades leads to excess returns and, secondly, whether the resulting price impact is permanent or temporary.

The research differentiated between buyer- and seller-initiated block trades and analysed these trades separately. The findings indicate that there are asymmetries between the two types of trades, specifically with respect to the frequency of occurrence and the pricing, with seller-initiated trades being more prominent in all aspects. The prevailing market conditions seem to account for the price asymmetry between seller- and buyer-initiated trades while the market trading structure explains the total price impact.

Using well established statistical techniques, the key findings reveal that while block trades have an impact on the prices of the underlying securities, the total impact is predominately temporary as share prices revert back within one to three trades, irrespective of the type of trade. Contrary to expectations, the block size does not have an impact on the total price or on the speed of price re-adjustment. Further, if the market has information about a pending block trade, there is insufficient evidence that they react to such information prior to the execution of the block trade.

The research concludes that block trades do not lead to an adverse effect on security prices of actively traded shares. This will be of interest to firms whose shares are prone to being traded in blocks, equity traders, policy makers and regulators.

DECLARATION

I, Kinya Kithinji, declare that this research report is my own, unaided work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

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Kinya Kithinji

January 2006

DEDICATION

I dedicate this research report to my husband, Anthony Ndegwa, to my parents - Japheth & Rose Kithinji and to my siblings - Mary and Jack. Thank you for all the guidance, support and most of all, for believing in me.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks to:

- Mark Peters, my supervisor for his time and encouragement;

- Prof Mike Ward and Chris Muller for their helpful advice in the initial phases of this research; and

- A special thanks to Roy Mutooni for assistance with the data used in this research.

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GLOSSARY

The J200 Top 40 Index

The J200 Top 40 Index (previously known as the ALSI 40 Index) is an equity index made up of securities that best replicate the performance of the South African equities market as a whole. The constituent companies are drawn from the large-, medium- and small-cap sectors with a greater bias towards large cap firms that are financially stable, widely traded and marketable.

Downtick

A downtick arises where the change in price from the prior price to the block price is negative; that is, the block is trading at a discount. They are usually associated with seller-initiated trades. These terms, that is downticks and seller-initiated trades, are used interchangeably in this study.

Market impact

These are additional transaction costs (implicit costs) which are usually over and above the explicit execution costs that cause the transaction price to be less favourable than the prevailing market price. Market impact costs are likely to be significant where block trades are concerned, as huge amounts of money are involved. In various international stock exchanges, large institutional investors conduct block trades independent of the auction market to avoid or at least minimise market impact.

Normal market size (NMS)

Each listed company is allocated a NMS based on its level of trading. The NMS is calculated over a 12-month period and re-evaluated quarterly or as often as it is deemed necessary by the Market Controller of the JSE Securities Exchange. In general, the higher the level of trading, the higher its NMS all else held constant.

According to the Exchange's block trading rules, a trade must exceed 20 times its normal market size to qualify as a block trade.

Parallel trading hypothesis or herding phenomenon

These arises where, at a particular period in time, institutions "gang up" and take on the same side of the market for a given stock. In an efficient market price movements are attributed to changes in equilibrium price and parallel trading in itself should not produce any price movements. However, in a less efficient market where securities are not perfect substitutes and where significant transaction costs exist, parallel trading can necessitate short-run price changes. This assertion supports the liquidity cost hypothesis.

Permanent price effect

This arises where a new equilibrium price emerges as a result of a block transaction.

Registered secondary distributions

In the US equities market, these are secondary trades that must be registered with the Securities and Exchange Commission (SEC) 20 days prior to the actual trade.

Unregistered secondary distributions represent secondary trades that are publicly announced on the day of the actual trade.

Survivorship bias

This arises where companies are excluded from an index. Companies may be eliminated from the index for various reasons, such as delisting from the Exchange, bankruptcy, or a merger.

An index is likely to be upward biased where it includes only those companies that have survived.

Temporary price effect

This arises where the security price rebounds following a block transaction.

Upticks

An uptick arises where the change in price from the prior price to the block price is positive; that is, the block is trading at a premium. Upticks are usually associated with buyer-initiated trades. These terms, that is, upticks and buyer-initiated trades, are used interchangeably in this study.

Zerotick

A zerotick arises where there is no change in price from the prior price to the block price. Such trades are difficult to automatically categorise and for this reason could either be buyer- or seller-initiated trades.

1 INTRODUCTION

1.1 PURPOSE OF THE STUDY

This research examines the impact of block transactions on share prices of securities listed on the JSE Securities Exchange (the "Exchange").

1.2 CONTEXT OF THE STUDY

In an efficient market, current market prices implicitly reflect investors' future expectations about the value of traded securities. New information which flows into the market in a random fashion affects the expected return or riskiness of securities and alters their prices. The literature on corporate finance suggests that prices are based on the present value of future cash flows, and not supply and demand, per se. From an economic theory perspective, security prices are predominantly driven by market forces of demand and supply.

Kraus & Stoll (1972) define block transactions as trades that involve a larger number of shares than those that can be readily handled in the normal course of trading. Much has been written on the impact of block trades on international exchanges in the United States, London, Paris and Sydney. Mark Atkins (1995) conducted a similar study on the Exchange. At that time, however, the South African economy had just opened its doors to the international community while reforms at the Exchange were at the inception stage.

Ten years after Atkins' study; it would be interesting to replicate the same studies on the Exchange. Since Atkins' study, there has been an influx of foreign investors into the Exchange, a rush for new and dual listings on the JSE and foreign bourses and the implementation of the Stock Exchange Control Act in November 1995. The South African stock market has indeed transformed from a highly regulated and closed exchange in the 80s and early 90s to a fully operational market in the late 90s. Today, the Exchange is not only the largest equities market in Africa, but is also comparable to other leading emerging and developing international stock exchanges.

Below are the highlights of the financial reforms that have taken place in the South African economy and specifically on the Exchange over the last ten years.

- By 2001, all listed companies were required to have sold off at least 10% of their shares to the general public (in conformity with international exchanges such as the London Stock Exchange - "LSE"). This has led to a change in shareholder profile of most listed companies;

- With effect from 1999 any shareholding of more than 5% in a company must be disclosed. This was introduced to enhance market transparency.

- There has been greater foreign direct investment as foreign companies hold minority shareholding in some listed companies.

- The relaxation of exchange controls has encouraged both foreign direct investment on the Exchange and has enabled local investors invest abroad as well.

- Inward Dual listings were permitted in 2004.

According to market analysts, the transformation and deregulation of the Exchange has led to greater competition, increased market liquidity, higher volumes of trading, better price recovery and faster transaction times, and has also reduced the cost of trading on the Exchange. Further, the introduction of the Johannesburg Equities Trading (JET) screen-based system and the real-time Stock Exchange News Service (SENS) has enhanced market transparency.

The capital flows due to voluntary unbundling of South African conglomerates such as Anglo and SAB Miller and, more recently, the Black Economic Empowerment activity, have set apart South Africa's market from other emerging markets.

In light of the developments discussed above, this study seeks to provide a better understanding of block trading on the Exchange.

1.3 PROBLEM STATEMENT

The aim of this research is to investigate how security prices are affected by block transactions and how these transactions subsequently impact on the price-discovery process of the underlying securities.

1.3.1 Research sub-problems

The first sub-problem is to determine the magnitude and the impact of the price movements as a result of both block sales and purchases.

The second sub-problem is to determine whether block transactions have both a temporary and permanent effect on security prices.

1.4 SIGNIFICANCE OF THE RESEARCH

The findings of this research will be of interest to firms whose shares are prone to being traded in blocks, to equity traders, to policy makers and to regulators as the research will generate answers to the some of their concerns as listed below.

The research will provide guidance on the effect of block transactions on shareholders' wealth. Selling shareholders are faced with the double loss of wealth in the form of a price decline and execution costs in the form of underwriting and other selling costs. These costs are expected to be substantial and are positively related to the size of the offering (Mikkelson & Partch, 1985).

If block transactions result in permanent price effects, Holthausen, Leftwich & Mayers (1990) suggest that this may influence the actions and strategies of the initiating parties and/or investors with information on the forthcoming block trade. There is in second place, a need to understand how block trades impact on investors' expectations and how investors incorporate that information when making investment or divestiture decisions.

Questions have been raised as to how the level of institutional holdings, together with the trading behaviour of institutions, impact on security prices. The market perception is that institutions practise parallel trading, where they "gang up" on the same side of the market and systematically trade in parallel. If the research proves that the actions of large/institutional investors can have an adverse effect on security prices, then its third significance would be to show that for firms whose shares are prone to being traded in blocks, a dispersed ownership structure is preferable.

Execution costs, which include the market impact and commissions paid by traders, are different across market structures. Chan & Lakonishok (1995) and LaPlante & Muscarella (1997) suggest that investors will seek out the market that offers either the lowest net costs or the largest net benefits for the execution of a block trade. In light of dual and multi-listing of a number of South African companies, the Exchange needs to remain an attractive destination for such types of trades as significant differences could affect the choice of the trading venue (Bessembinder & Venkataraman, 2004).

Finally, this study will add to the debate on the efficiency of the Exchange and provide a measure of the market's liquidity, (Chan & Lakonishok, 1995). A market is said to be liquid where it is able to absorb block trades with minimal price movements (LaPlante & Muscarella, 1997). Various international equities and derivatives exchanges such as the New York Stock Exchange ("NYSE") and the Australian Stock Exchange ("ASE") have established alternative trading floors - upstairs and downstairs markets to facilitate the execution of large trades (e.g. block trades) and promote market liquidity. In South Africa, the Exchange does allow for off-market dealing but does not have a separate upstairs and downstairs market per se.

1.5 STATEMENT OF LIMITATIONS

This research is limited to an analysis of the behaviour of actively traded securities quoted on the JSE Securities Exchange.

The study will not seek to establish the varying behaviours for individual securities (that is, security-specific characteristics) but will analyse the effects of block trades on securities in general.

The main focus of the study is the secondary market where block transactions alter the "flow" variable; that is, the rate of excess demand or supply of an existing security at a given period in time.

The study excludes block sales that arise when companies make a rights issue as a fund-raising strategy. Normally, rights issues are made at a discount to the prevailing market price to induce existing shareholders to take up the offer. A further complication is that the share price further declines once the securities eventually trade ex-rights.

The study excludes futures contracts and other derivatives instruments.

Finally, the study is limited to block trades executed on the Exchange over a 24-month period, between 1 June 2002 and 31 May 2004. This would be deemed to be indicative of all block trades.

1.6 ASSUMPTIONS

It is assumed that the securities listed on the Exchange react to new information that is firm-specific and also to general market information as it becomes available.

Further, it is assumed that block traders cannot simultaneously place a buy and sell order for the same stock.

1.7 SUBSEQUENT CHAPTERS

The report is divided into seven chapters.

Chapter Two covers the **LITERATURE REVIEW**. This chapter sets out with an introduction to the concept of block trading, which covers an overview of pioneer research on block trades and the motives underlying such trades. This is followed by a review of the factors that drive price movements within the context of the research, which establishes the framework for determining and exploring whether block trades result in temporary or permanent price effects.

In Chapter Three, the **HYPOTHESES** tested in this study are presented.

Chapter Four provides an overview of the **RESEARCH METHODOLOGY** that has been applied in this study. The study relies on methodologies used by Holthausen *et al* (1990) and Gemmill (1996) in their studies of the NYSE and the LSE respectively. Chapter Five deals with the **PRESENTATION OF RESULTS** and takes into account the differences between buyer- and seller-initiated trades.

Chapter Six presents the **INTERPRETATION OF RESULTS**.

Finally in Chapter Seven, **CONCLUSIONS** are drawn **AND RECOMMENDATIONS** are made.

2 LITERATURE REVIEW

This chapter outlines the literature used to derive the hypotheses tested in the research.

2.1 DEFINITION OF BLOCK TRADES

There is no international consensus on what constitutes a block trade. Various stock exchanges have developed their own definitions of block transactions. As a minimum, most exchanges have set out the minimum size of a block. At the NYSE, Sydney Stock Exchange (SSE), and the LSE, trades greater than 10,000 shares are considered to be block trades. These definitions have been adhered to by researchers such as Scholes (1972), Kraus & Stoll (1972), Mikkelson & Partch (1985), Seppi (1990), Keim & Madhavan (1996), LaPlante & Muscarella (1997) and Ghysels & Cherkaoui (2003).

Holthausen, Leftwich & Mayers (1987) suggest that a trade of 10,000 shares is unlikely to generate any price effect, especially in cases of companies with a large market capitalisation, and, as such, classify such trades as "vanilla blocks". Through their review of earlier studies, Holthausen *et al* (1987) identify three key definitions of block trades. These definitions have been applied by various researchers and include:

i. The dollar value of the transaction; and/or
ii. The proportion of the firm's outstanding shares traded: and/ or
iii. The number of shares traded relative to the average daily trading volume.

In their respective studies, Barclays & Holderness (1991) and Bolton & Von Thadden (1998) applied (ii) above, Chan & Lakonishok (1997) combined (i) and (ii), while Atkins (1995) combined (i) and (iii). Frino, Jarnecic & Lepone (2004) selected the largest 1% of trades in each stock listed on the ASE over their chosen review period.

Holthausen *et al* (1987) found that bias arise depending on how the sample is drawn. Where the sample is drawn based on definition (i) above, the largest blocks are trades relating to large firms while where the sample is drawn based on definition (ii) or (iii) above, the largest blocks are trades relating to smaller firms.

Locally, the JSE Securities Exchange's – South Africa Rules & Related Legislation Issue 18, pg 2-4 defines a block trade as "a transaction where a broking member (equities) trades as agent or principal in a single security where the transaction has a minimum value of R5million and comprises of at least twenty times normal market size." This definition seems to encapsulate at least the first and third attributes of a block trade as suggested above by Holthausen *et al* (1987). The Paris Bourse block trade definitions are comparable to those used in South Africa.

2.2 MOTIVES UNDERLYING BLOCK TRADING

This section highlights the various motives underlying block trading.

Block buyers and sellers may trade to exploit private information accessible to them either as institutional investors or persons with insider knowledge (Seppi, 1990) and (Keim & Madhavan, 1996). The trading strategies pursued by mutual funds oblige them to invest in research to facilitate information gathering and analysis of all traded securities. Portfolio managers search for information about all securities with a view to acquiring undervalued securities (Saar, 2001). Portfolio managers will replace securities in their portfolio that have unfavourable or no information with new securities that have more favourable information. Alternatively, they may sell such securities to meet their liquidity needs.

Chan & Lakonishok (1993) support the view that block buys are information driven. Investors select specific securities from numerous alternatives, which implies that they hold favourable firm-specific information. On the other hand, a decision to dispose of a particular lot of a given security is likely to be liquidity driven as most investors do not hold a market portfolio. Theoretical and empirical research has proved that block sales are more likely to be liquidity motivated, while block purchases are information based.

Investors are faced with an opportunity cost of investing in one security and not in another (Saar, 2001). Investors and portfolio managers are continually re-evaluating their circumstances and, as a result, rebalancing their portfolios to adhere to their investment objectives (Burdett & O'Hara, 1987; Seppi, 1990) and Saar (2001). Their concerns include meeting their desired asset allocation needs and aligning their portfolio to match their risk tolerance, return needs for growth and/or income, and their investment time horizon. Seppi (1990) acknowledges the need for portfolio rebalancing, but highlights that for the block trader, the expected loss (or gain) arising from trading in a block must be the lowest (or highest) on any alternative trading strategy.

Where a future large position is desirable on a particular stock, an investor may opt to take immediate action and take advantage of an opportunity and avoid either the time lags associated with buying small round lots from specialists (or from the market) or paying a premium in a future block purchase. Alternatively, an investor may prefer to lock in a known discounted price as a risk-aversion strategy, instead of acquiring the block at a future unknown price, which could be higher (Burdett & O'Hara, 1987).

2.2.1 Asymmetry between block sales and block purchases

Block trading literature suggested that there are asymmetries between block sales and purchases with respect to pricing, frequency of occurrence and the price-recovery process.

Scholes coined the phrase, "blocks are sold and not bought". Through empirical research on the NYSE by Kraus & Stoll (1972) and later studies on securities traded on the American Stock Exchange (AMEX) and National Association of Securities Dealers Automated Quotations (NASDAQ) by Keim & Madhavan (1996), these researchers found that over 80% of all block transactions were indeed seller initiated. Other researchers, such as Jones (1972) and Burdett & O'Hara (1987), also corroborate the existence of asymmetry in the market. To explain this phenomenon, it has been argued that it is easier to sell large blocks than it is to buy them. Chan & Lakonishok (1995) observe that there are more institutional sales than institutional purchases, although the differences are small.

LaPlante & Muscarella's (1997) studies of the NYSE and the NASDAQ found that the frequency of buyer- and seller-initiated trades is dependent on the block size. For smaller block volumes, these trade types have an equal likelihood of occurrence. However, as the size of the block increases there are more seller-initiated trades than buyer-initiated trades in both exchanges.

In more recent studies, Bessembinder & Venkataraman (2004) and Frino, Jarnecic & Lepone (2004) found that block buys and sales occur with similar frequency on the Paris and ASX bourses respectively.

The price asymmetry and price recovery have been discussed at length in Section 2.6.1 and Section 2.7 of this report respectively.

2.3 PIONEER RESEARCH ON BLOCK TRADES

Scholes (1972) and Kraus & Stoll (1972) pioneered studies in block trades. They developed four hypotheses to explain the mechanisms around block trades. These hypotheses are set out in the sections below.

2.3.1 Substitution hypothesis

According to Scholes (1972), in equilibrium, all securities are priced as perfect substitutes to one another. As a result, individually large buy or sell transactions will have an insignificant impact on the aggregate change in demand and supply. This hypothesis is in line with various financial and economic models on equilibrium security pricing such as the Capital Asset Pricing Model (CAPM) and pure competition, which assume a perfectly elastic demand and supply situation.

Substitution hypothesis predicts a permanent downward (or upward) shift in the price of a seller- or buyer-initiated block trade. Scholes (1972) examined secondary distributions on the NYSE and found no price reversals or any relation between the price change and the block size. His findings were in support of the substitution hypothesis. Perhaps because of the underlying assumptions, specifically the assumption of a pure competitive environment, few researchers have been able to validate this hypothesis through their studies.

2.3.2 Price pressure hypothesis

The price pressure hypothesis disagrees with substitution hypothesis, in that securities are not perfect substitutes and that the demand for a firm's shares is less than perfectly elastic.

On demand elasticity, Mikkelson & Partch (1985) found that the firm's size, its market price, the level of its daily trading volume and the degree of institutional investor ownership influence a share's elasticity relative to other traded shares. Shares of small-cap firms, low-priced shares, those with low daily average trading volume, that make up or a smaller proportion of institutional investor ownership are likely to be inelastic or less elastic. Consequently, an initial upward (or downward) shift in the price is required as a "sweetener" to induce investors to take on the opposite side of the transaction. Chiyachantana (2004) found that large cap firms tend to have smaller price impacts than smaller cap firms. Kraus & Stoll (1972) refer to this as the distribution effect brought about by the different investor preferences for a given security.

Where the volume traded is above the normal trading volume, as is the case with block trades, the market needs time to adjust accordingly. In addition to the market's inability to readily absorb the new volumes, Mikkelson & Partch (1985) further suggest that a block seller (purchaser) faces a downward (upward) sloping excess demand (supply) curve and will be required to trade his securities at a discount (premium). The change in price is temporary as the value of the security block trade does not fundamentally change. The security price will eventually revert back to the original level once normal market trading volumes have been restored. Basically, the price change is a function of size and the lack of perfect substitutes and has no permanent price effects. The relevance of block size has been discussed further under Section 2.9 of this research.

According to Ball & Finn (1989), the price pressure hypothesis is somewhat ambiguous, as it does not specify the time period within which any price reversals should take place nor does it indicate what constitutes a large block. Scholes (1972) and Ball & Finn (1989) found no support for the price pressure hypothesis as no price reversals were noted after block trades in their studies.

2.3.3 Short term liquidity cost hypothesis

This hypothesis is quite similar to the price pressure hypothesis above. The block trader is forced to trade away from the equilibrium price. The block sales and purchases trade at a lower (or higher) price respectively than the ruling market price. The price change represents a commission charged to cover immediacy costs and liquidity needs. Intermediaries need to be compensated for their services, which include inventory holding or search costs. The price impact is temporary and prices revert back to equilibrium. Kraus & Stoll's (1972) findings are in support of the price pressure and the liquidity cost hypotheses with specific emphasis on seller-initiated trades. In their view, it is the speed of price re-adjustment that distinguishes between the two hypotheses, with the price readjustment taking a shorter time in the former compared to the latter.

Jones' (1972) study of block trades on the NYSE between July 1 1968 and September 30 1969 produced results that are consistent with the liquidity cost hypothesis. On seller initiated transactions, the average closing prices declined following the trade and fully recovered within 20 days of the trade. In some cases, the average closing prices did not appear to fully recover but instead settled at a new lower level. Jones attributed the absence of a full price recovery to trailing block transactions, as such trades exerted additional downward price pressure.

Interestingly, comparable price impacts were not found for buyer-initiated trades in Jones (1972) or Burdett & O'Hara (1985), which implies that such trades are unlikely to be liquidity motivated.

This hypothesis has been supported by various researchers, such as Kraus & Stoll (1972), Firth (1975), Holthausen *et al* (1990) and Gemmill (1996).

2.3.4 Information hypothesis

The information hypothesis builds on the Efficient Market Hypothesis (EMH) model developed by Fama (1965).

Kraus & Stoll (1972) point out that new information is a crucial driver in assessing the risk profile of the firm and, as a result, the expected rate of return and the price of its security. Block transactions may be reactions to information coming into the market about the marketability of a security or its industry (Guthmann & Bakay, 1965). Seller initiated trades would be triggered by bad news while buyer initiated trades would be associated with good news. Alternatively, depending on the identity of the trader, block transactions may be signals to the market. The actions of persons privy to confidential information about the firm are constantly scrutinised and acted on by other market participants (Scholes, 1972).

According to Holthausen *et al* (1987), block traders signal their perceptions of the value of the security. The actions of block sellers should warn the market that the security is overvalued while those of block purchasers hint that the security is undervalued. The more extreme the information, the larger the block is likely to be (Burdett & O'Hara, 1985).

Easley & O'Hara (1992:578) state that … "the presence or absence of a trade may provide information to market participants….traders learn from both trades and the lack of trades because each may be correlated with different aspects of information. In particular, while trades provide signals of the direction of any new information, the lack of trade provides a signal of the existence of any new information."

Researchers in support of the information hypothesis include: Scholes (1972), Grossman & Stiglitz (1980), Glosten & Milgrom (1985), Kyle (1985), Easley & O'Hara (1987), and Atkins (1995). Others such as Glosten (1989) and Seppi (1990) assert that both information and block size matter.

2.4 EFFICIENT CAPITAL MARKETS

An efficient capital market has been defined by Reilly & Brown (1997), as a market in which stock prices quickly adjust to new information, which implies that current prices incorporate all available information that could impact on a stock's value.

The efficient market hypothesis (EMH) is based on the assumption that new information impacting on stock prices comes to the market randomly. The market is made up of competing investors who independently analyse their stock to maximise their wealth. On receipt of new information, these investors quickly buy and sell stocks so that the price changes reflect the new information.

The EMH comprises of three hypotheses, which differ based on the amount of information reflected in the stock prices. First, a market is said to be weak form if the stock prices reflect all the historic market information. Second, the semi-strong EMH builds on the weak form EMH and states that not only is historical data reflected in current prices but also all current public information such as earnings and dividend announcements, economic and political news. Finally, the strong form EMH builds on the above two forms and asserts that stock prices reflect private information as well.

Research on the efficiency of the JSE Securities Exchange has generated mixed results. Studies conducted by Taylor (1977), Gilbertson & Roux (1977) and Wanckel (1979) support semi-strong form efficiency while later studies by Knight & Affleck-Graves (1983) and Bhana (1989) have rejected the semi-strong argument and have come up with evidence of inefficiency. There is no research that supports the strong form EMH of the entire JSE, although Strebel (1977) argues that in the high-volume sector, specifically where the trading volume is in excess of 250,000 shares, the evidence of efficiency exists.

While there appears to be a lack of consensus among researchers on the efficiency of the Exchange, for purposes of this research it has been assumed that the Exchange operates in a semi-strong form; that is, securities listed on the Exchange react to publicly available new information that is both general and firm specific.

2.5 DETERMINANTS OF PRICE MOVEMENTS

2.5.1 Overview

In an efficient market, price movements result from changes in the equilibrium price. This happens either in response to new information about the future expected return (and/or risk) of the security (Kraus & Stoll, 1972; and Madhavan, Richardson & Roomans, 1997) or where there is a widespread change in the risk-return preferences of investors (Kraus & Stoll, 1972) or where market imperfections and friction arise (Madhavan *et al*, 1997).

According to Madhavan & Cheng (1997) the identity of block traders, their investment style and reputation impact on the overall price movements.

2.5.1.1 Identity of the block traders

Both Seppi (1990) and Madhavan & Cheng (1997) have developed models that confirmed the significance of a block trader's reputation with respect to the actual price impact. In the case of a negotiated trade, where the trader has good relations with brokers or where the trader is able to accurately signal his trading motives, more favourable price concessions become applicable.

In earlier studies, both Scholes (1972) and Firth (1975) pointed out that the identity of the block trader is critical. Firth (1975) looked at money management firms and found that the fund managers who followed a growth-oriented strategy or had higher turnover rates are generally perceived to be less patient in trade execution and, as a result, are likely to incur larger price impact and execution costs. In addition, greater price variability is expected where the acquirer of the stake is an investment bank, as investment banks have a relatively short-term view and their actions may indicate a possible takeover.

Similarly, Keim & Madhavan (1995, 1996) showed that traders who follow a technical- or momentum-based strategy incur higher trade execution costs than value traders. The same applies to information-motivated traders compared against liquidity-motivated traders. In the case of the former, the execution time is critical (Seppi, 1990; and Keim & Madhavan, 1995, 1996).

In their studies on institutional trades, Chan & Lakonishok (1995) attributed price impact to the capitalisation of the stock traded (the firm size), the trade size (in relation to its normal trading volume) and the identity of the money management firm undertaking the trade.

On the other hand, Mikkelson & Partch (1985) suggest that the price impact on block sales is significant, irrespective of the characteristics of the seller and/or the size of the block trade. In their studies, they analysed five variables:

(i) The characteristics of sellers;

(ii) The seller's pre offering ownership;

(iii) The seller's post offering ownership;

(iv) The dollar value of the offering; and

(v) The number of shares offered relative to the number of shares outstanding.

These authors found no relationship between the price decline on block sales and any of the last four variables listed above, but found that the magnitude of the price decline is greatest where the seller is perceived to have insider information, such as in the case of a director or senior officials within the organisation.

Market perception holds that a shareholder with a substantial shareholding - specifically a controlling stake - is able to exert significant influence in the decision-making process within the firm. In addition, these shareholders have access to insider information similar to that available to directors and senior management. Their findings imply that with respect to block sales, the actions of these specific insiders (directors and senior management and not major shareholders) convey either adverse information or simply no favourable information. Mikkelson & Partch (1985) further report that the price effect is also significant where no repurchase offer is made by the seller.

Mikkelson & Partch (1985) found no relationship between price decline on block sales and the size of ownership prior to the block trade. Further, neither the size of the post-block trade stake held by the seller nor the block size measured in terms of the dollar value of the offering or the proportion of firm's shares included in the trade had any impact on price movements.

2.5.1.2 Market structure

The trading structure of an exchange may impact on the pricing of block trades. Both LaPlante & Muscarella (1997) and O'Neill (2002) looked into the different trading systems of the NYSE and NASDAQ exchanges. They found that the NYSE, a centralised public limit order book specialist exchange, was more efficient at executing large transactions than NASDAQ, an over-the-counter, multi-dealer exchange. One would expect greater efficiency on NASDAQ as its structure provides brokers with access to all dealers' quotes as they become available. Brokers are able to directly contact the dealer providing the best price and consummate a deal. Yet LaPlante & Muscarella (1997) found that the NYSE had a significantly larger proportion of zerotick block trades, significantly smaller temporary price effects, and smaller price impacts for both buyer- and seller-initiated trades of comparable size. In contrast, Gemmill (1996) found similarities in the patterns of price impacts and the speeds of price adjustment between the LSE (a dealer's market) and the NYSE (a specialist market) despite the differences in trading structures. Both the LSE and the NYSE are the dominant exchanges in their respective regions. The LSE is the largest established securities market in the United Kingdom, while the NYSE accounts for over 80% of all shares traded in US listed exchanges.

Gemmill (1996) in his examination of block trades on the LSE singled out market volatility as the most critical factor affecting the spreads, the size of the spreads, execution costs and the speed of price adjustment after a block trade. He looked at various publication regimes: immediate, 90 minutes and 24 hours and found that the timeliness (or speed) in publication of prices for block trades does not affect the time taken by prices to reach a new level.

Koski & Michaely (2000) single out the market's reaction to the information content as the sole determinant of block pricing and liquidity. The size of the block trade and the firm's characteristics such as size and trading volume are irrelevant.

2.6 MAGNITUDE AND IMPACT OF PRICE MOVEMENTS

The existence of an asymmetry in the price impact between block purchases and sales is broadly consistent with the findings of several researchers such as Scholes (1972), Kraus & Stoll (1972), Burdett & O'Hara (1987), Holthausen *et al* (1987), Ball & Finn (1989) and Chan & Lakonishok (1993). The consensus is that block sales trade at a discount while block purchases trade at a premium.

On the examination of trade packages, Chan & Lakonishok (1995) established that higher average price changes occur in block buys than in block sales. They noted an average increase of 1% in the former and an average reduction of -0.35% in the latter. Further, the subsequent reversal was much smaller for block sales than block buys. Frino *et al* (2004) noted that, on average, a price increase of 0.33% arose from block buys while a decline of -0.37% was noted on block sales. Interestingly, Madhavan & Cheng (1997) found that after making adjustments for selectivity bias, price asymmetry between block purchases and sales ceases to exist.

2.6.1 Price impact asymmetry

The magnitude of the price movement is dependent on the events taking place around the block transactions.

2.6.1.1 Company news and events

Koski & Michaely (2000) found that the price impact was largest when trades occurred around announcement periods, smaller during regular periods, and smallest during ex-dividend periods. In an earlier study Seppi (1992a) found similar results when looking at block trades around quarterly earnings announcements. Koski & Michaely (2000) investigated the effect of asymmetric information on prices and liquidity by analysing trades, spreads and depths. They also found that spreads are larger and that the depth is lower during announcement periods than during ex-dividend periods.

2.6.1.2 Equity market conditions

An investigation into the link between the behaviour of institutional investors and the asymmetry phenomenon by Saar (2001) suggests that the historical performance of share prices influences the permanent price impact asymmetry between block purchases and sales. The permanent price asymmetry will be strongly positive where block trades occur during periods of depressed stock market. According to Saar's (2001) model, block trades that arise during periods where the market is more vibrant, on an upswing and bullish, will experience lower permanent price asymmetry. In fact, where the price appreciation has been abnormally long, nil or negative price asymmetry may arise; that is, block sales will have a greater permanent price impact than the block purchases. Saar (2001) adds that the intensity of institutional trading and the frequency of information events, which are influenced by the recent price performance, also directly impact on the price asymmetry. Where the market is depressed or is at the base of an upswing and the trading intensity of institutional investors is on the rise, the permanent price asymmetry is likely to be very pronounced compared to the same level of trading intensity in a bullish market.

Chiyachantana, Jain, Jiang & Wood (2004) investigated institutional trading in international stocks from 37 countries and concluded that during bullish market conditions, the price impact is higher for institutional purchases than sales. However, during bearish market conditions, the reverse occurs as the price impact is higher for institutional sales than purchases. The findings of their study would suggest that most empirical studies were conducted when the markets was undergoing a bullish phase. In the view of Chiyachantana *et al* (2004) the liquidity available to block trades is driven by market conditions, which in turn have a price impact. In a bearish market, investors are more willing to sell their equity than buy more equity. On the other hand, during bullish market conditions, investors would prefer to buy rather than sell equity. These assertions imply that it would be easier to execute a large block purchase during bearish market conditions and a large block sale during bullish market conditions. Another way of looking at this is that block traders will pay a liquidity premium if they wish to sell in a bearish market. On the other hand, they incur a low price impact if they choose to sell during a bullish phase.

Chiyachantana *et al* (2004) also suggests that emerging markets tend to have a higher price impact than developing markets.

2.6.1.3 Information leakage

Pre-block trade price movements affect the total price impact (Madhavan & Cheng, 1997, Firth (1975), Easley & O'Hara (1985), Chan & Lakonishok (1995), Gemmill (1996), Keim & Madhavan (1996), Koski & Michaely (2000) and Frino *et al* (2004) noted a steady build-up in prices prior to the announcement of a block purchase. They attributed the price adjustment to information leakage. Studies conducted by Keim & Madhavan (1996) confirm the presence of price build-up of up to four weeks prior to the actual block trade date and show a direct and positive relationship between the block size and the price movements. Koski & Michaely (2000) concur, but note that the price build up occurs across all block purchases irrespective of their size.

Conversely, Holthausen *et al* (1990) found that for pre block trades between -5 to -2, there was evidence of information leakage in both block purchases and sales. However, for pre-block trade -1, the reverse happened; that is, the returns were negative for block purchases and positive for block sales.

Gemmill (1996) found no evidence of information leakage and states that price movements do not arise prior to the announcement of a block sale. On the other hand, Koski & Michaely (2000) note that bid quotes decrease prior to the arrival of a block sale; this they attribute to reporting delays for larger and potentially more complicated block sale transactions. Koski & Michaely (2000) argue that while block sales are reported as single trades, block purchases can be split up in reporting when they are satisfied by two or more buyers.

LaPlante & Muscarella (1997: 109) caution that "while block trades are likely to cause price movements they are less likely to cause a price impact". The authors found that zerotick trades formed between 41% and 50% of the block trades on the NASDAQ and NYSE exchanges respectively. The balance was almost equally split between upticks and downticks in both exchanges. They attribute the high occurrence of zeroticks to information leakage, which arises when block traders "shop" the block and/or when they engage in order splitting.

To test for information leakage, a comparison is made between the price of the block and the price immediately prior to the block trade. A look at trades executed within - the last hour of the block, 15 minutes, 30 minutes and 60 minutes prior to the block trade - resulted in fewer incidences of zeroticks. In addition, the absolute return computed on these trades is greater than that computed on earlier trades. LaPlante & Muscarella (1997) contend that this indicates that the market may have already re-adjusted itself before the actual block is executed, that is, information on the block trade leaked.

2.6.1.4 Other factors

Information leakage is just one of the factors that could lead to price appreciation on large trade packages. Chan & Lakonishok (1995) highlight other factors such as trend chasing, herding or responding in common to news, and events and announcements which could take place over the trade package period. In the case of block sales, Chan & Lakonishok (1995) observe a price appreciation, though smaller than that of block purchases.

2.6.1.5 Order splitting (fragmentation)

Order splitting is associated with both block buys and sells.

To counter information leakage, Firth (1975) suggests that prospective block purchasers should take advantage of regulatory loopholes, split their orders, and gradually build up their stake in the company prior to the release of that information. At the time of Firth's (1975) study, the US Companies Act required that block purchasers notify the company of their intentions within 14 days from the day they begin to accumulate the shares.

Keim & Madhavan (1996) confirmed the presence of "shopping a block" and found the practice beneficial to block traders, as it increases the number of counterparties involved and, consequently, reduces the price impact.

Similarly, Chan & Lakonishok (1995) and Keim & Madhavan (1995) contend that in practise, large and sophisticated institutional investors break up their orders over several trades. To avoid making price concessions required to induce investors, institutional investors (block traders) are continuously trading in the market for at least four days before a given trade is fully executed. Chan & Lakonishok (1995) introduced the concept of trade packages, which validates the need for multi-day trade studies instead of single-day trade studies. They applied the same methodology as their predecessors, such as Kraus & Stoll (1972), and reviewed the behaviour of stock prices immediately before and after trade packages. They found that between 20% - 22% of all institutional trades were completed within a day, while over 50% of all institutional trades took over four days to execute. The order splitting behaviour of institutional investors supports the argument that the demand for securities is less than perfectly elastic.

Using an equilibrium model, Seppi (1990) showed that liquidity traders need not break up their block trades as long as they can signal to the market that they are in fact uninformed traders; that is, are not information-motivated traders. The idea in theses circumstances is that it is possible to trade blocks with minimal price impacts.

The reverse of order fragmentation - consolidation of smaller orders - does not feature much in the block trading literature. However, it is worth noting that in their methodology, Koski & Michaely (2000) combined block trades that occurred within five seconds of each other into a single trade before conducting any analysis.

2.7 TEMPORARY AND PERMANENT PRICE EFFECT OF BLOCK TRADES

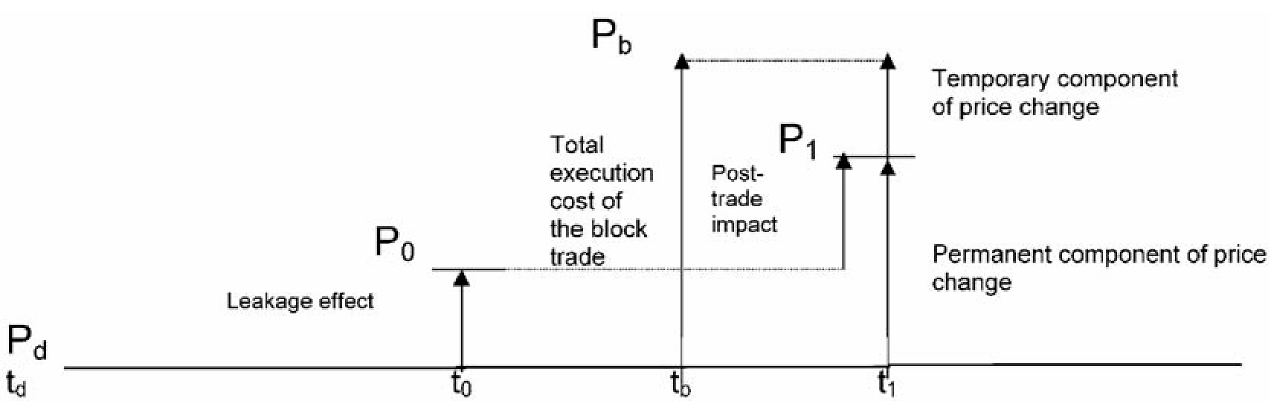
2.7.1 Introduction

Kraus & Stoll (1972) first made the distinction between temporary and permanent price effects. Temporary and permanent price effects are associated with both the liquidity cost and the information hypotheses discussed under Section 2.3.

Plus ticks (buyer-initiated trades) are expected by definition to have on average a positive impact while minus ticks (seller-initiated trades) have on average a negative impact. This implies that the permanent and temporary price impact on buyer- and seller-initiated trades would be positive and negative respectively. From their sample, Kraus & Stoll (1972) found that 74% of minus ticks had a negative price impact, while 69% of plus ticks had a positive price impact. The price adjustment usually happens on the actual block-trade day. The price levels after the block trade rise in the case of block sales and fall following a block purchase but fail to fully recover to their original price level. As a result, plus ticks tend to trade at a higher level, while minus ticks trade at a lower level. These new levels are arrived at by the tenth day after the trade.

The temporary and permanent price components associated with a block purchase are depicted below. The graph also shows the impact of information leakage.

Figure 1: Temporary and permanent price impact



Source: Bessembinder & Venkataraman (2004)

2.7.2 Temporary price effect

The temporary price effect is brought about the illiquidity of the market (Keim & Madhavan, 1996); and LaPlante & Muscarella, 1997). According to the liquidity cost hypothesis, prices are expected to fully recover after a transaction as there is no fundamental change in the value of the company.

The temporary price impact (TQ) is the logarithmic return from the post-block transaction to the actual block trade, denoted as:

$TQ = \ln P(b) - \ln P(1)$

Where P (1) represents the equilibrium prices after the block trade

P (b) represents the price of the block trade

Figure 1 depicts price movements arising from a block purchase. As shown in the graph, the liquidity effect of the block results in a price reversal and moves prices downwards to P (1).

O'Neill (2002), Frino *et al* (2003), Bikker, Spierdijk & Jelle van der Sluis (2004) and Bessembinder & Venkataraman (2004) applied the above formula and found the TQ of seller- and buyer-initiated trades to be negative and positive respectively.

A look at the temporary effect will provide an explanation for the premium paid by a trader (seller or buyer) to transact in the market. LaPlante & Muscarella (1997) argue that the larger the temporary effect, the higher the premium paid. Because the temporary price effects are influenced by the liquidity of the market, the more illiquidity the market is, the more difficult it is to absorb block transactions.

2.7.3 Permanent price effect

The reason there is a permanent effect in all buyer- and seller-initiated trades is the information content of the transaction. Saar (2001) in his argument in favour of a permanent price changes points out that the fact investors want to trade a block implies that they no longer hold the same belief in the value of the security. Permanent price changes are attributed to information and price-pressure hypotheses. The hypotheses have been supported by various researchers such as Kraus & Stoll (1972), Firth (1975), Holthausen *et al* (1990), Atkins (1995) and Gemmill (1996). As long as inelastic demand and supply conditions exist for a particular security, a permanent price effect will occur, irrespective of the initiating party; that is, whether it is a buyer- or seller-initiated trade.

The permanent price effect is a function of the block size. However, Mikkelson *et al* (1985) observation on share price elasticity implies that low priced, fairly illiquid securities are more prone to a permanent price effect.

The permanent price impact (PQ) is a function of the proxy equilibrium prices before and after the block trade. The actual price of the block trade has no impact on the permanent price change.

The logarithmic return is denoted as:

$PQ = \ln P(1) - \ln P(d)$

Where P (1) represents the equilibrium prices after the block trade

P (d) represents the equilibrium prices before the block trade.

O'Neill (2002), Frino *et al* (2003), Bikker *et al* (2004) and Bessembinder & Venkataraman (2004) applied the above formula and found that, on average, the PQ of seller- and buyer-initiated trades was negative and positive respectively, similar to their findings on the TQ above.

The permanent price asymmetry is partly attributable to the trading strategies of mutual funds. Saar (2001) notes that the constraints imposed on funds - such as restrictions against short selling and the investing limits across various products or categories - greatly influence the order flow and, as a result, sustain the information differences between buys and sells. He suggests that the divergence is likely to diminish as more investments shift to hedge funds. However, Saar (2001) cautions that further research is required to confirm these assertions.

Researchers such as Kraus & Stoll (1972), Holthausen *et al* (1987, 1990), Chan & Lakonishok (1993, 1995), Keim & Madhavan (1996), Gemmill (1996) and Chiyachantana, Jain, Jiang & Wood (2003) concur that buyer-initiated trades have a larger permanent price effect than seller-initiated trades do. Gottardo & Murgia's (2003) studies on permanent price effects for both trade types were inconclusive.

Leakage effect

The leakage effect (LQ) results in the price shift from P(d) to P(0) and is measured as :

LQ = ln P (0) - ln P (d)

Where P (0) represents the prices *just* before the block trade

P (d) represents the equilibrium prices *several trades* before the block trade.

Bessembinder & Venkataraman (2004) applied the above formula and found that, on average, the LQ of seller- and buyer-initiated trades was negative and positive respectively, similar to their findings on the TQ and PQ above.

Total price effect

Madhavan & Cheng (1997) found that the total price impact was roughly similar for both buyer- and seller-initiated trades of comparable sizes. However, the total price impact increases in absolute value terms as the block size increases (Atkins, 1995); and Madhavan & Cheng, 1997). However, Keim & Madhavan (1996) found smaller price impact on larger blocks and Ghysels & Cherakaoui (2003) confirmed these findings in their analysis of the performance of securities on the Casablanca Stock Exchange.

The post-trade price impact is denoted as:

PQ = ln P (1) - ln P (0)

Chan & Lakonishok (1995) note that larger blocks attract higher execution costs; this is probably due to selection problems or greater demands on liquidity.

The total execution costs of the block trade are:

$TQ = \ln P(b) - \ln P(d)$

Sections 2.7.4 and 2.7.5 build on the discussions above and distinguish between the temporary and permanent price effects of buyer- and seller-initiated trades.

2.7.4 Buyer-initiated trades

According to Kraus & Stoll (1972) and Holthausen *et al* (1990), most of the price recovery on buyer initiated trades happens within one trade. In contrast, Raab (1976) found that the price rebound continued for at least ten trades. Holthausen *et al* (1990) used the same data set and suggest that the differences between their findings and those of Raab (1976) could be due to "changes in the institutional structure of block trading over time or to differences in the sample selection" (1990: 72).

In Slovenia, Gregoric & Vespro (2003) observed block trades executed between 2000 and 2001. They noted that significant temporary price effects started about ten days before the trade was executed and that the full price adjustment was made within 20 days after the trade. This was attributed to the desire of block buyers to have some private benefits associated with control.

Chan & Lakonishok (1995) found limited evidence of price reversals arising from institutional purchases; a marginal decline was noted at least five days after the trade. Typically, the post-block trade prices rose slightly and remained at their new higher level.

Firth (1975) asserts that the price adjustment on a large block purchase is due to information content. He argues that announcements carry some information content; therefore, prices rise prior to and on the actual announcement date. The price readjusts the day after the announcement; however, as the market immediately incorporates that information, no price reversals per se arise. It is worthy reiterating that at the time of Firth's (1975) study, block purchasers were required to make their intentions known to the company within 14 days of their intended acquisition.

Gemmill (1996) also found evidence of temporary price impacts, while Holthausen *et al* (1987) found no evidence of a temporary price effect or of any association between the temporary price movements and the size of the block.

Changes in corporate control usually happen through a block trade. Barclay & Holderness (1991) focused on buyer-initiated negotiated block trades that involved at least 5% of the common stock of NYSE and AMEX-listed corporations. They noted that whilst the concentration of the ownership remained unchanged (that is, retained either a dispersed or concentrated ownership structure) the change in the identity of the block holder led to significant changes within the firm that had a direct impact on its value. These authors attributed the change in the firm's value to the new block holder's specific expertise, different managerial and monitoring skills, and/or the provision of synergies in research and development or in production.

In their study, Barclay & Holderness (1991) noted that a 10-15% change in ownership led to abnormal price increases and extensive managerial turnover. Price increases tended to be larger where there was minimal or no resistance from management to attempts by the new block purchaser to influence corporate policy. The price increases were even larger when a full acquisition was made. These authors' findings are in support of both the temporary and permanent price movements. A permanent price change arose where a full acquisition was made while a temporary price change occurred where a partial acquisition was made. In the latter, the price gradually began to fall over the subsequent 40 days and then remained level thereafter. Barclay & Holderness (1991) do not indicate whether the new price level is different from the initial equilibrium price; that is, whether full price recovery is made.

Holthausen *et al*'s (1987) and Gemmill's (1996) studies of the NYSE and LSE respectively confirmed that permanent price impacts are significant for buyer-initiated trades. In addition, Chan & Lakonishok (1993), Keim & Madhavan (1996) and Koski & Michaely (2000) observed similar results. According to Gemmill (1996), the permanent price effect arises because there are more informed buyers than sellers.

Holthausen *et al* (1987) associate the size of the block to the permanent price effect and its magnitude; that is, the larger the block, the greater the permanent price effect. In their view, the permanent price effect is consistent with the excess supply curves that are less than perfectly elastic, or information effects.

In a recent study, Frino, Mollica & Walter (2003) suggest that it is shortcomings in the research design used by prior researchers that has contributed to the perceived asymmetry in the behaviour of block trade prices. In their view, block purchases are not necessarily more informative than block sales.

2.7.5 Seller-initiated trades

The incidences of temporary price change effects on buyer-initiated trades are said to be less prevalent than on seller-initiated trades. As the market participants seldom go short to meet the demands of buyer-initiated traders, the price change is likely to be permanent and reflect changes in the underlying value of the security.

Jones (1972) found that the average closing prices of trades following seller-initiated trades do not recover but find a new equilibrium level. There has been greater consensus in more recent studies, as Mikkelson & Partch (1985), Holthausen *et al* (1987) and Gemmill (1996) found significant temporary impacts but no significant permanent impacts. A later study by Holthausen *et al* (1990) cites that the share price reverts back to the original equilibrium price within one trade if the trade was liquidity motivated. Overall, prices will take at least three trades before settling at their post-block equilibrium level. Gottardo & Murgia (2003) found significant temporary impacts irrespective of the block size but smaller or no significant permanent impacts as the block size increased.

Gemmill (1996) found the speed of adjustment of block transactions on the LSE to be quite similar to that observed on the NYSE, in that a full adjustment was made within three to five trades. This finding is in line with the earlier findings of Holthausen *et al* (1990), who established that for seller initiated trades on the NYSE, most of the price re-adjustment happened within the first trade, and a new equilibrium is achieved within a maximum of three trades. Holthausen *et al* (1990) reiterated their findings of their earlier research by proving that the speed of price adjustment was dependent on the size of the block traded. They proved that there is a direct and positive relationship between the speed of price adjustment and the block size.

On institutional transactions, Chan & Lakonishok (1993) found similar results to those of non institutional trades. The same price asymmetry noted in previous studies where no distinction was made between institutional and non institutional transactions was observed. Interestingly, on block purchases, the price change, though permanent continued to appreciate, while on institutional sales, the price reverts back to its original level (an almost complete price recovery).

2.8 LEADING AND TRAILING BLOCKS

The trading activity before and after a particular block trade should be analysed to establish instances of multiple blocks. Kraus & Stoll (1972) found that buyer-initiated trades tend to cluster and thus result in higher incidences of multiple blocks on buyer-initiated than on seller-initiated trades. This observation is in support of the information motive behind buyer-initiated trades. Immediate price recovery could be dampened where leading blocks are trailed by significant following block trades, making it difficult to distinguish whether the post trade stock price reaction is attributable to the information hypothesis or the price-pressure hypothesis. Kraus & Stoll (1972) define a leading block as the first block in a series of blocks in a given stock. In their definition, no other blocks should have occurred in that stock during the *previous* three trading days.

Kraus & Stoll (1972) cite that the existence of trailing blocks may signal the existence of information. A trailing block has been defined as the last block after a series of blocks which is not followed by subsequent blocks, in the same stock, over the next one to ten trading days. Where the information hypothesis applies, selecting trailing blocks amounts to selecting blocks that have less bad news, and therefore price recovery is expected.

Kraus & Stoll (1972) noted that price recovery occurs in the case of seller-initiated trailing blocks, while on buyer-initiated trailing blocks, the prices maintain themselves at the new level. These findings support the distribution hypothesis and information hypothesis respectively.

In contrast, Holthausen *et al* (1987) assert that trailing and leading block transactions have no impact on either the permanent or temporary price effects.

2.9 DOES BLOCK SIZE MATTER?

"It takes volume to move price" (Wall Street adage)

A discussion on block trades would be incomplete without an understanding of the importance block size plays in the price-discovery process. Mixed views have been presented by researchers on this point. Some of these issues have been highlighted in previous sections and we continue the discussion in the following section.

There is a Wall Street adage that states "It takes volume to move price". Jones & Lipson (1994) refute this view and state that it is the occurrence of transactions and not the trade size per se that generates share price volatility.

2.9.1 Informational content

Jones & Lipson (1994) state that, on average, the size of the trade has no incremental information content, yet Scholes (1972) argues that the size of a block may be a proxy of the amount of information the trader has on the firm. However, Scholes (1972) found no reliable evidence of any relationship between price changes and block size.

Mikkelson & Partch (1985) and Burdett & O'Hara (1987) focused on seller-initiated trades and suggested that the size of a trade is a signal of underlying information. These authors specifically consider block size as a proxy for unfavourable information. According to Burdett & O'Hara (1987: 198), "the larger the trade size, the greater the probability that the trade is information based". However, Kyle (1985) cautions that informed traders can disguise their trades as those of liquidity traders, and diminish in this way the relation between block size and information effects.

Ball & Finn (1985) found weak evidence of a negative relation between the two variables but noted no relationship between block size (relative to either shares outstanding or normal trading volume) and temporary price effect on either sales or purchases. Bikker *et al* (2004) observed that the block size had a limited impact on the total price while on the Exchange; Atkins (1995) found a relationship between the block size and the absolute value of the price change.

2.9.2 Price impact

Where the liquidity cost hypothesis applies, Kraus & Stoll (1972) assert that the block size matters as the price impact is positively correlated to the size of the block. The larger the block, the greater the price change required to induce investors to take on the opposite side of the transaction, especially where no close perfect substitutes exist for the traded securities. From empirical tests, Kraus & Stoll (1972) found the relationship between block size and price impact to be more significant in seller-initiated block trades.

Holthausen *et al* (1987) conducted a cross-sectional analysis on the effect of large transactions on security prices. They argued that block size matters, irrespective of whether the transaction is seller- or buyer-initiated. From their observations, they noted that as the block size increased, the proportion of zeroticks diminished. In Holthausen's *et al* (1987) view, this suggests that the total price effects are a function of the block size. In a follow up study, Holthausen *et al* (1990) found that a strong relationship exists between the permanent price effects of buyer-initiated trades and block size; they concluded that the magnitude of the permanent price effect is a function of block size. Their findings are consistent with Kraus & Stoll (1972), who argued that permanent price effects are a function of block size (measured in dollar terms) for both sales and purchases. Interestingly, Gottardo & Murgia (2003) found that on the Italian Exchange it was the temporary price effects and not the permanent price effects that were a function of block size.

Holthausen *et al* (1990) noted instances where the direct relationships existed between block size and the nature of the price change; that is, whether it is permanent or temporary. They found no relationship between the temporary price effects of buyer-initiated trades and block size, a view shared by Ryngaert (1983).

Gemmill (1996) introduced an interesting angle by suggesting that there is a limit to the inverse relationship between the block size and the total price impact. As the block size increases the fixed cost decreases on a per share basis, resulting in an overall lower total price impact.

2.9.3 Speed of price re-adjustment

According to Dann, Mayers and Raab (1977), price re-adjustment takes minutes, and share prices tend to be temporarily depressed following a block trade. Owing to the speed of price re-adjustment, investors cannot profit.

Easley & O'Hara (1992) suggest that, generally, the volume (block size) affects the speed of price adjustment. On seller-initiated trades, Holthausen *et al* (1990) found that the block size influences both the permanent and temporary price effects. In contrast to previous studies, the price impact arising from temporary price changes was found to be smaller than that arising from permanent price changes. However, Ryngaert (1983) asserts that it is only the magnitude of the temporary price effect that depends on block size (defined relative to the number of shares outstanding) for block sales. Keim & Madhavan (1996) found a larger temporary price impact on block trades of smaller capitalised companies, which suggests greater illiquidity issues with respect to smaller stocks.

Holthausen *et al* (1990) attribute the speed of price re-adjustment to the size of the block, for seller-initiated blocks; the larger the block, the slower the price re-adjustment. On large blocks, block brokers who acquire securities are more likely to gradually sell off their stocks held as inventory at a discount, dampening the possibility of an immediate price reversal.

Holthausen *et al* (1990) cite that liquidity motivated block trades show evidence of a positive correlation between the level/amount of inventory or search costs and the size of the block traded and, as a result, inferred that a positive relationship exists between temporary price effects and block size.

2.10 INSTITUTIONAL TRADES

To fully understand the behaviour of share prices, it is important to consider the actions and investment strategies of active investors such as institutional investors and JSE member firms. Brokers on the JSE Securities Exchange can act as agents and shop for potential buyers/sellers to take on the opposite side of the block trade or, alternatively, take on all or part of a block trade on their own account and gradually reduce their holdings to a desirable level.

The general perception is that institutional investors on average have larger holdings and therefore larger trades arise. Institutional herding practices would magnify the price movement.

Holthausen *et al* (1987) suggest that the level of institutional holdings has no impact on either the permanent or temporary price effects. This view has been supported by Jones (1972), who carried out studies on institutional investors and focused on the extent and the nature of trading imbalances generated by institutions. Jones (1972) found no support for the parallel-trading hypothesis as institutions do not appear to systematically "gang up" on the same side of the market. Lakonishok, Shleifer & Vishny (1992) also found that, unlike popular belief, the actions and investment strategies of institutional traders do not result in the stabilisation or destabilisation of share prices. Lakonishok *et al* (1992) found little or no evidence of herding (or parallel trading) and of positive or negative feedback trading around large stocks, which typically form a significant portion of institutional holding and trading. Interestingly, they found evidence of herding and positive feedback trading in smaller stocks.

In their study, Chan & Lakonishok (1993) focused on the market impact of institutions changing the composition of their portfolios. These authors found that though institutions traded heavily in the largest stocks (based on market capitalisation), the actual trades were small as over 80% of trades involved less than 10,000 shares which alludes to the order-splitting behaviour discussed in the previous section. From this, Chan & Lakonishok (1993) argue that managers trade strategically to reduce the influence of short term liquidity costs or information effects. As a result, they were unable to conduct studies on institutional trades that were larger than the typical trading volume.

Chan & Lakonishok (1995) propose that significant mis-pricing of a security relative to the market and not mere price movement is what triggers the buy or sell actions taken by active fund managers.

2.11 UPSTAIRS AND DOWNSTAIRS MARKETS

Whilst the JSE Securities Exchange does not have separate upstairs and downstairs markets, the Exchange allows for off-market deal negotiation, which in effect is quite similar to an upstairs market. However, all trades have to be reported to the Exchange; in the case of privately negotiated trades, they are "put through" the JET system (the JSE trading engine). An upstairs market, by definition, allows for privately negotiated trade of a listed security between buyer(s) and seller(s); it is not executed through the listing exchange.

On the NYSE and the Paris Bourse, the upstairs market exists to facilitate the very large trades (in terms of share size and dollar value) (Seppi, 1990) or to facilitate trades where there is temporary market illiquidity, for high-priced stocks (Madhavan & Cheng, 1997). The tendency is for liquidity-motivated trades to be executed in the upstairs market while information-motivated trades are executed in the downstairs market, Seppi (1990).

However, over 80% of the total trades on the NYSE are executed in the downstairs market, without the facilitation of the upstairs market (Madhavan & Cheng, 1997). For buyer- and seller-initiated trades greater than 50,000 shares, 56% and 42% respectively of these trades were executed in the downstairs market.

According to Madhavan & Cheng (1997), the price impact on upstairs markets is higher due to the search costs incurred in finding the counterparties to the trade; in fact, the researchers contend that the primary benefactors in negotiated deals are actually the counterparties and not the initiator. However, the relative costs are likely to decline where there are the fixed costs of negotiation. The authors conclude that the cost differentials between negotiated (upstairs) and downstairs trades are minimal.

2.12 CONCLUSIONS

The literature suggests that there are asymmetries behind the rationale, the pricing and the total price impact of block sales (seller-initiated trades) and block purchases (buyer-initiated trades).

Investors engage in block trading either to take advantage of new information or to cover liquidity needs. Seller-initiated trades are associated with bad news while buyer-initiated trades are linked to good news. The information hypothesis proposes that where new information leads to block trading, the price changes tend to be permanent.
On the other hand, institutional investors may decide to sell off a block of shares to cover liquidity shortfalls. The liquidity hypothesis puts forward the view that the price changes resulting from block trades are predominately temporary. The general consensus is that most buyer-initiated trades are likely to be information motivated while seller-initiated trades are liquidity-driven. The liquidity and information hypotheses form the basis for Hypothesis 2 discussed in Section 3. This research seeks to understand whether block sellers and buyers have different motives for trading and if the total price impact varies between the two categories of traders.

The literature further suggests that the price impact and the speed of price re-adjustment following a block trade varies depending on various factors which include, but are not limited to, firm specific factors, the identity and reputation of the block trader, the existence of multiple block trades, the present and past performance of equities market in which the block is traded, the degree of information leakage, splitting of orders and the absolute size of the block traded. These factors lay the foundation for Hypothesis 1 which seeks to establish whether there are significant price changes arising from either block purchases or sales of securities listed on the JSE Securities Exchange.

3 HYPOTHESES

3.1 RESEARCH HYPOTHESES

The emerging literature discussed in the previous section suggests that block transactions have an impact on the behaviour of share prices.

3.1.1 Hypothesis One

This provides the opportunity to test the hypothesis that price effects arise due to block purchases and sales of securities listed on the JSE Securities Exchange.

H0: The null hypothesis states that the mean and median average trade-to-trade excess return on block trades is not significantly different from zero.

HA: The alternative hypothesis states that the mean and median average trade-to-trade excess return on block trades is significantly different from zero.

$H0: \quad RXt \quad = 0$

$HA: \quad RXt \quad \neq 0$

Where *RXt* represents the mean trade-to-trade excess return on block trade at trade *t*

3.1.2 Hypothesis Two

In this section, the researcher will examine the cumulative price changes and establish whether they are temporary or permanent.

<u>Temporary price effects</u>

H0: The temporary price changes on both block sales and purchases are not significantly different from zero.

HA: The temporary price changes on both block sales and purchases are significantly different from zero.

H0: TQ = 0

HA: TQ ≠0

Permanent price effects

H0: The permanent price changes on both block sales and purchases are not significantly different from zero.

HA: The permanent price changes on both block sales and purchases are significantly different from zero.

H0: PQ = 0

HA: PQ ≠0

Total price effect

The total price effect on each block trade is a summation of the permanent and temporary price effects computed above.

The research methodology used to test the hypotheses is discussed in detail in the next chapter.

4 RESEARCH METHODOLOGY

This chapter describes the methodology that was followed to ascertain the validity of the research hypotheses set out in the previous chapter. It describes the processes that were used in data collection, analysis and interpretation, and concludes with a discussion on the validity and the reliability of the chosen research method.

4.1 OVERVIEW

The methodology applied by Holthausen *et al* (1990) and Gemmill (1996) in their studies of the NYSE and the LSE respectively were adapted and applied in this study. The US studies looked at trades over a 14-month period between 1 December 1982 and 31 January 1984. The London studies looked at transactions of the 50 most active shares for the month of May for each of the six years between 1987 and 1992. These methodology applied by Holthausen *et al* (1990) has also been applied by Koski & Michaely (2000) and later by Frino *et al* (2003) on the ASX.

4.2 RESEARCH POPULATION

The population is defined as the South African traded equity market, focusing on equities included in the J200 Top 40 Index (formerly known as the All Share Index or the ALSI 40) of the JSE Securities Exchange. These shares are the most actively traded on the Exchange and account for a substantial portion of the total market capitalisation.

A block trade has been defined in accordance with the guidelines stipulated in the JSE Securities Exchange–South Africa Rules & Related Legislation Manual.

4.3 SAMPLE SIZE AND SELECTION

A total of 52 companies were constituents of the J200 Top 40 index over the 24 months running from 1 June 2002 to 31 May 2004. Appendix A provides a summary of the J200 Top 40 companies during this period.

4.3.1 Tick classification rule

In order to distinguish between buyer- and seller-initiated trades, prior studies have relied on the tick classification rule. Holthausen *et al* (1987) and, later, Lee & Ready (1989) investigated the tick rule, and both research teams found the rule to be reasonable. Other researchers who have applied this rule include: Kraus & Stoll (1972), Aggarwal & Chen (1990), Atkins (1995), Madhavan & Cheng (1997), LaPlante & Muscarella (1997), O'Neill (2002), Gottardo & Murgia (2003), and Bessembinder & Venkataraman (2004).

The tick classification rule works two-fold: it can be used to identify the type of trade and as a measure of the price impact (LaPlante & Muscarella, 1997).

In the case of the former, a comparison is made between the share price immediately before a block trade is executed (Pp) and the actual transaction price of the block trade (Pb).

- Where (Pp) is greater than (Pb), the block is said to be trading at a discount, and as a result is classified as a downtick (seller-initiated) trade.
- Where (Pp) is less than (Pb), the block is said to be trading at a premium, and as a result is classified as an upticks (buyer-initiated) trade.
- Where there is no price difference between (Pp) and (Pb), the trade is classified as a zerotick trade. Such trades were excluded from further analysis as it is difficult to establish the nature of the initiating party using the tick rule.

In their studies, Kraus & Stoll (1972) point out that a misclassification is highly unlikely; that is, where seller- and buyer-initiated trades are wrongly classified as an up-tick and as a downtick respectively. Keim & Madhavan (1996) are critical of the tick test, which resulted in 7.2% and 20.4% of their sample of seller- and buyer-initiated trades respectively being incorrectly classified. They further found that the use of the tick rule upwardly biased the average total price impact on all trades.

An alternative classification system was developed by Ellis, Michaely & O'Hara (2000) - the quote based rule, which applies bid-ask prices as opposed to transaction prices.

Koski & Michaely (2000) and Frino *et al* (2003) have applied this technique, which compares the block trade price to the prevailing bid-ask prices. Frino *et al* (2003) suggest that if the block trade occurs at the ask quote, the trade should be classified as a buyer-initiated trade. If the trade occurs at the bid price, then it should be classified as a seller-initiated trade. However, if the trade is executed at neither the ask nor the bid price, then the "traditional" tick classification rule can be applied. Koski & Michaely (2000) took a slightly different approach and compared the block trade to the prevailing bid-ask midpoint. Where the block trade is priced above the prevailing bid-ask midpoint, the trade should be classified as a buyer-initiated trade, and vice versa for a seller-initiated trade.

4.3.2 Sample characteristics

On the Exchange, block trades are coded as "BT" which distinguishes them from other trades. All block trades (as defined by the Exchange) for each firm listed on the JSE Top 40 were analysed. During this period, a total of 320 block transactions were executed. With an average of 20 working days per month, there were at least 13 block trades every month.

Table 1: Sample statistics of trade type, frequency and rand volume

Value traded (Millions)	Frequency Count			By trade type			
	No. of trades	%	% (cum)	Buyer	Seller	Zero ticks	Total
>5 and <= 10*	23	7%	7%	7	9	7	23
>10 and <=20	81	26%	33%	17	28	36	81
>20 and <=30	56	18%	51%	20	15	21	56
>30 and <=40	43	14%	65%	17	12	14	43
>40 and <=50	14	4%	69%	5	6	3	14
>50 and <=60	17	5%	75%	6	7	4	17
>60 and <=70	9	3%	77%	2	3	4	9
>70 and <=80	16	5%	82%	0	12	4	16
>80 and <=90	3	1%	83%	0	2	1	3
>90 and <=100	10	3%	87%	3	4	3	10
>100	42	13%	100%	9	26	7	42
	314	**100%**		**86**	**124**	**104**	**314**

**there are 6 trades that were registered as BT but are less than R5million in value*

To better understand the distribution of block trades, Table 1 presents the summary statistics on trade type, frequency and rand volume for all block trades executed *before* exclusions were made.

In general, Table 1 shows that seller-initiated trades exceed buyer-initiated trades in both rand value terms and in frequency of occurrence. The frequency of block trades in general peaks for trades valued between R11million and R20million, then declines as the block volume increases and rises again for trades in excess of R100million. The decline in block trade volumes is noticed across all block trade types.

At the smaller block volumes, either trade type appears to have an equal likelihood of occurrence. As the size of the block increases, there are more significantly more block sales than purchases. In most categories, seller initiated block trades exceed other trade types.

It is also important to note that there is a high incidence of zerotick trades (33% of the total block trades) across all categories.

Though not shown in Table 1 above, the mean block size for block purchases was 1.5million shares while block sales averaged twice that at 3.3million shares.

The average value of a block sale was R83.7million compared to R54.9million for a block purchase. It is worth noting that when exclusions are made, based on the reasons outlined in Section 4.3.3 below, the average value per block sale significantly drops to R59.4million as five of the largest block sales are excluded. There are no major changes in the case of the average value of a block purchase when exclusions are made.

4.3.3 Sample exclusions

To arrive at the final sample, several exclusions were made.

a) A sanity check was conducted to identify irregular trades; for example, those with a share price of 1 cent and less. In addition, the final sample excluded block trades that failed to fully comply with the Exchange's definition of a block trade, for example those with a rand value of less than R5million.

b) We have excluded zeroticks as it is difficult to establish the nature of the initiating block trader.

c) Consistent with the US studies by Holthausen *et al* (1990), this study excluded opening trades - that is, block trades that took place within the first hour of trading - as they may represent a large number of individual transactions that have been crossed.

d) Where more than one block trade was executed in a given day, the trailing blocks were excluded. Without full knowledge of the identity of the block trader, it may be difficult to establish whether parallel herding is taking place or whether particular block traders are engaged in order splitting to mitigate significant price swings.

e) In addition, trailing blocks might be influenced by noise traders and thus affect the trade-to-trade excess returns and the temporary and permanent price effects. Chan & Lakonishok (1997) acknowledge that it is difficult to arrive with a model that filters all the noise that could affect price movements.

f) Block trades that have less than 15 daily returns over the proposed benchmark period and/or less than ten trades surrounding the actual block trade were excluded from the sample. This was done to limit the distortion of share price returns caused by irregular trading.

g) We have also excluded block trades that are registered after normal trading hours.

h) Outliers can cause distortions and cause the results to be skewed; therefore any temporary and/or permanent price change that exceeds 5% was excluded.

De-listed shares were retained until the day of delisting while newly listed shares were included from their first trading day.

Table 2 below provides a summary of the block trades excluded to arrive at the final sample, while the final sample post-exclusions are listed in Appendix B.

After the adjustments had been made, the sample size dropped to 159 transactions. Seller-initiated trades remain the dominant trade type, 97 trades (61%) were classified as seller-initiated trades while the remaining 62 trades (39%) represent buyer-initiated trades.

Table 2: Sample breakdown

	Number of transactions
Total sample from 1 June 2002 to 31 May 2004	320
Less:	
• Irregular trades for example those with a share price of 1 cent and less or those that failed to fully comply with the Exchange's definition of a block trade.	6
• Zeroticks trades	104
• Trailing buyer- & seller-initiated trades	42
• Transactions with incomplete information	3
• Transactions registered after normal trading hours	-
• Outliers: Transactions with significant temporary and/or permanent price changes	9
Final sample	**159**

Adhering to the Exchange's definition of block trades has translated in a relatively smaller sample than those found in similar studies. Most researchers has used samples of 10,000 shares or more while Atkins (1995) looked at blocks valued at R1million.

4.3.4 Use of transaction data

In contrast to previous studies conducted on block trades, Holthausen *et al* (1990) chose to use transaction data to analyse the temporary and permanent price effects instead of closing prices. Their adoption of this approach was triggered by findings made by Harris (1989).

In his study of the transaction prices of stocks listed on the NYSE, Harris (1989) found that the use of closing prices results in an overstatement of stock values as large mean day-end transaction prices were noted across most firms irrespective of time. The results were stronger the later in the day the transactions took place and where they involved low-priced stocks. While his research failed to identify the driving forces behind the above phenomenon, Harris (1989) was able to eliminate variables that have no relationship with the above phenomenon. These variables include stock price manipulation by market participants, inaccurate reporting of closing data, clustering of stock price, day-of-the-week or calendar-month phenomenon, trading volume, simultaneous trading on regional exchanges, or the existence of large outliers. Harris (1989) found some evidence that suggests that the change in the frequency of ask prices at day end may offer an explanation for the large mean day-end transaction prices.

Where closing prices are used, Holthausen *et al* (1990) argue that for seller-initiated trades, the measured temporary price effects are inclined to be overstated while the permanent price effects are likely to be understated. The reverse is expected for buyer-initiated trades; that is, measured temporary price effects are likely to be understated while the permanent price effects are likely to be overstated.

Keim & Madhavan (1996) argue in favour of using closing prices to analyse the temporary and permanent price effects in the case where stocks are infrequently traded, such as with low capitalised stocks. Since the sample consists of actively traded securities, the research has been conducted using transaction data. The benefit in the design of the methodology selected by Holthausen *et al* (1990) is that the analysis can be carried out at three different levels: an overall market analysis; an industry level analysis; and a firm-specific analysis.

It is worth noting that several researchers are opposed to the use of transaction data and are in favour of using the bid-ask quotes. Frino *et al* (2004) found no evidence of immediate price reversals in both block purchases and sales when the quote rule approach was used. Instead, there was a steady continuation of price increases and decreases associated with block purchases and sales respectively. They attributed this anomaly to the bid-ask bounce that is not accounted for when transaction data is used. However, owing to data limitations this research uses transaction data.

4.4 DATA COLLECTION

The main sources of data were the Deutsche Bank Securities and McGregor BFA (Pty) Ltd databases.

The Deutsche Bank Securities database was used to obtain individual share data on all registered block trades. For each trade, details of the transaction prices, the date and the time of the block trade, and the number of shares traded were extracted. In addition, the prices of 15 trades executed before and the five trades executed immediately after the block trades were obtained.

In cases where odd lots preceded a block trade, the former was ignored. Odd lots involve a trade of less than 100 shares and are usually executed at a premium.

4.5 DATA INTEGRITY

Various data integrity tests were carried out and the results presented under Section 5.1.

4.6 DATA ANALYSIS

To analyse the price impact and the speed of price adjustment, the following steps were carried out for both the buyer and seller initiated trades. The day in which the block is traded on the exchange is denoted as trade 0. The first step was to compute the logarithmic returns on the 20 trades around each block, that is, the 15 trades before and the five after the block trade.

4.6.1 Hypothesis One

This provides the opportunity to test the hypothesis that price effects arise due to block purchases and sales of securities listed on the JSE Securities Exchange.

Mean and median trade-to-trade excess returns

A benchmark return ("BEN") series was constructed for each block of each firm based on the trade-to-trade returns for trades executed over the benchmark period.

The benchmark period was selected as a control for information leakage. The period covered ten trades from -20 through to -11 for each of the identified upticks (buyer-initiated trades) and downticks (seller-initiated trades). In their analyses, Holtahausen *et al* (1990) and Koski & Michaely (2000) focused at the firm level while Gemmill (1996) looked at trades.

The benchmark return was represented as:

Equation 1

$$BEN_{bi} = \sum_{t=-20}^{t-11} R_{bit} / 10 \qquad (1)$$

Where

t = the trades over the range -20 to -11.

i = represent the various securities within the Top 40 Index.

b = represent the block type, either buyer or a seller initiated trade.

R_{bit} = trade-to-trade return for firm i at trade t for block b.

The second step was to compute the excess return (*RX* $_{it}$) or the market impact costs. The excess returns for block sales and purchases were computed over a ten trade window, -5 to +5, by comparing the trade-to-trade return for a particular firm *i*, (*R* $_{bit}$) to the benchmark return, *BEN* $_i$.

Equation 2

$RX_{it} = R_{bit} - BEN_{bi}$ t=-5,…+5, (2)

In addition, the following tests were carried out:

i. The distribution of t –statistics was computed on individual trades (eg. all trades -5, -4 etc) and it was established whether the trades were significantly different from zero.

Equation 3

The *t* –statistics (*t X it*) is defined as:

t X it = (R it – BEN i) / SD it t=-5,…+5, i=1,…,40

Where

R it = b=1∑20 R bit / 20, t=-5,…+5, i=1,…,40

And SD represents the estimate of the standard deviation for the two samples assumed to have unequal variances.

ii. The Mann-Whitney U-test was computed to test whether there was a significant difference between the two block types. Differences between buyer-initiated trades and seller-initiated trades were tested across the pre- and post-block trades, the block trades, and the excess returns.

The Mann-Whitney U test is the nonparametric equivalent of an independent samples t-test, and compares the differences in the location of two populations based on observations from the two independent samples. Both tests determine the differences between two samples.

iii. To examine the differences between mean returns on block trades and the pre- and post-block trades, the Wilcoxon Signed Rank Sum test was conducted. The Wilcoxon Signed Rank Sum test is the nonparametric version of the paired samples t-test. This procedure is used with two related variables to test the hypothesis that the two variables have the same distribution.

   It makes no assumptions about the shapes of the distributions of the two variables (i.e. normality is not assumed). This test takes into account information about the magnitude of differences within pairs and gives more weight to pairs that show large differences than to pairs that show small differences.

   The analysis involved the average returns on the five pre and post block trades and the block trade returns.

iv. The 20 largest upticks (buyer-initiated trades) were split into the ten largest and ten smallest and the same tests listed above were conducted with the aim of determining whether the speed of price adjustment varies with the size of the trade.

v. The same tests were carried out for the 20 largest down ticks.

vi. Finally, two linear regression analyses were conducted. Regression analysis estimates the coefficients of the linear equation, involving one independent variable that best predicts the value of the dependent variable. It is used to model the value of a dependent scale variable based on its linear relationship to a predictor.

The independent variable used in both instances was the **Block Trades** while the dependent variable in the first run was **Excess Returns** and **Shares Traded** in the second run. Excess returns are calculated by subtracting the five-day average pre-block trade value from the five-day average post-block trade value for each trade.

4.6.2 Hypothesis Two

In this section, the researcher examined the cumulative price changes to establish whether they are temporary or permanent.

Temporary and permanent price effects of block trades

A review of the cumulative excess returns on both block purchases and sales provided a clear pattern of the temporary and permanent price effects (Gemmill, 1996). The start and end points were the pre-block trade periods where there was no influence of the block and post-block trade periods where the market had fully absorbed the impact of the block, respectively. The choice of the pre- and post-block trades below were initially arbitrarily selected but were later found to be sufficient for purposes of this research.

Temporary price effects

The temporary price effect captures the price impact associated with the market's illiquidity.

A comparison between the logarithmic return on the post-block trades and actual block trade was computed as follows:

TQ = Ln (actual price on the block trade 0) – Ln (average price of post block trades, +3 to +5)

Permanent price effects

To establish the permanent price effect, a comparison between the logarithmic return on the post and pre-block trades was computed as follows:

PQ = Ln (average price of post block trades, +3 to +5) - Ln (actual price of pre block trade, -11)

Total price effect

The total price effect on each block trade is a summation of the permanent and temporary price effects computed above.

T Q = Ln (actual price on the block trade 0) – Ln (actual price of pre block trade, 11)

4.7 VALIDITY AND RELIABILITY

Internal and external validity of the research study must be carried out irrespective of the chosen research methodology. Validity refers to the "accuracy, meaningfulness and credibility of the research project as a whole" (Leedy & Ormrod, 2001:103).

4.7.1 Internal validity

Leedy & Ormrod (2001) emphasise the importance of internal validity in any research. They define internal validity as the ability to draw accurate cause and effect relationships based on the research design and data adopted by the researcher.

For this study, publicly available recorded secondary data was applied and well-established statistical techniques as used by Holthausen *et al* (1990) and Gemmill (1996) were adopted to ensure internal validity.

4.7.2 External validity

External validity refers to the ability of the research to be generalised across persons, settings and time, Leedy & Ormrod (2001).

To enhance the external validity, two strategies suggested by Leedy & Ormrod (2001) have been applied in this study. First, the sample selected can be described as representative as it is made up of securities that best replicate the performance of the South African equities market as a whole.

Secondly, similar studies have been replicated in both the local JSE Securities Exchange and international exchanges. Researchers have arrived at the same conclusions even after conducting studies in dissimilar contexts.

4.7.3 Reliability

Reliability refers to the ability to yield consistent results and conclusions where the same research is conducted under the same conditions by more than one researcher. The limited use of subjective judgement will enhance the reliability of the research.

5 PRESENTATION OF RESULTS

5.1 DATA INTEGRITY TESTS

The data fall into the **non-comparative** or **metric** scales category and, for the purposes of analysis, are considered to be **ratio** data (numbers are used to rate objects such that numerically equal distances on the scale represent equal distances in the characteristic being measured with a fixed zero point).

Table 3: Measures of location, variability and shape

Seller /Buyer	Trade Period	N	Min	Max	Sum	Mean	SD	Variance	Skew-ness	Kurtosis
Buyer	Pre-Trade Average (-20 to -11)	40	-0.0047	0.0019	-0.0068	-0.0002	0.0011	0.0000	-2.2825	7.8990
	Pre-Trade Average	40	-0.0108	0.0053	-0.0152	-0.0004	0.0024	0.0000	-2.3129	9.7732
	Block Trade	40	-0.0031	0.0541	0.2824	0.0071	0.0099	0.0001	3.2803	13.1051
	Post-Trade Average	40	-0.0068	0.0469	0.1457	0.0021	0.0063	0.0000	5.6602	39.1547
	Excess Returns	40	-0.0089	0.0031	-0.0250	-0.0006	0.0020	0.0000	-2.0645	7.6588
	BEN	40	-0.0044	0.0019	-0.0030	-0.0001	0.0009	0.0000	-2.7290	0.3738
Seller	Pre-Trade Average (-20 to -11)	68	-0.0061	0.0028	-0.0023	0.0000	0.0009	0.0000	-4.1956	32.1113
	Pre-Trade Average	68	-0.0067	0.0063	0.0340	0.0005	0.0015	0.0000	-0.4007	8.7517
	Block Trade	68	-0.2403	0.0017	-0.9674	-0.0142	0.0312	0.0010	-5.9591	41.8177
	Post-Trade Average	68	-0.0068	0.0469	0.1457	0.0021	0.0063	0.0000	5.6602	39.1547
	Excess Returns	68	-0.0073	0.0469	0.1117	0.0016	0.0065	0.0000	5.2449	35.6490
	BEN	68	-0.0061	0.0028	-0.0023	0.0000	0.0009	0.0000	-4.1956	0.2908

However, parametric testing requires the variables to be metric **and** normally distributed. The above statistics can also be presented in form of histograms.

On the basis of the descriptive statistics set out above, the data was found not be normally distributed and required further investigation. As a result, Kolmogorov-Smirnov Goodness-of-Fit Test have been performed.

5.1.1 Kolmogorov-Smirnov Good-of-Fit Test

The Kolmogorov-Smirnov Goodness-of-Fit test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, e.g. normal. The Kolmogorov-Smirnov Z is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions.

As mentioned, many parametric tests require normally distributed variables, and this goodness-of-fit test tests whether the observations could reasonably have come from a normal distribution.

Table 4: One-Sample Kolmogorov-Smirnov test

One-Sample Kolmogorov-Smirnov Test

Seller/Buyer			PreTradeAvg_20_11	PreTradeAvg	BlockTrade	PostTradeAvg	BEN
Buyer	N		40	40	40	40	40
	Normal Parameters[a,b]	Mean	-.0001693	-.0003812	.0070603	-.0010056	-.0000758
		Std. Deviation	.00114955	.00242894	.00993472	.00215699	.00088463
	Most Extreme Differences	Absolute	.287	.282	.264	.254	.251
		Positive	.179	.197	.264	.228	.188
		Negative	-.287	-.282	-.216	-.254	-.251
	Kolmogorov-Smirnov Z		1.816	1.781	1.667	1.606	1.589
	Asymp. Sig. (2-tailed)		.003	.004	.008	.011	.013
Seller	N		68	68	68	68	68
	Normal Parameters[a,b]	Mean	-.0000332	.0005000	-.0142267	.0021426	-.0000332
		Std. Deviation	.00089493	.00154960	.03124678	.00629238	.00089493
	Most Extreme Differences	Absolute	.261	.242	.321	.298	.261
		Positive	.234	.242	.312	.298	.234
		Negative	-.261	-.201	-.321	-.259	-.261
	Kolmogorov-Smirnov Z		2.151	1.995	2.645	2.457	2.151
	Asymp. Sig. (2-tailed)		.000	.001	.000	.000	.000

a. Test distribution is Normal.

b. Calculated from data.

All of the significance levels (bottom row in each of the buyer and seller sections) of the Z-scores (second row from the bottom) are all less than 0.05, which implies that the data is **not normally distributed**. Therefore, the data cannot be tested using **parametric**

tests, which make the assumption that the data is normally distributed data, but need rather to be tested using **nonparametric tests**.

The sample size was further reduced due to a zero average values of some firms either at the pre- or post-block trade phase. A zero value is indicative of no trades in that phase and has been excluded as the mean value will be otherwise skewed.

5.2 RESULTS OF TESTING OF THE HYPOTHESES

The sample was tested for daily excess returns covering the five trades prior to the block trade and the five trades immediately after. The logarithmic returns for these ten trades around each block were computed. These were compared to the benchmark return (BEN) to arrive at the excess returns. As expected and as shown in Table 3 above, the average BEN returns are close to zero on block purchases and sales respectively.

5.2.1 Individual Excess Returns

Table 5 shows the individual excess returns between trades -5, the actual block trade, -0, and trades +5 on block sales and purchases respectively.

Table 5: Excess returns around block trades

	-5	-4	-3	-2	-1	0	1	2	3	4	5
	Pre block trade					Block trade	Post block trade				
Block sales (sample size =68)											
Average excess return (AER)	0.005%	0.097%	0.103%	-0.076%	0.120%	-1.423%	1.236%	-0.087%	-0.023%	-0.030%	-0.026%
Cumulative excess returns	0.005%	0.102%	0.205%	0.130%	0.250%	-1.173%	0.064%	-0.023%	-0.046%	-0.076%	-0.101%
Median excess return	0.000%	0.000%	0.000%	0.000%	0.000%	-0.486%	0.307%	0.000%	-0.006%	0.000%	0.000%
Mean t	0.062	1.719	1.452	-1.054	2.917		3.221	-1.426	-0.45	-0.498	-0.358
Sig. (2 tailed)	0.95	0.09	0.151	0.296	0.005		0.002	0.159	0.654	0.62	0.721
Block purchases (sample size =40)											
Average excess return (AER)	0.061%	-0.033%	-0.053%	-0.153%	-0.012%	0.706%	-0.565%	0.111%	-0.153%	0.175%	-0.071%
Cumulative excess returns	0.061%	0.028%	-0.026%	-0.179%	-0.191%	0.515%	-0.049%	0.062%	-0.091%	0.084%	0.013%
Median excess return	0.000%	0.000%	0.000%	0.000%	0.000%	0.437%	-0.221%	0.000%	0.000%	0.000%	0.000%
Mean t	1.16	-0.884	-0.738	-1.353	-0.133		-3.193	0.928	-1.114	1.705	-0.641
Sig. (2 tailed)	0.253	0.382	0.465	0.184	0.895		0.003	0.359	0.272	0.096	0.525

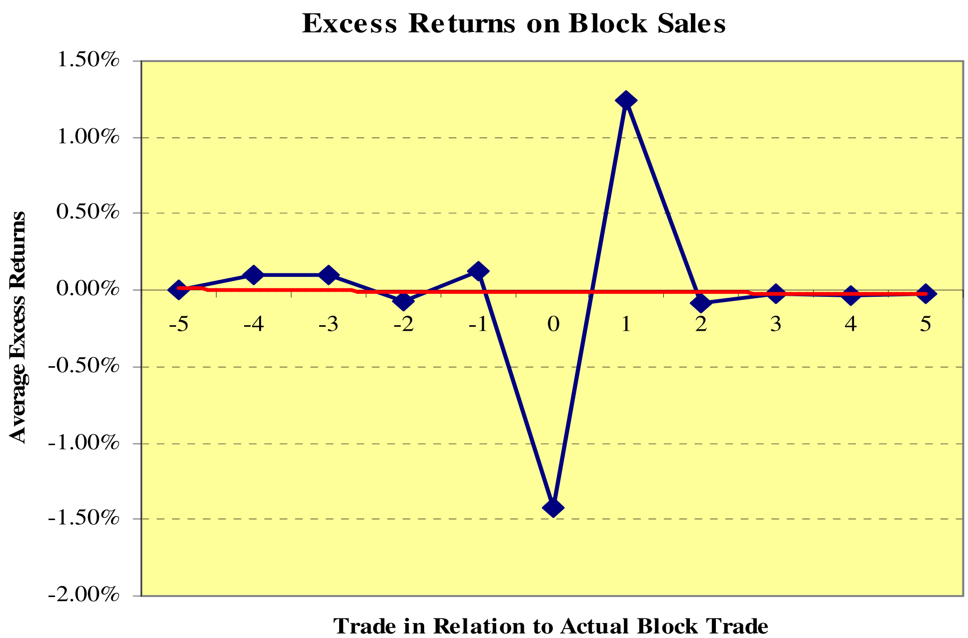
The price impact as represented by the average excess returns (AER) is significantly higher for block sales than for block purchases. However, for both block sales and purchases, the median results are negligible in all trades except at trades 0 and +1.

Figures 2 and 3 below present the excess trade-on-trade returns on the 11 trades surrounding block trades.

Seller-initiated trades

On average, block sales were preceded by a gradual share appreciation, as represented by the positive average excess returns (AER).

Figure 2: Excess returns on block sales

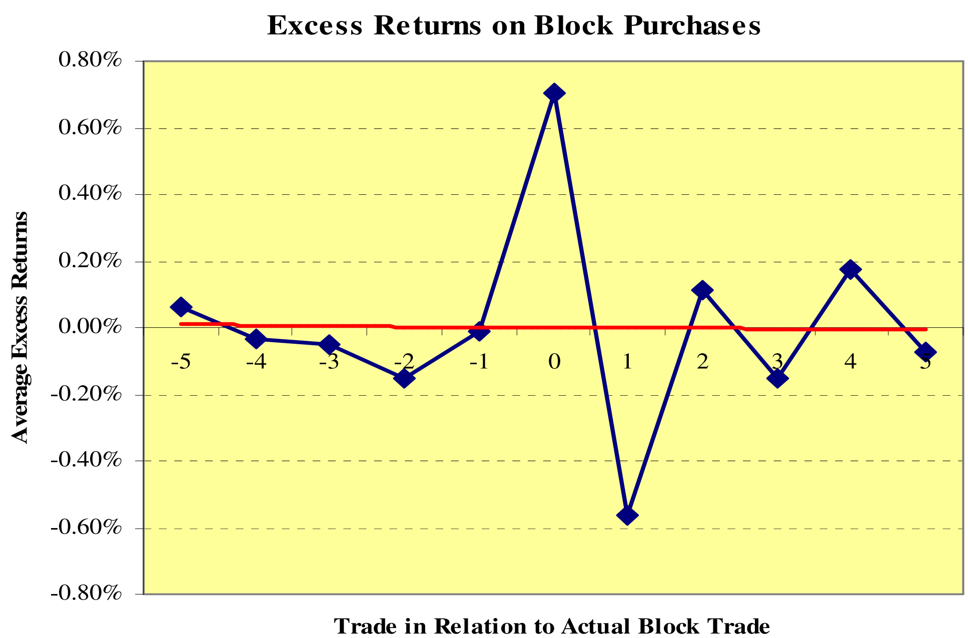


When a block sale was executed the share price depreciated by 1.423%. However, the price subsequently re-adjusted by a 1.236% increase. The share prices remain relatively unchanged over the next four trades; that is, between trades +2 to trades +5.

Buyer-initiated trades

In the four trades preceding the block purchase, the share prices depreciate, resulting in minimal negative average excess returns. On average, there are no positive excess returns noted prior to the actual block purchase. When a block purchase was executed, there was a 0.706% increase in positive average excess returns but this is immediately followed by a 0.565% price reversal. The excess returns are volatile over the next four trades.

Figure 3: Excess returns on block purchases



5.2.2 Hypothesis One

H0: The null hypothesis states that the mean and median average trade-to-trade excess return on block trades is not significantly different from zero.

HA: The alternative hypothesis states that the mean and median average trade-to-trade excess return on block trades is significantly different from zero.

$H0: \quad RXt \quad = 0$

$HA: \quad RXt \quad \neq 0$

Where *RXt* represents the mean trade-to-trade excess return on block trade at trade *t*.

The mean trade-to-trade excess returns are represented by the column labelled "Excess Returns".

The two block types were tested separately and the results are presented in the tables 6 and 7 below.

Table 6: Mean trade-to –trade excess returns

One-Sample Statistics

Seller/Buyer		N	Mean	Std. Deviation	Std. Error Mean
Buyer	ExcessReturns	40	-.0006244	.00197711	.00031261
Seller	ExcessReturns	68	.0016426	.00650239	.00078853

Table 7: One Sample Test

One-Sample Test

		Test Value = 0					
						95% Confidence Interval of the Difference	
Seller/Buyer		t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Buyer	ExcessReturns	-1.997	39	**.053**	-.00062440	-.0012567	.0000079
Seller	ExcessReturns	2.083	67	**.041**	.00164257	.0000687	.0032165

<u>Buyer-initiated trades</u>

$\boldsymbol{H_0}$ is ***not rejected*** as the significance value exceeds 0.05. Therefore, the mean trade-to-trade excess return on block trades is not significantly different from zero for buyer-initiated trades.

<u>Seller-initiated trades</u>

$\boldsymbol{H_0}$ is ***rejected*** as the significance value does not exceed 0.05. Therefore, the mean trade-to-trade excess return on block trades is significantly different from zero for seller-initiated trades.

5.2.2.1 Additional procedures

The t-statistics (or its equivalent) on individual trades (e.g. all trades -5, -4 etc) were computed to establish whether the trades were significantly different from zero. We found that only the block trade and the trade +1 are statistically significant in terms of the excess returns at the 5% significance level.

No other trade has any significant price effect.

5.2.2.2 Mann-Whitney U Test

The purpose of the Mann-Whitney U test was to establish whether there is a significant difference between buyer- and seller-initiated trades. The differences were tested across the pre- and post-block trades, the block trades and the excess returns. The results are presented in the tables below:

Table 8: Mann-Whitney U test results for all trades

Ranks

	Seller/Buyer	N	Mean Rank	Sum of Ranks
PreTradeAvg	Buyer	40	43.53	1741.00
	Seller	68	60.96	4145.00
	Total	108		
BlockTrade	Buyer	40	87.68	3507.00
	Seller	68	34.99	2379.00
	Total	108		
PostTradeAvg	Buyer	40	31.78	1271.00
	Seller	68	67.87	4615.00
	Total	108		
ExcessReturns	Buyer	40	44.19	1767.50
	Seller	68	60.57	4118.50
	Total	108		

Table 9: Summary table of test statistics

Test Statistics[a]

	PreTradeAvg	BlockTrade	PostTradeAvg	Excess Returns
Mann-Whitney U	921.000	33.000	451.000	947.500
Wilcoxon W	1741.000	2379.000	1271.000	1767.500
Z	-2.801	-8.442	-5.791	-2.625
Asymp. Sig. (2-tailed)	.005	.000	.000	.009

a. Grouping Variable: Seller/Buyer

The results indicate that there is a significant difference (<0.05) between buyers and sellers across the data tested. The significant difference between the block types in terms of excess returns means that hypotheses should be tested across individual block types rather than as a whole.

In the following sections, we have analysed block purchases and sales separately. The Mann-Whitney U Test was computed for the 20 largest buyer-initiated trades and seller-initiated trades to establish whether block size affects the speed of price adjustment.

Table 10: Mann-Whitney U test results for the ten largest and smallest buyer-initiated trades

Ranks

	Grouping	N	Mean Rank	Sum of Ranks
PreTradeAvg	10 largest up ticks	10	11.35	113.50
	10 smallest up ticks	10	9.65	96.50
	Total	20		
BlockTrade	10 largest up ticks	10	10.60	106.00
	10 smallest up ticks	10	10.40	104.00
	Total	20		
PostTradeAvg	10 largest up ticks	10	8.85	88.50
	10 smallest up ticks	10	12.15	121.50
	Total	20		
ExcessReturns	10 largest up ticks	10	9.20	92.00
	10 smallest up ticks	10	11.80	118.00
	Total	20		

Table 11: Summary of test statistics for the ten largest and smallest buyer-initiated trades

Test Statistics[b]

	PreTradeAvg	BlockTrade	PostTradeAvg	Excess Returns
Mann-Whitney U	41.500	49.000	33.500	37.000
Wilcoxon W	96.500	104.000	88.500	92.000
Z	-.645	-.076	-1.250	-.983
Asymp. Sig. (2-tailed)	.519	.940	.211	.325
Exact Sig. [2*(1-tailed Sig.)]	.529[a]	.971[a]	.218[a]	.353[a]

a. Not corrected for ties.

b. Grouping Variable: Grouping

The results indicate that there is no significant difference (>0.05) between the ten largest and the ten smallest buyer-initiated trades within the 20 largest upticks category. The lack of a significant difference between these groups indicates that the speed of price adjustment does not vary with the size of the trade in the buyer-initiated trades segment.

We carried out the same tests above for seller-initiated trades. The results indicate that there is no significant difference (>0.05) between the ten largest and the ten smallest seller-initiated trades within the 20 largest downticks category. The lack of a significant difference between these groups indicates that the speed of price adjustment does not vary with the size of the trade in the seller-initiated trades segment.

The results are presented in Tables 12 and 13 below.

Table 12: Mann-Whitney U test results for the ten largest and smallest seller-initiated trades

Ranks

	Grouping	N	Mean Rank	Sum of Ranks
PreTradeAvg	10 largest down ticks	10	11.25	112.50
	10 smallest down ticks	10	9.75	97.50
	Total	20		
BlockTrade	10 largest down ticks	10	8.30	83.00
	10 smallest down ticks	10	12.70	127.00
	Total	20		
PostTradeAvg	10 largest down ticks	10	12.30	123.00
	10 smallest down ticks	10	8.70	87.00
	Total	20		
ExcessReturns	10 largest down ticks	10	11.80	118.00
	10 smallest down ticks	10	9.20	92.00
	Total	20		

Table 13: Summary of test statistics for the ten largest and smallest seller-initiated trades

Test Statistics[b]

	PreTradeAvg	BlockTrade	PostTradeAvg	Excess Returns
Mann-Whitney U	42.500	28.000	32.000	37.000
Wilcoxon W	97.500	83.000	87.000	92.000
Z	-.567	-1.663	-1.361	-.983
Asymp. Sig. (2-tailed)	**.571**	**.096**	**.174**	**.326**
Exact Sig. [2*(1-tailed Sig.)]	.579[a]	.105[a]	.190[a]	.353[a]

a. Not corrected for ties.

b. Grouping Variable: Grouping

To ascertain the robustness of the above results, we substituted the ten smallest downticks (upticks) within the 20 largest downticks (upticks) with the ten smallest downticks (upticks) in the *total* sample.

We found that the results were consistent with those in the original sample and corroborates the fact that the speed of price adjustment does not vary with the size of the trades.

Table 14: Summary statistics based on the ten smallest seller-initiated trades

Test Statistics[b]

	PreTradeAvg	BlockTrade	PostTradeAvg	Excess Returns
Mann-Whitney U	44.500	26.000	25.000	26.000
Wilcoxon W	99.500	81.000	80.000	81.000
Z	-.417	-1.814	-1.890	-1.814
Asymp. Sig. (2-tailed)	.676	.070	.059	.070
Exact Sig. [2*(1-tailed Sig.)]	.684[a]	.075[a]	.063[a]	.075[a]

a. Not corrected for ties.

b. Grouping Variable: Grouping

The results indicate that there is no significant difference (>0.05) between the ten largest and ten smallest seller-initiated trades.

5.2.2.3 Wilcoxon Signed Rank Sum test

To examine the differences between mean returns on block trades and the pre- and post-block trades, the Wilcoxon Signed Rank Sum test was conducted. The analysis involved the average returns on the five pre- and post-block trades and the block trade returns.

Table 15: Wilcoxon Signed-Rank test for both buyer- and seller-initiated trades

Ranks

Seller/Buyer			N	Mean Rank	Sum of Ranks
Buyer	PostTradeAvg - PreTradeAvg	Negative Ranks	23[a]	22.65	521.00
		Positive Ranks	16[b]	16.19	259.00
		Ties	1[c]		
		Total	40		
Seller	PostTradeAvg - PreTradeAvg	Negative Ranks	29[a]	28.14	816.00
		Positive Ranks	39[b]	39.23	1530.00
		Ties	0[c]		
		Total	68		

a. PostTradeAvg < PreTradeAvg

b. PostTradeAvg > PreTradeAvg

c. PostTradeAvg = PreTradeAvg

The test statistic is based on the ranks of the absolute values of the differences between the two variables. The absolute differences between the variables are ranked and the ranks are split into three groups. Negative ranks contain those cases for which the value of the second variable exceeds the value of the first variable. While the positive ranks contain those cases for which the value of the first variable exceeds the value of the second variable. Ties contain cases for which the two variables are equal. If the two variables do not differ, the sum of the positive ranks will approximately equal the sum of the negative ranks.

Table 16: Summary of test statistics

Test Statistics[c]

Seller/Buyer		PostTradeAvg - PreTradeAvg
Buyer	Z	-1.828[a]
	Asymp. Sig. (2-tailed)	.068
Seller	Z	-2.182[b]
	Asymp. Sig. (2-tailed)	.029

a. Based on positive ranks.

b. Based on negative ranks.

c. Wilcoxon Signed Ranks Test

The Wilcoxon Signed-Rank test detects differences in the distributions of two related variables.

In this split it is evident that there is a significant difference between pre- and post-trade block averages in terms of **seller-initiated trades** (<0.05) and no significant difference in terms of **buyer-initiated trades** (>0.05).

The same tests were carried out on the ten largest and smallest buyer- and seller-initiated trades. The results are presented in the tables below.

Table 17: Wilcoxon Signed Rank test for the ten largest and smallest buyer- initiated trades

Ranks

Grouping			N	Mean Rank	Sum of Ranks
10 largest up ticks	PostTradeAvg - PreTradeAvg	Negative Ranks	6[a]	6.33	38.00
		Positive Ranks	3[b]	2.33	7.00
		Ties	1[c]		
		Total	10		
10 smallest up ticks	PostTradeAvg - PreTradeAvg	Negative Ranks	6[a]	6.17	37.00
		Positive Ranks	4[b]	4.50	18.00
		Ties	0[c]		
		Total	10		

a. PostTradeAvg < PreTradeAvg

b. PostTradeAvg > PreTradeAvg

c. PostTradeAvg = PreTradeAvg

Table 18: Summary of test statistics

Test Statistics[b]

Grouping		PostTradeAvg - PreTradeAvg
10 largest up ticks	Z	-1.836[a]
	Asymp. Sig. (2-tailed)	.066
10 smallest up ticks	Z	-.968[a]
	Asymp. Sig. (2-tailed)	.333

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

In this split it is evident that there is no significant difference between pre- and post-trade block averages in terms of **the ten largest and smallest upticks (buyer-initiated trades) within the 20 largest upticks category** (>0.05).

Table 19: Wilcoxon Signed Ranked test for ten largest and smallest seller-initiated trades

Ranks

Grouping			N	Mean Rank	Sum of Ranks
10 largest down ticks	PostTradeAvg - PreTradeAvg	Negative Ranks	2[a]	5.00	10.00
		Positive Ranks	8[b]	5.63	45.00
		Ties	0[c]		
		Total	10		
10 smallest down ticks	PostTradeAvg - PreTradeAvg	Negative Ranks	4[a]	3.75	15.00
		Positive Ranks	6[b]	6.67	40.00
		Ties	0[c]		
		Total	10		

a. PostTradeAvg < PreTradeAvg

b. PostTradeAvg > PreTradeAvg

c. PostTradeAvg = PreTradeAvg

Table 20: Summary of test statistics

Test Statistics[b]

Grouping		PostTradeAvg - PreTradeAvg
10 largest down ticks	Z	-1.784[a]
	Asymp. Sig. (2-tailed)	.074
10 smallest down ticks	Z	-1.274[a]
	Asymp. Sig. (2-tailed)	.203

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

In this split it is evident that there is no significant difference between pre- and post-trade block averages in terms of **the ten largest and smallest downticks (seller-initiated trades) within the 20 largest downticks category** (>0.05).

To ascertain the robustness of the above results, we substituted the ten smallest downticks (upticks) within the 20 largest downticks (upticks) with the ten smallest downticks (upticks) in the *total* sample.

The results were consistent with those of the original sample.

5.2.2.4 Regression analysis

To further check our findings, we have conducted separate regression analysis for both buyer- and seller-initiated trades. The dependent variable in this regression is **Excess Returns**, and the independent variable is **Block Trades** in the first run and **Shares Traded** in the second run. Excess returns are calculated by subtracting the five-day average pre-block trade value from the five-day average post-block trade value for each trade.

Regression analysis is a powerful and flexible technique for analysing associative relationships between a dependent variable and an independent variable. The mathematical model that is developed determines whether the independent variable explains a significant variation in the dependent variable; i.e. whether a relationship exists.

It is important to be cognisant of the fact that while the independent variable may explain the variation in the dependent variable, this does not necessarily imply dependence, as regression analysis is concerned with the nature and degree of association between variables and does not imply or assume causality.

The strength of the association is displayed by the R^2. Also known as the coefficient of determination, R^2 signifies the proportion of the total variation in Y that is accounted for by the variation in X. It varies between 0 and 1, with a value closer to 1 indicating a stronger relationship.

Standardisation is the process by which the raw data are transformed into new variables, which have a mean of 0 and a variance of 1. The purpose of standardisation is to reduce the data to the same scale, which in turn allows for more accurate analysis. This is the Beta (β) column, and the values indicate the slope of the regression line (i.e. the expected change in Y when X is changed by a unit). The t statistics helps in determining the relative importance of each variable in the model, and the significance indicates which independent variables are significantly related to the dependent variable.

<u>Effect of block trades on excess returns</u>

The purpose of this regression is to determine whether the proportion of the block trade has a significant effect on the excess return.

Model Summary

Seller/Buyer	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Buyer	1	.049[a]	.002	-.024	.00200053
Seller	1	.887[a]	.787	.784	.00302519

a. Predictors: (Constant), BlockTrade

Coefficients[a]

Seller/Buyer	Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Buyer	1	(Constant)	-.001	.000		-1.425	.162
		BlockTrade	-.010	.032	-.049	-.304	.763
Seller	1	(Constant)	-.001	.000		-2.437	.018
		BlockTrade	-.185	.012	-.887	-15.606	.000

a. Dependent Variable: ExcessReturns

The results indicate that there is a significant relationship in block sales and not the block purchases. The R Square value and significance of the t statistic (<0.05) indicates that there is a strong relationship in the block sales between excess returns and the proportion of the block trade. Therefore, the larger the proportion of the block trade the larger the excess return value will be.

The regression results are consistent with the findings in Section 5.2.1, in that excess returns on block sales are significantly different from zero. However, despite the consistent results, one limitation is that we have not adjusted for the impact of general market movements.

Effect of shares traded on excess returns

The purpose of this regression is to determine whether the size of the shares traded has a significant effect on the excess return.

Model Summary

Seller/Buyer	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Buyer	1	.301[a]	.090	.066	.00191026
Seller	1	.271[a]	.073	.059	.00630631

a. Predictors: (Constant), SharesTraded

Coefficients[a]

Seller/Buyer	Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Buyer	1	(Constant)	.000	.000		.214	.831
		SharesTraded	-4.7E-010	.000	-.301	-1.944	.059
Seller	1	(Constant)	.001	.001		.635	.527
		SharesTraded	2.99E-010	.000	.271	2.287	.025

a. Dependent Variable: ExcessReturns

The results indicate that there is a significant relationship in the seller-initiated trade segment and not the buyer-initiated trade segment, although the results are not as clear as indicated in the previous regression.

The significance of the t statistic (<0.05) indicates that there is a significant relationship in the seller block between excess returns and the size of the shares traded; however, the R Square value indicates that the relationship is not strong.

Building on the above analysis, the next section separates the total price impact into temporary and permanent price components.

5.2.3 Hypothesis Two

<u>Temporary price effects</u>

The null hypothesis states that the temporary price changes on both block sales and purchases are not significantly different from zero.

The alternate hypothesis states that the temporary price changes on both block sales and purchases are significantly different from zero.

<u>Permanent price effects</u>

The null hypothesis states that the permanent price changes on both block sales and purchases are not significantly different from zero.

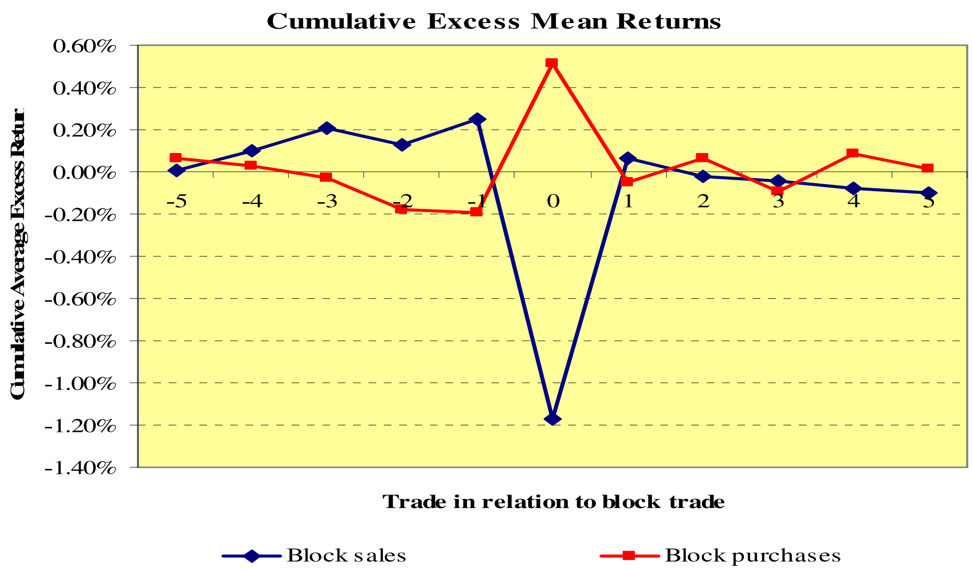
The alternate hypothesis states that the permanent price changes on both block sales and purchases are significantly different from zero.

5.2.3.1 Cumulative excess returns

According to Gemmill (1996), a review of the cumulative excess returns on both block purchases and sales will provide a clear pattern of the temporary and permanent price effects. The same approach was applied by Koski & Michaely (2000).

The cumulative excess returns were calculated over these trades and are presented in Figure 4 below.

Figure 4: Cumulative excess mean returns on block trades



It can be seen that the full effect of the block trade was captured over this period. This conclusion was reached as there was no visible excess return by the fourth trade following the block trade. In addition, it is worth noting that major price fluctuations are noted between trade -1 and trade +3.

Table 21 presents a summary of the temporary and permanent price effect of block trades. All price impact measures are expected to be positive for block purchases and negative for block sales. The results of the current study show that 64% of block purchases had a positive total price impact while 61% of block sales had a negative total price impact, excluding trades with a 0% total price impact.

Table 21: Temporary and permanent price effects of block purchases and sales

Block Type	**Temporary Effect**			**Permanent Effect***			**Total Effect**		
	Mean	**Std Dev.**	**T-value**	**Mean**	**Std Dev.**	**T-value**	**Mean**	**Std Dev.**	**T-value**
Block Purchases	0.56%	0.009	3.765	(0.05%)	0.008	(0.354)	0.51%	0.008	4.056
Block Sales	(1.06%)	0.031	(2.876)	(0.10%)	0.007	(1.219)	(1.17%)	0.032	(3.037)

The total price effect resulting from a block purchase is a rise in price of 0.51%. The price impact is predominately temporary. Surprisingly, the permanent price effect is negative, though it is statistically insignificant. On average, the total price impact of a block sale is a decline in price of 1.17%, of which 91% is temporary while the remaining 9% is permanent.

Overall, the total price effect is higher for block sales than for block purchases.

Further analysis was carried out in order to make generalisations on the data. The temporary price changes on both block sales and purchases are significantly different from zero at all three levels of significance discussed above. The alternate hypothesis, which states that the temporary price changes on both block sales and purchases are significantly different from zero, is accepted.

For both block purchases and sales, the permanent price changes are not significantly different from zero at 1%, 2% or 5% significance level. The null hypothesis which states that the permanent price changes on both block sales and purchases are not significantly different from zero is accepted.

Using Bessembinder & Venkataraman's (2004) model, the permanent price effect* can be split between the post-trade impact and the leakage effect, as shown in Table 22 below to establish what drives the permanent price effect.

Table 22: Post-trade impact and leakage effect

Block trade type	**Post trade impact**		**Leakage Effect**		**Permanent Effect**	
	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation
Block purchases	(0.01%)	0.008	(0.03%)	0.003	(0.05%)	0.008
Block sales	(0.10%)	0.007	0.00%	0.005	(0.10%)	0.007

The post trade impact measures the market's reaction after the announcement and the execution of the block trade, while the leakage effect measures the impact of any information leakage of the block trade prior to its execution.

As mentioned earlier, all price impact measures are expected to be positive for block purchases and negative for block sales. This observation is noted on block sales but interestingly, this does not hold in the case of block purchases.

From the table above, one can deduce that information leakage does not arise or is minimal and that the post trade impact forms the most significant portion of the permanent price effect.

6 INTERPRETATION OF RESULTS

In light of the evidence, there are notable asymmetries between block sales and purchases with respect to (1) the frequency of occurrence, (2) pricing, and the (3) price recovery process.

6.1 BLOCK TRADE ASYMMETRIES

During the 24-month period under review, there were more block sales than block purchases. Seller-initiated block trades exceeded buyer-initiated block trades in both rand value terms and in frequency of occurrence. In fact, as the size of the block increases, there were more block sales than block purchases. One could easier conclude that block trades are sold rather than bought, as suggested by Scholes (1972).

The rationale behind this observation has not been properly investigated in prior literature. It is possible that block purchasers are using alternative avenues to acquire a large number of shares thus the lower proportion of block purchases. Block purchasers could be buying directly from the corporation through a private placement or through a directly negotiated deal with a shareholder. Barclay, Holderness & Sheehan (2001) found that investors acquiring a large number of shares through a block trade tended to pay a premium while those who opt for a private placement deal pay a discount to the post-announcement price. Any rational investor would prefer to buy shares at a discount as opposed to a premium which then implies that private placements would be a preferred option to a block trade. In addition to block trades, the Exchange provides investors with a choice of alternate off-market transactions such as corporate finance ("CF") trades, off-order book principal trades ("OP") or portfolio trades ("PF").

Institutional investors such as financial institutions, fund managers and private equity firms are typical investment buyers. These are entities that buy shares purely for investment with minimal involvement in the day-to-day management of the companies they acquire. Aside from block trades, such investors are likely to participate in off-order book principal trades ("OP") or portfolio trades ("PF").

A trade or financial buyer would typically be an entity that may be operating the same or a similar business and is looking to be directly involved in the management of its acquisitions to ensure that they complement each other (say through either horizontal or vertical integration). Such a buyer would participate in a corporate finance ("CF") trade which is a negotiated trade between a prospective acquirer and a target listed company. To qualify as a corporate finance ("CF") trade, the transaction value should be a minimum of 3% of the total net asset value and the parties must notify the public via a SENS announcement.

Perhaps if the sample was expanded to include all off-market trades, the perceived asymmetries between block purchases and block sales may be less evident or even skewed in favour of block purchases, given the prevailing market conditions. Interestingly, based on the prevailing market condition at the time of this research, one would have expected a greater proportion of block purchases than sales to corroborate the discussions in Section 6.2.1 below which basically suggests that under bearish market conditions, it is easier to trade in block purchases than sales.

6.2 DETERMINANTS OF PRICE MOVEMENTS

Factors affecting price movements associated with block transactions and investigated in this research include the present and past performance of equities market in which the block is traded (that is, the prevailing market conditions), the equity market trading structure, the existence of multiple block trades, the degree of information leakage, splitting of orders and the absolute size of the block traded. These factors laid the foundation for Hypothesis 1. Other factors such as firm specific factors, the identity and reputation of the block trader were not considered.

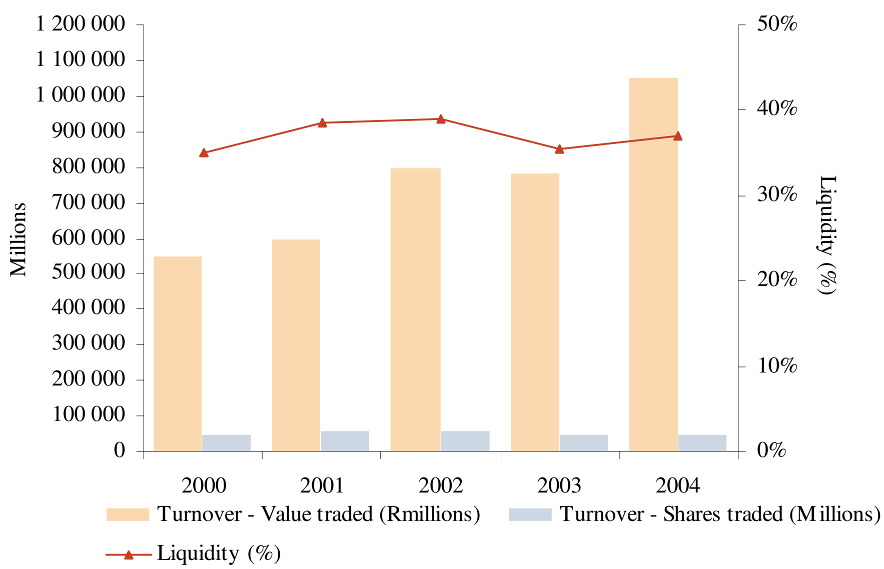
6.2.1 Market conditions

One plausible explanation to explain the price asymmetry may be the prevailing market conditions. According to Chiyachantana *et al* (2004) under bearish market conditions, it is easier to buy blocks than it is to sell blocks. This means that due to liquidity constraints, block sales will incur a higher price impact.

A closer look at the trading performance on the Exchange over the period under review sheds some light on the actual market conditions. While the Exchange has been on a general upward trend, from a year-on-year comparison, the Year 2003 was relatively bearish when compared to 2002 and 2004. In fact from a total number of deals perspective, the Exchange recorded the lowest number of deals in 2003 over the entire five year period. In addition, the market liquidity was at its lowest.

The sample period in this research covered the last 7 months in 2002, a full year in 2003 and the first 5 months in 2004. As illustrated in Figure 5 below, turnover as measured by the value of shares traded and by the number of shares traded dropped in 2003 when compared to 2002 and 2004.

Figure 5: Trading performance on the Exchange



Source: JSE Monthly Bulletin, October 2005

As an emerging stock market, the Exchange is considered to be comparable to other leading emerging and developing equity markets. In fact, 2003 was an equally challenging year for international exchanges and the effects of the weak global markets were felt on the Exchange as well.

One can conclude that market conditions play an important role in the overall direction and magnitude of price impact on block trades.

6.2.2 Market trading structure

Atkins (1995) found that the total price impact arising from block trades (that is, seller- and buyer-initiated trades respectively) ranged between 1.7% and 3.5%. The results of this research raise the possibility that the market liquidity has improved over the past ten years as is reflected by the lower total price impacts arising from block trades which ranges between 0.7% and 1.4%.

Further at the time of Atkins' research, the Exchange operated an open outcry trading system also known as the floor trading system. Analysts have suggested that the outcry trading system could have contributed to "price pressure and adverse selection", (Gottardo & Murgia, 2003:5). In June 1996, the Exchange migrated from the floor trading to an automated, screen-based, computer driven trading system - "JET" system. The new system was introduced to enhance the overall market liquidity, minimize trading costs, and improve transparency and price formation. The developments of the Exchange, particularly the changes in the trading structure, appear to have made it easier to execute larger trades at a relatively lower cost.

Whilst the research did not seek to ascertain whether the identity of the block trader has an impact on the pricing of blocks, it is worth nothing that the Exchange's order-driven pricing system ensures that orders are anonymously matched on a continuous basis. As a result, trading parties never get to know the identity of the party they transact with. Thus minimises the impact, if any, that the identity of a block trader would place on the pricing of a block trade.

6.2.3 Order size

It is surprising that order size does not seem to be a determinant of price impact neither does it have an impact on the speed of price re-adjustment. This raises the question about the role that order size plays with respect to the Top 40 shares. Atkins' sample was made up of block transactions with a value of R1million of shares listed in the financial and industrial sectors of the Exchange while this research focused on blue chip stocks which are amongst the most actively traded securities listed on the Exchange. The evidence suggests that with respect to the Top 40 shares, the market places more emphasis on the actual share traded while its order size is of less importance.

6.2.4 Information leakage

There appears to be no signals sent to the market in form of information leakage before the execution of a block trade. Information leakage is said to arise where the market anticipates an upcoming block trade and as a result the share price rises (or falls) ahead of a block purchase (or block sale). Instead, on average, there was no notable change in the transaction prices preceding either type of block trade.

The use of intra-day price data coupled with the Exchange's "price/time" rule may have contributed to the observation. The Exchange's order book system is organised on the "price/time" priority principle which means that during continuous trading, orders are ranked and matched in terms of best price first and then in time sequence.

Perhaps another possible explanation would be the market's trading structure, specifically the use of SENS. Listed companies are required to issue cautionary announcements via SENS to advise their shareholders and the public at large of any negotiations with a third party, that, if successful may have a material impact on the company's share prices. For this reason, investors tend to be aware of price sensitive transactions prior to the actual transaction. The companies typically issue a first cautionary announcement and then a renewal of an existing cautionary if the transaction has been concluded or is still in progress. If the market's perception of the transaction is favourable, the share price is likely to have risen before the actual block trade is executed on the Exchange, and vice versa, if the transaction is perceived to have an adverse effect on the company's future performance.

As information is disseminated to the market way in advance of the actual transaction, one can conclude that this possibly minimises any gradual appreciation or depreciation of the share price when the actual transaction occurs.

On the other hand, if some players within the market respond to the SENS after the actual block trade, then one would expect some form of price continuation where transaction prices would continue to rise in the case of a block purchase and the reverse would happen in the case of block sales.

6.2.5 Order splitting

There was a high incidence of zerotick block trades approximately 33% of total trades. According to LaPlante & Muscarella (1997), this may be attributed to either information leakage or order splitting before the block trade is actually executed. In the preceding section, it has been concluded that there is no evidence in support of information leakage.

6.2.6 Multiple block trades

A total of 42 different instances of multiple block trades were observed, with the majority being buyer-initiated trades. A closer look at the multiple blocks suggests that block traders may be engaging in order splitting. In all cases, block trades of a given firm's shares were executed within the same day and, in fact, within minutes of each other. In majority of these cases, the split trades were of a similar size; that is, a trader sells/buys round lots of say 500 000 shares each in at least two instalments.

To some extent, the structure of the Exchange inherently contributes to order splitting as the maximum order size is governed by a multiple of the normal market size ("NMS"). Should a trade exceed its maximum order size, the order is split between two or more orders before being entered into the order book. From our initial sample, we noted instances where trades were broken down into several smaller, usually equal-sized, lots. In most cases, the order was fully executed within the same day. These trades represented 13% of the initial sample set. These were classified these as trailing blocks and excluded them in our analysis, for illustrative purposes, a sample of these trades are presented in Appendix 4.

6.3 MAGNITUDE AND IMPACT OF PRICE MOVEMENTS

Hypothesis 2 tested whether block sellers and buyers have different motives for trading and if the total price impact varies between these two categories of traders.

The findings of this research are consistent with those of several researchers with respect to the magnitude, direction and impact of price movements associated with block trades.

6.3.1 Liquidity and information hypotheses

The literature notes that most buyer-initiated trades are likely to be information motivated while seller-initiated trades are liquidity-driven. While the findings of this research are inconsistent with the information hypothesis, it is in accord with the liquidity hypothesis.

As expected, majority of the seller-initiated blocks trade at a discount while buyer-initiated blocks trade at a premium. It looks as if block traders are forced to trade away from the equilibrium price to compensate for their immediacy needs. As discussed in Section 6.1 above, acquirers of large blocks of shares may opt for private placements which they can purchase at a discount as opposed to block purchases which typically trade at a premium. This is probably why the informational aspect fails to come through.

The price movement surrounding a block trade combined with the immediate price reversal suggests that short-term liquidity effects are at work, and perhaps the imperfect substitution between stocks is responsible for the price pressure arising from block trades (Chan & Laskinshof 1993, 1995).

6.3.2 Total price impact

The findings of this research indicate that the total price impact on seller-initiated trades is higher than that on buyer-initiated trades. The price impact as represented by the mean excess return is -1.42% and 0.71% for seller-initiated trades and buyer-initiated trades respectively. This may suggest that the market reacts less favourably to block sales than block purchases as the latter are absorbed with less price movement. These results are consistent with those of Holthausen et al (1990) who found block sales and purchases on the NASDAQ had a mean excess return of -0.55% and 0.53% respectively. In a similar study, LaPlante & Muscarella (1997) found that NYSE block trades had a mean excess return of -1.23% (for sales) and 1.18% (for purchases). Other researchers with similar findings were Bikker et al (2004).

Atkins (1995) found that the mean of the cumulative abnormal returns (CARs) for post-block trades irrespective of the type was statistically higher than the mean of the CARs for pre-block trades. Our findings are consistent with respect to block sales but inconsistent with respect to block purchases.

Even though there is evidence suggesting that block trades in developed markets are absorbed with less price movement when compared to those in emerging markets, this assertion does not hold across all markets. The price impact on the Exchange is higher than that of the NASDAQ, as shown by Holtahausen *et al* (1990), but comparable to the NYSE, as shown by LaPlante & Muscarella (1997).

6.3.3 Temporary and permanent price effects of block trades

The liquidity hypothesis puts forward the view that the price changes resulting from block trades are predominately temporary. For both buyer- and seller-initiated trades, most of the price re-adjustment happens within one trade; that is, the trade that immediately follows the actual block trade. These findings are consistent with those of several researchers such as Kraus & Stoll (1972), Holthausen *et al* (1990), Gemmill (1996), and Frino *et al* (2004).

The results suggest that on average, both buyer- and seller-initiated trades have no permanent price effect. Using Bessembinder & Venkataraman's (2004) model, one can break down the components of the permanent price effect into the post-trade impact and the leakage effect. According to the literature, if the block trade is information driven, then the post trade impact is expected to be positive for buyer-initiated trades and negative for seller-initiated trades because of price continuation following the execution of the block trade. The same relationship is expected to hold for leakage effect due to prior price build up before the execution of the trade.

The post trade price impact on both buyer- and seller-initiated trades was negative indicating a price reversal subsequent to the block trade while the leakage effect was negligible for both types of trades. These observations corroborated the view that block trades are liquidity motivated and have no informational content.

7 CONCLUSION

This research examined the price implications of block transactions, a few trades before and after the execution of a block trade, of quoted shares listed on the JSE Securities Exchange. The research differentiated between buyer- and seller-initiated block trades and analysed these trades separately.

The research findings demonstrate that while block trades have an impact on the prices of the underlying securities, the total impact is predominately temporary, irrespective of the type of trade. This appears to have been influenced by the short term illiquidity of the market.

Unlike earlier studies, the results of the pre-block trade price movements suggest that information does not leak into the market prior to the execution of a block trade as there is no steady build up in prices prior to a block purchase or a fall in prices prior to a block sale. However, the occurrence of multiple trades and zerotick trades could imply that information leaked during the pre-block period and/or block traders engage in order splitting. An understanding into the mechanisms of the Exchange suggests that the latter is the more likely explanation.

A comparison between Atkins' research findings and those from this research suggests that the recent development in the Exchange specifically the change in the trading structure plus the prevailing market conditions are the main determinants of the block trade pricing.

Finally, there is limited evidence to show that the order size has an impact on the price impact and the speed of price re-adjustment.

7.1 IMPLICATIONS OF THE STUDY

The findings of this research will be of interest to firms whose shares are prone to being traded in blocks, equity traders, policy makers and regulators. The study shows that the actions of large/institutional investors do not appear to have an adverse effect on security prices of the J200 Top 40 shares.

It further suggests that the South African equities market has the capacity to absorb large trades with minimal price movements. This could be a great concern to shareholders with shares in South Africa companies that have a dual and multi-listing, or to institutional shareholders with a significant shareholding in any of the Top 40 shares. The price impacts are comparable with those of developed financial markets, which implies that the JSE is fairly liquid.

In addition, the study could imply that the Exchange has put in place policies that monitor market manipulation and insider trading activities that could result in unusual price movements.

7.2 AREAS FOR FUTURE RESEARCH

This study focused on the behaviour of actively traded securities - specifically, shares that make up the J200 Top 40 index. It would be interesting to extend the analysis to a sector level and compare and contract the price impact on block trades between sectors, with a view to establishing whether some sectors react more strongly than others.

A comparative study on block trades on the JSE and large international exchanges such as the NYSE could be carried out to establish whether there are any differences in block execution. This would be particularly relevant in instances where companies have a dual or multi listing that includes the JSE.

Finally, transaction data can be substituted with bid-ask quotes to establish whether the latter minimises the problem of bid-ask bounces as has been suggested by some researchers.

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A APPENDICES

A.1 Constituents of the J200 Top 40 Index

No.	*Code*	Share Name
1	*ABI*	Amalgamated Beverage Industries Ltd
2	*AFB*	Alexander Forbes
3	*AGL*	Anglo America Plc
4	*AMS*	Anglo American Platinum Corporation Ltd
5	*ANG*^{n}	AngloGold Ashanti Ltd
6	*AOD*	African Rainbow Minerals Gold
7	*ASA*	Absa Group Ltd
8	*AVG**	AVGold Ltd
9	*BAW***	Barloworld Ltd
10	*BIL*	BHP Billiton Plc
11	*BOE*	BOE Ltd
12	*BVT*	The Bidvest Group Ltd
13	*CRH**	Coronation Holdings Limited
14	*CRN* ***	Coronation Holdings Limited –N
15	*DDT*^{n}	Dimension Data
16	*DSY*^{n}	Discovery Holdings LTD
17	*DUR*	Durban Deep
18	*FSR*	FirstRand Ltd
19	*GFI*^{n}	Gold Fields Ltd
20	*HAR*	Harmony Gold Mining Company Ltd
21	*IMP*	Impala Platinum Holdings Ltd
22	*INL*	Investec Ltd
23	*INP*	Investec plc
24	*IPL*	Imperial Holdings Ltd
25	*ISC***	Iscor Ltd
26	*JNC*	Johnnic Communications
27	*KMB*	Kumba Resources Ltd
28	*LBT*	Liberty International PLC
29	*LGL***	Liberty Group Ltd
30	*MTN***	MTN Group Ltd
31	*NED*	Nedcor Ltd

32	*NIBH**	Nedcor Investment Bank Holdings Ltd
33	*NPK***	Nampak Ltd
34	*NPN*	Naspers Ltd
35	*NTC*	Netcare
36	*OML*	Old Mutual Plc
37	*PIK***	Pick 'n Pay Stores Ltd
38	*PPC*	Pretoria Portland Cement Company Ltd
39	*RCH*^{n}	Richemont Securities AG
40	*REM*	Remgro Ltd
41	*RMH*	RMB Holdings Ltd
42	*SAB*	SABMiller Plc
43	*SAP*	Sappi Ltd
44	*SBK*	Standard Bank Group Ltd
45	*SHF***	Steinhoff International Holdings Ltd
46	*SLM*^{n}	Sanlam Ltd
47	*SOL*	Sasol Ltd
48	*TBS***	Tiger Brands Ltd
49	*TKG*	Telkom SA Ltd
50	*TNTn*	Tongaat
51	*VNF***	VenFin Ltd
52	*WHL*	Woolworths Holdings Ltd

Key:

* were de-listed as at 30 May 2004.

** companies with more than 10 registered block trades

^{n} companies with no registered block trades

A.2 Final sample of buyer- and seller-initiated trades

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
1	SHF	05/06/2002	12:12:32	3,487,000	795	27,721,650	buyer
2	CRN	07/06/2002	10:02:27	200,000	5,620	11,240,000	buyer
3	BIL	11/06/2002	11:43:29	1,000,000	5,435	54,350,000	buyer
4	AFB	13/06/2002	09:59:33	1,000,000	1,560	15,600,000	seller
5	VNF	18/06/2002	13:44:53	5,309,284	1,860	98,752,682	seller
6	SHF	20/06/2002	12:26:16	10,000,000	800	80,000,000	seller
7	REM	21/06/2002	12:46:21	1,000,000	7,010	70,100,000	seller
8	LBT	25/06/2002	16:27:20	312,577	9,225	28,835,228	seller
9	SHF	25/06/2002	15:32:45	5,564,479	800	44,515,832	seller
10	ISC	03/07/2002	16:58:16	9,537,215	2,167	206,671,449	seller
11	NPK	03/07/2002	12:18:52	1,006,460	1,379	13,879,083	seller
12	TBS	03/07/2002	11:45:12	535,303	6,652	35,608,356	seller
13	NED	04/07/2002	17:01:30	140,000	11,891	16,647,400	seller
14	TBS	15/07/2002	15:03:57	757,000	6,850	51,854,500	buyer
15	SAB	17/07/2002	14:50:25	1,483,000	7,266	107,748,848	seller
16	ABI	18/07/2002	16:05:27	300,000	4,550	13,650,000	seller
17	NIB	24/07/2002	10:33:14	3,895,100	387	15,074,037	buyer
18	NIB	14/08/2002	13:39:10	40,000,000	347	138,800,000	seller
19	NPK	21/08/2002	13:44:09	10,000,000	1,275	127,500,000	seller
20	CRH	23/08/2002	15:59:33	232,457	5,130	11,925,044	buyer
21	CRN	23/08/2002	15:59:56	548,770	5,130	28,151,901	seller
22	LBT	23/08/2002	16:52:53	1,134,384	10,050	114,005,592	seller
23	LGL	23/08/2002	10:39:16	366,300	5,460	19,999,980	seller

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
24	ABI	05/09/2002	11:51:02	400,000	4,180	16,720,000	buyer
25	FSR	05/09/2002	12:09:15	15,241,721	615	93,736,584	seller
26	ABI	06/09/2002	16:51:43	300,000	4,200	12,600,000	seller
27	MTN	06/09/2002	16:02:42	2,000,000	930	18,600,000	seller
28	KMB	11/09/2002	14:52:39	1,500,000	3,850	57,750,000	buyer
29	LGL	13/09/2002	11:12:54	1,314,600	5,420	71,251,320	seller
30	CRH	17/09/2002	14:53:08	1,719,550	4,950	85,117,725	seller
31	CRN	17/09/2002	14:55:01	8,938,732	4,950	442,467,234	seller
32	SHF	17/09/2002	13:25:41	2,468,983	708	17,480,400	seller
33	TBS	27/09/2002	15:49:58	529,000	7,280	38,511,200	buyer
34	NED	21/10/2002	16:41:59	475,641	11,080	52,701,023	seller
35	LBT	11/11/2002	14:55:56	380,000	8,960	34,048,000	buyer
36	CRN	11/11/2002	15:19:46	489,200	5,100	24,949,200	seller
37	LBT	12/11/2002	12:52:43	320,000	8,940	28,608,000	buyer
38	LBT	13/11/2002	12:39:19	1,250,000	8,950	111,875,000	buyer
39	IPL	21/11/2002	15:18:29	500,000	5,400	27,000,000	buyer
40	INL	22/11/2002	12:09:58	106,459	12,500	13,307,375	buyer
41	INP	22/11/2002	12:09:22	72,943	12,800	9,336,704	buyer
42	IPL	28/11/2002	11:02:13	1,000,000	5,400	54,000,000	buyer
43	NPK	04/12/2002	11:37:49	2,500,000	1,500	37,500,000	buyer
44	NPK	06/12/2002	12:58:52	1,658,068	1,530	25,368,440	buyer
45	AFB	30/01/2003	15:29:54	698,000	1,275	8,899,500	buyer
46	SHF	07/02/2003	16:12:15	2,021,700	556	11,240,652	buyer
47	VNF	07/02/2003	16:11:18	1,282,750	1,627	20,870,343	buyer
48	ASA	07/02/2003	12:53:40	2,300,000	3,350	77,050,000	seller

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
49	RMH	10/02/2003	13:29:44	5,000,000	1,030	51,500,000	seller
50	PIK	11/02/2003	09:33:22	748,593	1,300	9,731,709	buyer
51	SHF	11/02/2003	09:37:56	2,000,000	585	11,700,000	seller
52	ISC	14/02/2003	15:45:19	2,193,000	2,210	48,465,300	buyer
53	ABI	26/02/2003	15:32:42	251,519	4,750	11,947,153	seller
54	NPK	26/02/2003	15:30:47	1,651,639	1,254	20,711,553	seller
55	SBK	27/02/2003	10:41:44	1,000,000	2,900	29,000,000	seller
56	TBS	05/03/2003	16:10:45	100,200	6,250	6,262,500	seller
57	TBS	05/03/2003	16:38:11	100,200	6,250	6,262,500	seller
58	ABI	07/03/2003	16:45:12	328,000	4,700	15,416,000	seller
59	MTN	11/03/2003	15:32:54	1,823,000	1,287	23,462,010	seller
60	BIL	18/03/2003	13:50:27	1,957,400	4,200	82,210,800	seller
61	IPL	18/03/2003	11:15:36	717,500	5,010	35,946,750	seller
62	ISC	28/03/2003	10:36:40	2,251,180	1,625	36,581,675	buyer
63	SBK	28/03/2003	11:25:35	3,499,865	2,700	94,496,355	buyer
64	NED	28/03/2003	12:17:51	200,000	9,000	18,000,000	seller
65	TKG	28/03/2003	14:00:46	6,357,200	2,916	185,388,666	seller
66	INL	31/03/2003	17:56:18	915,000	7,650	69,997,500	buyer
67	INP	31/03/2003	17:55:06	3,485,000	7,650	266,602,500	buyer
68	NED	31/03/2003	12:01:50	3,038,677	8,980	272,873,195	buyer
69	ASA	02/04/2003	12:09:45	3,750,000	3,020	113,250,000	seller
70	NPN	24/04/2003	14:43:09	1,500,000	2,160	32,400,000	buyer
71	MTN	25/04/2003	11:14:09	2,300,866	1,220	28,070,565	buyer
72	BVT	25/04/2003	15:11:10	1,000,000	4,000	40,000,000	seller
73	IPL	30/05/2003	16:08:15	3,479,900	4,900	170,515,100	seller

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
74	BVT	18/06/2003	12:08:03	670,000	4,200	28,140,000	buyer
75	INL	19/06/2003	16:06:18	2,468,348	11,000	271,518,280	buyer
76	SHF	04/07/2003	13:38:06	5,991,292	660	39,542,527	seller
77	ISC	11/07/2003	16:54:04	600,000	1,550	9,300,000	seller
78	NTC	05/08/2003	13:03:49	13,495,060	387	52,266,367	seller
79	SHF	06/08/2003	10:56:56	4,000,000	765	30,600,000	seller
80	PIK	07/08/2003	09:18:54	1,500,000	1,475	22,125,000	seller
81	IPL	15/08/2003	15:59:59	322,155	5,995	19,313,192	seller
82	KMB	21/08/2003	12:51:06	1,070,000	3,628	38,819,600	seller
83	SHF	17/09/2003	10:45:02	3,000,000	740	22,200,000	seller
84	BVT	18/09/2003	16:04:32	2,237,747	4,300	96,223,121	buyer
85	FSR	18/09/2003	11:38:44	5,000,000	770	38,500,000	buyer
86	SHF	18/09/2003	14:33:13	4,570,619	740	33,822,581	buyer
87	AVG	30/09/2003	09:12:20	1,000,000	940	9,400,000	seller
88	KMB	02/10/2003	11:41:13	932,384	3,380	31,514,579	seller
89	PPC	06/10/2003	15:06:17	275,648	11,551	31,840,100	buyer
90	VNF	06/10/2003	15:46:58	3,399,389	1,680	57,109,735	seller
91	VNF	07/10/2003	14:10:07	2,000,000	1,705	34,100,000	buyer
92	HAR	07/10/2003	10:55:21	819,406	9,400	77,024,164	seller
93	SAP	08/10/2003	14:10:34	593,389	8,900	52,811,621	buyer
94	BAW	14/10/2003	10:16:25	500,000	5,890	29,450,000	buyer
95	VNF	16/10/2003	12:21:48	1,000,000	1,740	17,400,000	buyer
96	NTC	20/10/2003	15:45:06	3,166,700	450	14,250,150	seller
97	KMB	28/10/2003	12:30:37	1,081,584	3,500	37,855,440	buyer
98	NPN	30/10/2003	10:43:41	650,000	3,220	20,930,000	seller

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
99	MTN	11/11/2003	16:55:28	8,000,000	2,365	189,200,000	seller
100	SHF	13/11/2003	10:48:02	3,400,000	728	24,752,000	buyer
101	MTN	13/11/2003	10:43:50	9,974,732	2,375	236,899,885	seller
102	LGL	18/11/2003	11:09:46	1,982,161	5,000	99,108,050	buyer
103	PPC	18/11/2003	14:46:21	350,000	14,010	49,035,000	buyer
104	IMP	18/11/2003	11:08:52	166,667	59,100	98,500,197	seller
105	ISC	18/11/2003	14:42:41	3,027,800	2,290	69,336,620	seller
106	SOL	18/11/2003	11:12:00	1,195,848	8,810	105,354,209	seller
107	RMH	20/11/2003	14:21:40	2,000,000	1,205	24,100,000	buyer
108	KMB	25/11/2003	15:56:42	727,569	3,685	26,810,918	seller
109	OML	01/12/2003	15:29:44	4,012,694	1,103	44,260,015	buyer
110	RMH	01/12/2003	10:45:36	1,500,000	1,270	19,050,000	buyer
111	BAW	01/12/2003	15:25:32	366,375	6,320	23,154,900	seller
112	NED	02/12/2003	16:46:29	2,948,648	6,900	203,456,712	buyer
113	PPC	05/12/2003	15:27:01	50,000	14,000	7,000,000	seller
114	ISC	08/01/2004	10:12:42	2,000,000	2,942	58,840,000	seller
115	AVG	13/01/2004	15:07:22	954,835	1,160	11,076,086	seller
116	AVG	14/01/2004	14:40:40	982,829	1,170	11,499,099	seller
117	INP	14/01/2004	14:55:32	175,000	14,900	26,075,000	seller
118	REM	16/01/2004	16:00:57	1,000,000	7,100	71,000,000	seller
119	PPC	19/01/2004	09:59:48	995,833	13,000	129,458,290	buyer
120	NTC	20/01/2004	16:50:28	4,905,264	480	23,545,267	seller
121	PIK	20/01/2004	16:42:02	611,019	1,735	10,601,180	seller
122	NPK	22/01/2004	15:34:02	10,000,000	1,335	133,500,000	seller
123	NPN	22/01/2004	13:27:22	1,000,000	4,190	41,900,000	seller

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
124	REM	22/01/2004	16:06:09	1,811,213	7,100	128,596,123	seller
125	PIK	27/01/2004	09:31:56	617,356	1,690	10,433,316	seller
126	LGL	30/01/2004	14:36:31	644,299	5,350	34,469,997	seller
127	OML	30/01/2004	14:34:37	4,000,000	1,194	47,760,000	seller
128	IPL	04/02/2004	13:08:31	213,109	6,755	14,395,513	buyer
129	TBS	04/02/2004	15:23:18	455,100	8,205	37,340,955	seller
130	NPN	05/02/2004	12:53:55	3,298,236	4,200	138,525,912	seller
131	PIK	20/02/2004	16:29:37	818,400	1,771	14,493,864	seller
132	OML	24/02/2004	15:48:24	5,746,580	1,149	66,028,204	buyer
133	BAW	25/02/2004	12:05:30	1,117,676	6,770	75,666,665	seller
134	LGL	25/02/2004	12:06:27	1,388,379	5,450	75,666,656	seller
135	RMH	09/03/2004	14:11:26	1,000,000	1,440	14,400,000	seller
136	LGL	10/03/2004	11:08:48	1,000,000	5,520	55,200,000	seller
137	NTC	10/03/2004	13:58:32	3,000,000	460	13,800,000	seller
138	NTC	11/03/2004	15:21:13	4,653,517	460	21,406,178	seller
139	NTC	12/03/2004	14:48:33	2,000,000	464	9,280,000	buyer
140	AGL	19/03/2004	14:18:31	1,600,000	16,150	258,400,000	buyer
141	NED	19/03/2004	11:05:34	1,000,000	6,050	60,500,000	seller
142	REM	24/03/2004	10:54:26	1,017,264	7,300	74,260,272	seller
143	ABI	30/03/2004	10:30:32	681,721	7,200	49,083,912	buyer
144	NPN	06/04/2004	16:22:18	3,000,000	4,350	130,500,000	seller
145	LGL	07/04/2004	11:43:37	949,469	5,410	51,366,273	seller
146	NPN	15/04/2004	11:29:06	750,000	4,600	34,500,000	seller
147	VNF	21/04/2004	15:21:17	1,846,000	2,110	38,950,600	buyer
148	INL	22/04/2004	13:09:21	92,074	13,000	11,969,620	buyer

No.	Company	Transaction Date	Time	Number of shares traded	Share price(cts)	Value (Rands)	Type of trade
149	LGL	22/04/2004	13:08:32	368,297	5,451	20,075,869	buyer
150	VNF	22/04/2004	10:50:50	1,610,346	2,110	33,978,301	buyer
151	INP	22/04/2004	13:10:14	138,111	13,000	17,954,430	seller
152	ISC	22/04/2004	16:36:31	2,000,000	3,500	70,000,000	seller
153	BAW	04/05/2004	11:21:58	360,000	7,020	25,272,000	buyer
154	PPC	04/05/2004	12:49:16	75,000	13,900	10,425,000	buyer
155	INL	04/05/2004	11:22:32	97,777	12,645	12,363,902	seller
156	PPC	04/05/2004	11:23:01	90,919	13,599	12,364,075	seller
157	VNF	05/05/2004	13:29:11	1,172,728	2,090	24,510,015	buyer
158	MTN	10/05/2004	14:48:06	4,000,000	2,660	106,400,000	buyer
159	PIK	19/05/2004	10:08:06	750,000	1,660	12,450,000	seller

A.3 Multiple blocks

The transactions listed below are examples of some of the multiple block trades that occurred within the same day and suggests either order splitting or trailing blocks.

Company	**Date**	**Time**	**Shares traded**	**Share price (in cents)**	**Value (in Rands)**
ABI	18/07/2002	16:05:27	300,000	550	13 650 000
ABI	18/07/2002	16:11:17	200,000	550	9 100 000
CRN	06/06/2002	10:21:29	300 000	5, 620	16 860 000
CRN	06/06/2002	12:35:02	350 000	5, 620	19 670 000
CRN	06/06/2002	12:59:29	300 000	5, 620	16 860 000
CRN	06/06/2002	16:26:34	200 000	5, 620	11 240 000
CRN	07/06/2002	10:02:27	200 000	5, 620	11 240 000
CRN	07/06/2002	12:24:03	200 000	5, 610	11 220 000
INL	22/11/2002	12:09:58	106 459	12, 500	13 307 375
INL	22/11/2002	13:00:08	106 459	12, 500	13 307 375
PIK	08/07/2003	15:23:37	811 644	1, 500	12 174 660
PIK	08/07/2003	15:40:08	842 000	1, 500	12 630 000
PIK	08/07/2003	16:04:20	760 000	1, 500	11 400 000
PIK	07/08/2003	09:18:54	1 500 000	1, 475	22 125 000
PIK	07/08/2003	14:06:42	1 500 000	1, 485	22 275 000
TBS	24/03/2003	12:06:22	500 000	6, 090	30 450 000
TBS	24/03/2003	13:03:17	1 700 000	6, 090	103 530 000
TBS	24/03/2003	13:03:39	800 000	6, 090	48 720 000
TBS	24/03/2003	20:53:55	500 000	6, 090	30 450 000
TBS	24/03/2003	20:54:11	1 700 000	6, 090	103 530 000

Company	Date	Time	Shares traded	Share price (in cents)	Value (in Rands)
TBS	24/03/2003	20:54:11	800 000	6, 090	48 720 000
TBS	25/03/2003	21:33:40	500 000	6, 090	30 450 000
TBS	25/03/2003	21:33:50	1 700 000	6, 090	103 530 000
TBS	25/03/2003	21:33:50	800 000	6, 090	48 720 000
TKG	15/05/2003	12:54:15	660 166	3, 320	21 917 511
TKG	15/05/2003	14:45:55	660 166	3, 320	21 917 511

A.4 Consistency matrix

The following will be applicable to the various hypotheses listed below:

Source of Data: Secondary data accessed from Deutsche Bank Securities and McGregor BFA (Pty) Ltd databases.

Analysis: Well-established statistical techniques

Research problem: To investigate how stock prices are affected by block transactions and how these transactions subsequently impact on the price discovery process of the underlying stocks.		
Sub- problem	**Hypothesis**	**Literature sources**
1. **The first sub-problem** is to determine the magnitude and the impact of the price movements on both block sales and purchases.	To test whether price effects arise due to block purchases and sales of securities. H0: The mean and median average trade-to-trade excess return on block trades is not significantly different from zero. HA: The mean and median average trade-to-trade excess return on block trades is significantly different from zero.	*Determinants of price movements:* • Identity of the block traders: Scholes (1972), Firth (1975), Mikkelson & Partch (1985), Seppi (1990), Keim & Madhavan (1995,1996), Madhavan & Cheng (1997), • Market structure: Gemmill (1996), LaPlante & Muscarella (1997), Koski & Michaely (2000), O'Neill (2002).

Sub- problem	Hypothesis	Literature sources
	H0: RXt = 0 *HA: RXt ≠0* Where RXt represents the mean trade-to-trade excess return on block trade at trade *t*	*Existence of asymmetry in the price impact between block purchases and sales:* Scholes (1972), Kraus & Stoll (1972), Burdett & O'Hara (1987), Holthausen *et al* (1987), Ball & Finn (1989) and Chan & Lakonishok (1993), Chiyachantana *et al* (2004). *Factors that may lead to price impact bias* *a) Information leakage:* Firth (1975), Madhavan & Cheng (1997), LaPlante & Muscarella (1997), Koski & Michaely (2000), Seppi (1992) and Saar (2001), Frino *et al* (2004) *b) Order fragmentation:* Firth (1975), Seppi (1990), Chan & Lakonishok (1995), Keim & Madhavan (1996)

Sub- problem	Hypothesis	Literature sources
2. The **second sub-problem** is to determine whether block transactions have a temporary and permanent effect on security prices.	The researcher will examine the cumulative price changes and establish whether they are temporary or permanent. *Temporary (and/or permanent) price effects* H0: The temporary and/or permanent price changes on both block sales and purchases are not significantly different from zero. HA: The temporary and/or permanent price changes on both block sales and purchases are significantly different from zero. *Temporary price effects* $H0: TQ = 0$ $HA: TQ \neq 0$ *Permanent price effects* $H0: PQ = 0$ $HA: PQ \neq 0$	The *temporary price effect* is brought about the illiquidity of the market, Keim & Madhavan (1996) and LaPlante & Muscarella (1997). *Permanent price changes* are attributed to information and price pressure hypotheses inelastic demand curves: Kraus & Stoll (1972), Firth (1975), Holthausen *et al* (1990), Atkins (1995), Gemmill (1996) and Ghysels & Cherakaoui (2003). *Buyer initiated trades* Kraus & Stoll (1972), Raab (1976) Holthausen *et al* (1987, 1990), Barclay & Holderness (1991) and Chan & Lakonishok (1995) and Gemmill (1996), Bessembinder & Venkataramanb (2004) *Seller initiated trades* Mikkelson & Partch (1985), Holthausen *et al* (1987, 1990) Chan & Lakonishok (1993), Gemmill (1996), Bessembinder & Venkataramanb (2004).