



**Acquisitions and the demand curve for securities:  
Does company size matter?**

**Jan-Hendrik Hugo**

**21000213**

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**UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA**

## Abstract

The frequency with which acquisitions occur in the South African business environment served as motivation to evaluate the effect of acquisition announcements on the share performance of JSE listed shares. The basis of the study was to use event study methodology to evaluate short term effects as well as to investigate size effects in acquisition announcements. Companies were grouped into small and large companies using market capitalisation as segmentation criteria.

To evaluate effects on the share price and volume traded, the market demand curve for traded securities was used. It proved to be a useful tool specifically in the evaluation of smaller companies, where information asymmetry was prevalent. The shift in the demand curve was evaluated by constructing a Demand Curve Variable, which showed the direction (if any) of the change in the demand curve.

Acquisition announcements by JSE listed companies over the last seven years were evaluated and confounding events were controlled for. The findings supported the fact that there exist differences in the results of the small and large company samples when making acquisition announcements, and that small companies have more pronounced negative effects subsequent to the announcement of an acquisition.

## Key Words

Acquisitions, company size, demand curve, announcements

## Declaration

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

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Jan-Hendrik Hugo

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Date

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# 1 Chapter 1: Introduction

## 1.1 *Problem definition*

In this study, the problem to be solved was whether or not changes occurred to the demand curve for traded securities of listed companies subsequent to the announcement of an acquisition. Furthermore, this study evaluated whether changes in the demand curve apply to companies regardless of their size, and whether the prevalence of information as a result of acquisition announcements related to large companies has an impact on share performance. The starting point was the actual announcement of acquisition in order to evaluate whether the act of announcement alone was sufficient enough to change the performance of a share traded on a stock exchange.

### 1.1.1 **Problem definition evaluation**

Organisations have one of two primary business growth options. They can either focus on growth through organic means (such as increasing sales to current customers) or they can grow by acquiring another company (Abdo, 2010). When one company buys another (or another's assets), they often have to contend with challenges such as cultural fit, management and employee motivation, customer perceptions, geographic changes and funding requirements. For listed companies there is also a public component to the challenges they face; this is the challenge of managing shareholder sentiment and market perception of their shares. (Hugo, 2011)

Expansion by acquisition can be expensive and listed companies rely, in part, on their share capital to fund these acquisitions. This study evaluated whether there were changes in price and volume of the acquiring company's traded securities. To assess this change, the market demand curve for traded securities was used as a tool to establish and explain changes in the share price and quantity of shares traded.

Studies related to acquisitions have found that managers of listed firms use acquisitions to boost the value of their shares, should they believe them to be undervalued (Draper & Paudyal, 2008), which means that in addition to growing the operation of the acquiring company, the act of acquisition may be used in an attempt to stimulate demand for the company's shares – by specifically addressing the share price. There is reason for the evaluation of the demand for a traded security (Petajisto, 2009) and this study evaluated that demand, subsequent to an acquisition announcement. More specifically, this study attempted to evaluate whether the size of the company has an effect on whether there is a *shift* in the demand curve for the traded securities or not.

Bearing in mind that the acquisition is, or should be, a business growth strategy, managing the share price is not favourable practice in analysts' opinion. (Abdo, 2010) However, the act of announcing an acquisition is expected to have an effect on the share performance of the acquiring company (Hugo, 2011) and this study attempted to analyse this effect.

## 1.2 Research Motivation

JSE Ltd, who operates the Johannesburg Securities Exchange (JSE), places special emphasis on the announcement of acquisitions by listed companies. To illustrate this they require the following from companies listing on the Exchange:

With the exception of trading statements, an issuer must, without delay, unless the information is kept confidential for a limited period of time... release an announcement providing details of any development(s) in such issuer's sphere of activity that is/are not public knowledge and which may, by virtue of its/their effect(s), lead to material movements of the reference price of such issuer's listed securities.(JSE Ltd (a), 2011, p. 51)

Furthermore, investigation of data sources revealed that a significant number of companies make these announcements as "voluntary announcements" (BFA McGregor, 2011), underscoring the value that companies place on making information known to shareholders. The requirements as set out by JSE Ltd (JSE Ltd, 2011) and the frequency of announcements seen on the JSE, was strong motivation to use the act of announcements of acquisitions as the base of this study.

Investigation of a popular financial publication (Fin24, 2011) gave an indication as to the vast amount of acquisitions occurring that affect listed South African companies. In one example, 50 articles regarding acquisitions were published in the last year alone (Fin24, 2011), which equates to roughly one article per week regarding an acquisition of, or by, a JSE listed company. Although this was found in just one publication, it clearly hinted at the impact acquisitions have on the South African business landscape.

However, when considering articles on acquisitions, it was often reported from the perspective of operational benefits and effects, with statements such as “...to get access to that [geographical] ground, you need to do mergers or acquisitions...” (Reuters, 2010 (a)) proving the point. But the effects of acquisitions on the actual share trade volumes in conjunction with changes in share price, and, whether the size of the acquiring company has an effect on these changes, emerged as a further point to evaluate. Therefore, this study was motivated by, amongst other factors, the need to understand the changes to shareholder value as a result of acquisition announcements of large as well as smaller listed companies.

Another observation that can be made from articles in the online media (Fin 24 (2011), Cranston, 2010, Reuters (a) (2010)) is that there is a strong focus on results and effects once the acquisition has been affected.

This study went one step back in the acquisition process, and considered the effects of the act of announcement of an acquisition. One reason for taking this step back is the involvement of commissions, such as the Competition Commission, in acquisition deals.

South Africa's Competition Commission plays a significant role in acquisition deals, particularly with large organisations. Two of the more famous examples of this are the proposed takeover by Nedbank of Standard Bank in 2000 (Cranston, 2010) and the proposed acquisition of Massmart by Walmart (Reuters, 2011). In the first example the deal did not take place after the Commission's ruling, and in the second the deal was initially threatened by adjudication by the Competition Commission.

The interest in the Commission's involvement lies in the fact that these acquisitions had already been announced to shareholders and the public at large, but the deal did not or would not necessarily happen. It could be argued that if a potential shareholder, having investigated which shares to purchase, becomes aware of this involvement from outside sources, he/she may decide to hold off on the purchase of an acquiring company's shares. This further motivated the use of the announcement of acquisition to evaluate effects on share price and volume traded, in that simply announcing an acquisition may not affect share performance.

The publications noted above focused mostly on large companies in their reporting (Fin24, 2011). This is understandable as these are the stalwarts of South African business who attract the attention of both the man on the street and large investment firms. These large companies have much information published by and of them (BFA McGregor, 2011), while companies on the bottom end of the JSE main board (in terms of market capitalisation) have less information published. It was expected to be useful to understand if there was a change in the demand curve for traded securities subsequent to an acquisition announcement or not, and if this change applied to companies of various sizes or not.

In conclusion, the strongest motivators for conducting this study was the need to understand the effects of announcing an acquisition on the potential shareholders' perception and the current shareholders' value, and then whether company size bears influence on this perception and value.

### ***1.3 Research purpose and scope***

This study was conducted using JSE listed companies grouped according to size. The scope was an evaluation of the act of announcement of an acquisition. This announcement could take the form of an official JSE announcement, or SENS (Securities Exchange News Service) announcement, or more informal announcement, such as printed media or other voluntary announcements.



Academically speaking, the purpose of this study was to apply the demand curve on traded securities for companies who announce acquisitions of other companies in order to contribute to a better understanding of acquisitions theory. In addition, the purpose was to evaluate if changes in the demand curve happen regardless of the size of the acquiring company.

Participants in business studies would, potentially, find it beneficial to grasp the effects of acquisitions announcements on the share performance of a company. Therefore, a key audience for this study included individuals with an interest in business theory, where the growth of the firm through acquisition is to be studied.

In a business environment the intended uses of this study was twofold:

- For shareholders of listed companies the study should give an indication of what happens to the value of a share once a company announces an acquisition of another company.
- For listed companies, who are considering acquisitions, the study aimed to show whether or not the act of announcing the acquisition would mean that volumes of shares traded and share prices will change.

## 2 Chapter 2: Summary of related literature

The theory base used in conducting this study included financial principles and economic theory, but, in order to evaluate previous studies done, it was grouped into the following parts:

- The demand curve;
- Acquisition announcements, share reactions and company size;
- Demand curve for traded securities;
- Event study methodology and share price changes;
- Evaluation of trade volumes of shares.

### 2.1 *The Demand Curve*

It is generally accepted that the demand curve and its movement was first described by Alfred Marshall in 1890 (Blaug, 1997). It is usually applied to markets for products and services. Along with supply, it forms the basis of microeconomic theory (Baye, 2009).

In essence, the theory describes a downward sloping curve, where 'Quantity Demanded' is on the Y axis and 'Price' is on the X axis. The theory reads that forces affecting the curve in its entirety (or market forces) would have an effect on both the quantity demanded and the price (Baye, 2009). In this study, there are three potential changes to the demand curve, discussed next.

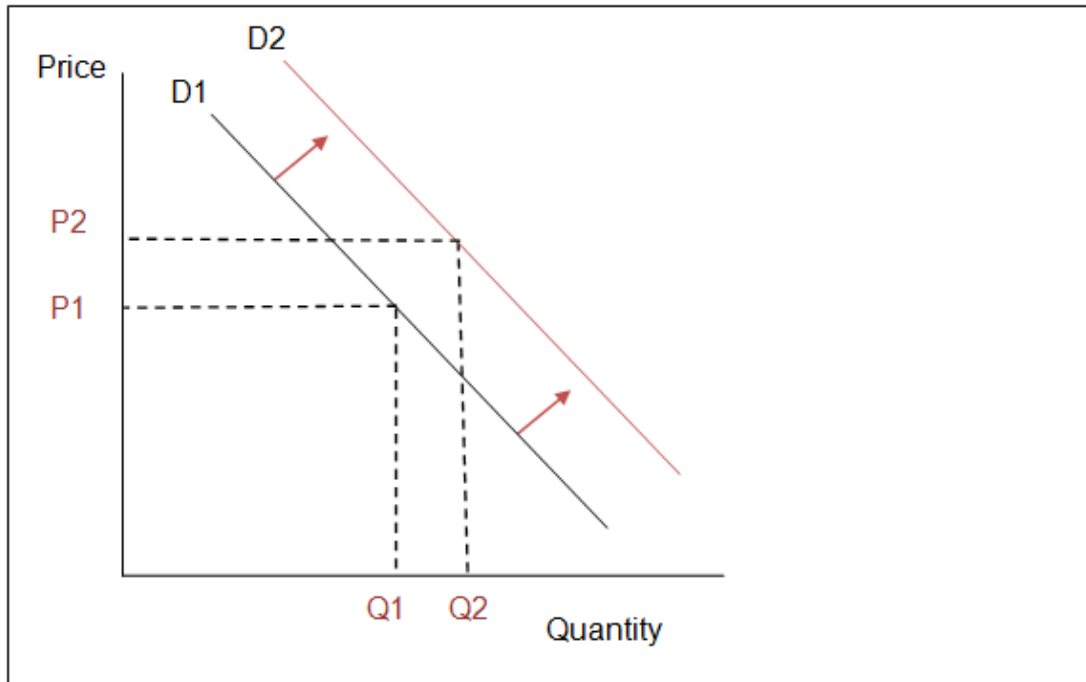
The first potential change to the demand curve can be explained by a drop in the price of an associated or complementary - as described by Baye (2009) – product meaning a shift in the demand curve for another (for example a fuel price increase would mean a decrease in motor vehicle sales). This shift is displayed in Figure 1 below.

Secondly, a move along the demand curve occurs when the organisation changes the price of their product and there is a change in the quantity demanded of the product. In the conventional downward sloping demand curve, a reduction in price means an increase in the quantity demanded. This move is shown in Figure 2 below.

Finally, the slope of the demand curve could also be altered by certain events. In very basic terms, if changes in the product's price affect quantity to a greater or lesser degree than before, the slope of the demand curve is altered. This is known as changes to price elasticity (Baye, 2009) and shown in Figure 3 below.

2.1.1.1.1 Figure 1 – A shift in the demand curve

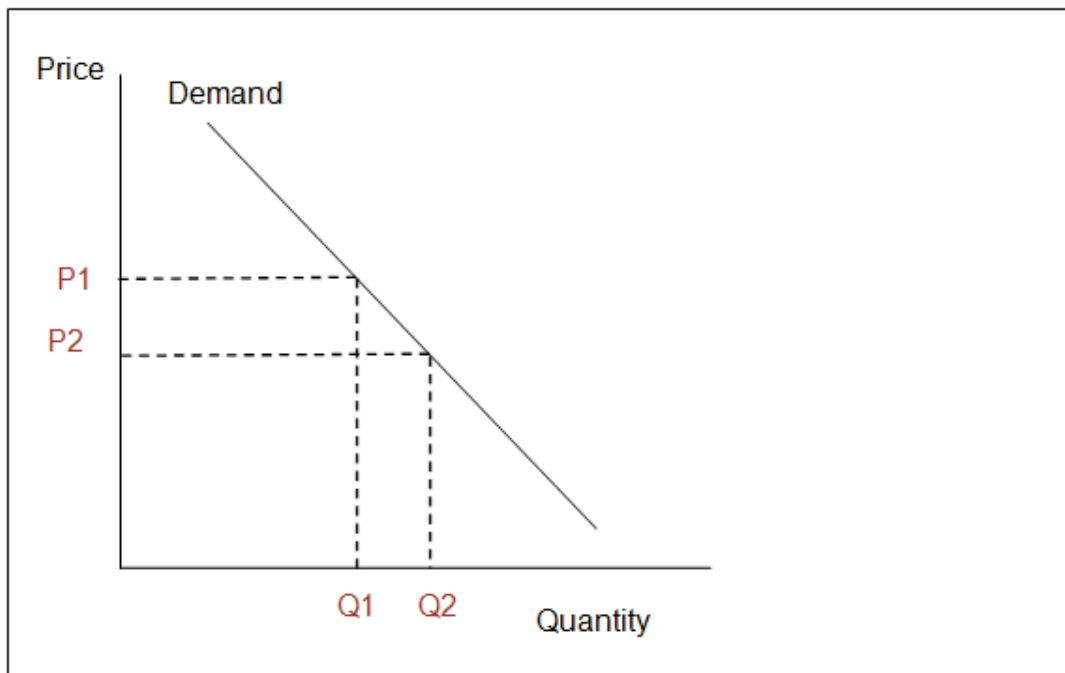
Increase in demand for a product (simplified from Baye (2009))



*The shift of the curve occurs due to forces in the market acting on the organisation's product.*

2.1.1.1.2 Figure 2 – Movement along the demand curve

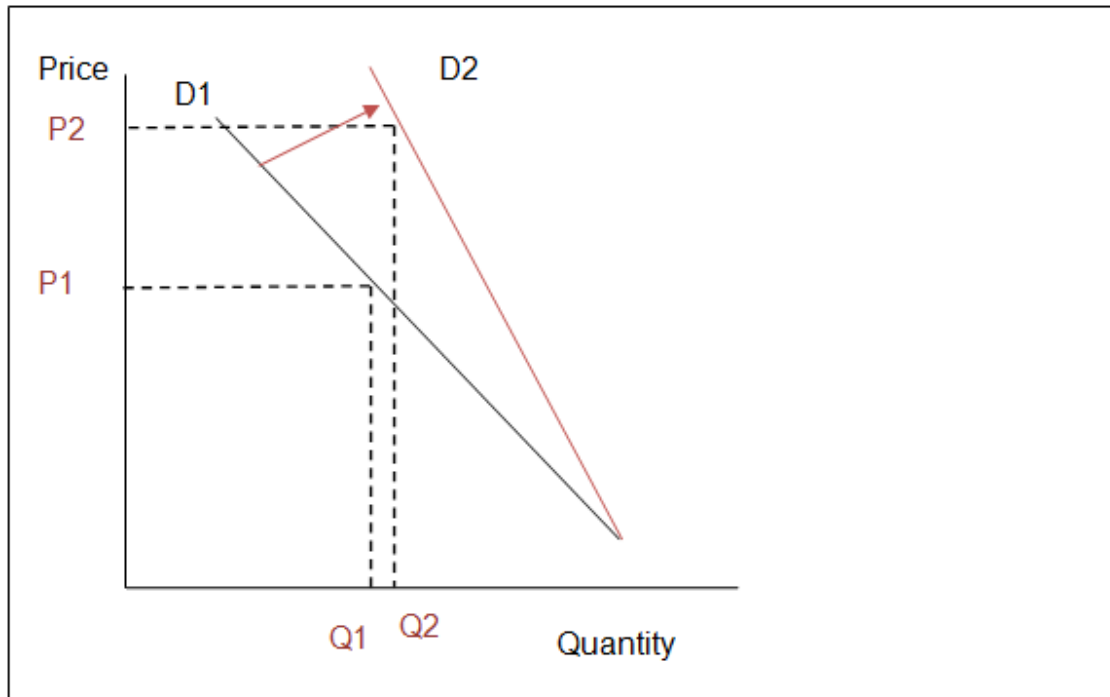
Changes to quantity demanded associated to a change in price alone (simplified from Baye (2009)).



*Changes in quantity demanded increased, caused by a reduction in the price of the product.*

2.1.1.1.3 Figure 3 – Changes to the slope in the demand curve

Changes in the slope of the demand curve (changes to price elasticity – Simplified from Baye (2009).



*A change (increase) in price has a lesser effect on the quantity demanded if there has been an increase in the slope of the demand curve (price elasticity).*

The fact that price (share price) and quantity (volume traded) are principles which apply to traded securities was the key reason for using the demand curve as a tool to understand the effects of announcement of acquisitions more clearly.

For the purposes of this study the following principle was used: when a change occurs in the same direction (in other words increases or decreases) for both price and quantity traded, it is seen as a *shift* in the curve. If price changes in one direction (for example increases) and quantity changes in the opposite direction (in other words decreases), it will show a *move along* the demand curve for the security. Price elasticity evaluation is more complex, but a change in one variable (price or quantity), with no change in the other, could indicate a change to the slope and therefore a change in the price elasticity of the share.

In conclusion, the demand curve is the basis by which price and quantity for a product is predicted and explained, and this study attempted to establish if this curve may be applied to predict what happens to price and quantity traded of listed securities when the firm announces an acquisition.

## ***2.2 Acquisition announcements, share reactions and company size***

There is a wide range of literature available on the subject of acquisitions and it is usually grouped together with mergers as a subject field. The studies below evaluated the notion that the bidding (or acquiring) company unlocks value through the announcement of acquisitions.

A study by Draper and Paudyal (2008), which evaluated the gains to bidders in acquisitions, and the effect of information asymmetry, noted that value is created from two sources namely “value [is created] through information dissemination and... due to synergy gains...” (p. 378). The departure point for Draper and Paudyal’s study, was the fact that there is indeed value unlocked for the bidder (or acquiring company) by the act of acquisition announcement.

Draper and Paudyal (2008) then concluded their findings by stating that changes in market value depend on the “...level of information asymmetry between company managers and investors...” (p. 401). This finding supports the notion that information is key and motivates the use of information changes (in other words announcement of acquisition) as the starting point.

A study by Floyd, Korabik and Moore (1995) conducted on USA-based mergers and acquisitions on the level of due diligence required for various sizes of acquisition deals, attempted to define the effect of information and company size. They found “...with [less] public information available...” (p. 72) smaller companies have more volatile results following a merger or acquisition when compared to their large counterparts. Floyd *et al*, however, made a clear distinction by comparing private companies (small) to publicly traded companies (large). This study, however, evaluated if the size of a public listed company would have a similar impact on value subsequent to an acquisition announcement.



Research by Moeller, Schlingemann and Stultz (2003) specifically focused on company size in an acquisition, concluded that company size has a definitive effect on the success of the acquisition announcement, which is surmised with:

“We have shown that small firms fare significantly better than large firms when they make an acquisition announcement. Overall, the abnormal return associated with acquisition announcements for small firms exceeds the abnormal return associated with acquisition announcements for large firms.” (p. 23)

They continued to establish the magnitude by which returns for small companies exceed that of large companies. They found a “...2.24 percentage point...” (Moeller *et al*, 2003, p. 23) difference in favour of smaller companies. Finally, their study was also focused on successfully completed deals, and therefore had a long period of study.

Moeller *et al*'s (2003) work gave justification to this study in that it showed that company size is of importance when evaluating the value created as a result of an acquisition announcement. While their study took place over a long period and was only focused on successful deals, the underlying principles held value for this study, in that it showed the effect of size in acquisition deals.

In contrast to Moeller *et al's* (2003) long event window, a study by Bartholy and Flugt (2009) focused on returns in the short term following an acquisition deal. They found that there is a significant difference between the target's (acquired company) and the bidder's (acquiring company) returns subsequent to acquisition announcement, with the target's shares performing significantly better in the short term.

A key insight, for a market where international acquisitions is prevalent, is “[f]urthermore, the thesis shows that a statistical difference cannot be found between the announcement effects of domestic versus cross-border [merger and acquisitions] for the bidders and targets...” (Bartholy & Flugt, 2009, p. 44)

To add to the findings of Batholy and Flugt (2009), a study by Aybar and Ficici (2009) also found that international acquisitions do not add additional value. They noted that:

“The results show that, on average, cross-border expansions of EMMs [Emerging Market Multi-nationals] through acquisitions do not create [additional] value.” (Aybar & Ficici, 2009, p. 1317)

When combining the findings of Aybar and Ficici (2009) and Batholy and Flugt (2009) it emerged that international acquisitions do not have a vastly different effect on share price performance and value to the acquiring company, when compared to local acquisitions. For this study the implication was thus that there was not a true need to distinguish the two types of acquisitions (local and international acquisitions) in doing data analysis.

To understand whether there was a positive effect on returns subsequent to acquisitions, Hayward and Hambrick (1997) found that this was not always the case. They found that in certain cases, there was a reduction in the returns of the acquiring company and this reduction was more pronounced in large acquisition deals. Their findings were taken over a period of a year, and addressed short and long term effects over that period. The implication to this study was that an increase in share price could not be assumed and therefore a *change* in price would be evaluated to determine a shift in the demand curve.

The above noted studies were related to changes in value associated with the share price or the returns associated with an announcement of acquisition. To evaluate changes in volume associated with announcements, a study by Palmon, Sun and Tang (1994) gave some insight. They found that subsequent to analyst opinion releases in financial publications, there was an effect on volume traded, however, it takes a few (three to ten) (p. 411) days to be affected.

While Palmon *et al's* (1994) study did not relate to acquisitions specifically, it does apply to the study of information changes of a share, and therefore, had application in this study - specifically in determining the period to be studied subsequent to the announcement.

In conclusion, it was clear from previous studies that the size of the company does have an effect on the reaction of current and potential shareholders with relation to acquisition announcements. There was a trend observed that smaller companies show a larger change, and that the bidder's share reaction is less than the target's share reaction. This study focused solely on bidders (in other words the company making the announcement) and searched for differences or similarities to the studies reviewed.

### ***2.3 The demand curve for traded securities***

In order for this study to succeed it was crucial for a downward sloping demand curve of traded securities to exist. Some studies have tied the demand curve to the demand for tradable securities by suggesting either a horizontal or a downward-sloping demand curve.

In a study by Cha and Lee (2001), evidence was given for a horizontal demand curve in that increased purchases (or increase in quantity demanded) of shares does not necessarily move the price higher. Furthermore, in a study conducted by Petajisto (2009), which evaluated the nature and extent of the demand curve of traded securities, it was found that the slope of the demand curve for stocks is "...over estimated by several orders of magnitude..." (p. 1014). If Cha and Lee's study was accurate, it would severely hamper this study. However, while Petajisto promoted the negative view, the study indicated that despite it being over estimated, the downward sloping demand curve for stocks does in fact exist.

A study on the nature of the demand curve for traded securities stated that “...[it] is sufficient to conclude that the demand curve is downward sloping because there cannot be finite excess demand at the prevailing price for a stock with a horizontal demand curve.” (Levin & Wright, 2006, p. 72)

This later research and reasoning from Levin and Wright (2006) gave justification to *this* study as it confirmed the existence of a downward sloping demand curve for traded securities. To add to the findings of Levin and Wright, a study related to the Nikkei (Japan’s stock exchange) found that “...results do tend to support the hypothesis that the demand curves for stocks are downward sloping.” (Liu, 2000, p. 263).

In a study on the existence of a downward sloping demand curve for stocks, it was noted that “...we interpret the evidence as supporting the hypothesis that demand curves for stocks slope down....” (Kaul, Mehorta, & Morck, 2000, p. 910). This further augmented the supposition of the existence of a downward sloping demand curve for traded securities.

In conclusion, this study did not evaluate the extent of the slope of the demand curve for stocks but rather the shift in the curve related to acquisition announcements. As stated above, the foundation for evaluating a shift in the demand curve was the existence of a downward sloping demand curve for traded securities. As described, the evidence found supported this.

## **2.4 Event Study Methodology and Share Price Changes**

As discussed above, a shift in the demand curve relies on a change in the price (in this case, the price of the traded security), and a change in quantity demanded (or quantity traded of the security). This change in price and quantity will be associated with a specific event (e.g. an announcement or press release) and therefore event study methodology was used in this study.

By way of definition “[a]n event study is a statistical technique that estimates the stock price [return] impact of occurrences such as mergers, earnings announcements, and so forth. The basic idea is to disentangle the effects of two types of information on stock prices...” (Mitchell & Netter, 1994, p. 550).

To ensure accuracy and reliability of this method of study it should be noted that “...conclusions from an event study are valid only if... the researcher has truly identified the abnormal returns associated with the event...” (McWilliams & Siegle, 1997, p. 629). McWilliams and Siegle further identified three significant assumptions to event study methodology which are that (p. 629):

- Markets are efficient;
- The event was unanticipated and;
- There were no confounding events during the event window.

A key to understanding event study methodology was found in work done on the reasons behind using event methodology. “Stock returns are subject to some degree of “noise” or random statistical fluctuations, but event study is looking for returns that exceed this normal level of variation.” (Wells, 2004, p. 62) In conducting *this* study, this ‘noise’ had to be taken into account and thus an objective was to identify above normal changes in order to ensure accuracy and relevance of findings.

Wells (2004) further described a mean adjusted model whereby the mean daily return on each selected firm was used over a predetermined period, and then noted as the ‘benchmark’. This benchmark is the average return of the share being studied over a period before the event identified. The returns after the event were then averaged and analysed over a period of time to determine above average returns.

Wells (2004) further explained a “market adjusted model” (pp. 65 - 66) which used the index or the market to determine the benchmark. This is an estimation of what the return of the share was expected to be during the event window. He introduced the use of regression analysis to determine the “...stock’s market risk, relative to the average stock...” (p. 65).

To estimate the expected return of a particular share, studies provided certain models as a control measure. Mushidzi and Ward (2004) evaluated abnormal returns related to the market, referred to as the CAPM model. As their study was mostly related to returns associated with acquisitions, the underlying methodology was valid to this study. The methodology used by Mushidzi and Ward proposed the calculation of an expected return, which was given by the regression formula:

$$\hat{R}_{it} = \alpha_i + \beta_i R_{mt}$$

Where

$\hat{R}_{it}$  = the predicted daily rate of return on security I on day t

$R_{mt}$  = the daily rate of return of the market on day t

$$R_{mt} = \text{Log} \left( \frac{ALSIt}{ALSIt-1} \right)$$

ALSIt = JSE All Share Index on day t

ALSIt-1 = JSE All Share index on day t-1

$\alpha_i$  = measures the constant return on firm I in the period that is not explained by the market, i.e. the return of firm I when the market does not move

$\beta_i$  = measures the sensitivity of firm I to the market, this is the measure of systemic risk of share i" (p. 21)

This equation has often been used in previous event studies ((Palmon *et al*, 1994); (Bartholy & Flugt, 2009); (Draper & Paudyal, 2008)) and was adopted for this study.



To understand the workings of the equation more clearly Palmon *et al* concisely explained that the equation represents a regression model which evaluates the extent to which the market predicts the return of the share being analysed.

Mushidzi and Ward (2004) used data obtained from specialist sources to obtain the values of  $\alpha_i$  and  $\beta_i$ . Once the expected returns were calculated, it was compared against the actual observed returns in their event window for each day subsequent to the event. They then combined all the abnormal returns into Cumulative Average Abnormal Return (CAAR), which is the mean of each evaluated share's abnormal return over the time subsequent to the event, an equation for further analysis.

To manually find the values of  $\alpha_i$  and  $\beta_i$  in the above regression model, Affleck-Graves, Callahan and Ramanan (2000) used a period of time before the event window. They used the market index as the independent variable and the observed prices of the traded share as the dependant variable for a year (in other words 250 trading days) to determine to what extent the market index predicts the actual observed price. The output was then an estimated  $\alpha$  and  $\beta$  to be used for detecting abnormal returns.

Simply using the market indexes as the ‘benchmark’ may be limiting, as it does not control for industry or sector market forces. Therefore, control portfolios may be constructed by grouping shares based on “...the market anomaly to be filtered out, if present...” (Mordant & Muller, 2003, p. 20). Furthermore the portfolio may either form an “... ‘add-on’ after abnormal returns [have] been determined... or as an integral part of the... model...” (p. 19).

In either case, control portfolios are constructed by grouping shares based on company size (large or small); value effect of the share (value or growth) and resource or non-resource counter. This was set out in the table below and is known as the eight factor mimicking model (Mordant & Muller, 2003, p. 20):

2.4.1.1.1 Table 1: Factor-mimicking control portfolios

	Large		Small	
	Value	Growth	Value	Growth
<b>Resources</b>	LVR	LGR	SVR	SGR
<b>Non-Resources</b>	LVN	LGN	SVN	SGN

Key: LVR = Large, Value, Resources  
 LVN = Large, Value, Non-resources  
 LGR = Large, Growth, Resources  
 LGN = Large, Growth, Non-resources  
 SVR = Small, Value, Resources  
 SVN = Small, Value, Non-resources  
 SGR = Small, Growth, Resources  
 SGN = Small, Growth, Non-resources

The method then relies on calculating a Market Effects control model (p. 22) by obtaining  $\beta$  values for each of these loading factors.

A study on abnormal volumes traded and insider trading, also showed that the use of control portfolio theory is valid for considering abnormal returns as “...it provides a number of advantages over the CAPM; in particular, it considers the unique factors (size, value and the resource effect) that have been shown to be significant on the JSE...” (Thaver & Ward, 2011, p. 63) which is in line with Mordant and Muller’s (2003) work.

Finally, all of the studies noted in this section referred to the day when information about the share changed as the event to be studied. To determine such a change and thus the day of the event, this study looked at what prices ‘should have been’ (expected returns) at a given time and compared this to the observed price at that particular time.

## ***2.5 Changes in volume traded***

To identify a shift in the demand curve for a traded security subsequent to acquisition announcement, a critical factor to consider was the quantity demanded – or the Y-axis of the demand curve. In the case of traded securities, volume traded was used as the variable to determine quantity demanded. To determine if there was a significant change in the volume traded a model needed to be constructed.

This study tested whether volumes traded differed from what they would normally be – or stated differently, searched for abnormal volumes traded. However, in a working paper, Lo and Wang (2000) narratively stated “...given the variety of measures used in the extant literature...” (p. 2) the task of defining volume traded is not simple.

One study on the effect of published analyst information described a two step process whereby relative trading volumes were evaluated on a given day, and then compared to relative trading volumes on the day chosen as day  $t_0$ . (Palmon *et al*, 1994). The “relative trading volume” (p. 403) is the daily trading volume of a particular share “relative to the market trading volume on the same day” (p. 404). This method had merit for this study as it focused on the number of transactions, or number of trades; which was in line with the need to determine changes in quantity traded of a particular share.

The use of relative measurements as a control was common in studies relating to abnormal volumes traded. However, the benchmark did change. Palmon *et al* (1994) suggested using the market index as a benchmark, whilst a study on trade volumes by Tong (2009) started by defining and grouping observations on the size of trades and then compared trades in the event window with previous trades per month in relative terms to the observed trading volume. (pp. 6 - 7).

In a study on trading volume and various types of information, Chae (2006) found that “...extreme skewness and kurtosis... show a clear break from normality; an assumption required for statistical procedures...” (p. 419). This led to transforming the data by logarithm. Chae also corrected for outstanding shares to determine “abnormal turnover.” (p. 418)

To determine an index change, Chae (2006) calculated share turnover by dividing the number of trades by the outstanding share amount. This gave an index (or percentage) of change in volume traded per day. The volume turnover before and after the event were then compared on an average basis, to determine abnormal volumes traded.

Logarithmic transformations of the data to perform statistical tests ((Thaver & Ward, 2011) and (Chae, 2006)) were considered for this study as well. This method ensured normality of the distribution as it assisted in doing more robust statistics.

In their study on abnormal trade volumes as an indication of insider trading, Thaver and Ward (2011) applied the practice of averaging trading volumes to determine abnormal volume traded. Specifically, they evaluated expected share turnover against observed share turnover to identify abnormal turnover. They continued to construct an “... [a]verage daily cumulative abnormal volume turnover (ACAVT)...” (p. 65) to evaluate abnormal volumes over the event period.

In their study on the effect of information in emerging markets, Battacharya, Daouk, Jorgenson and Kehr (2000) found that in certain circumstances the announcement of news events does not have a significant effect on volume traded. They noted that in the Mexican stock market, for a variety of reasons, shares do not immediately react to announcements (including acquisition announcements). This had relevance as the study by Battacharya *et al* focuses on emerging markets and this was where this study was focused as well.

The definitions of 'volume traded' ranged from trade volumes in monetary terms (Miles & Rosenfeld, 1983) to number of transactions (Palmon *et al*, 1994) to normalisation of turnover volume by logarithmic transformation (Chae, 2006). The literature on trade volumes was vast and varied, but constant themes throughout were: using methods to compare volumes traded in relative terms before and after the event identified, and finding ways of ensuring that robust statistics can be applied to the data.

## 3 Chapter 3: Research hypotheses

### 3.1 Introduction

For the demand curve of shares to shift subsequent to acquisition announcements, there would need to be changes (or events) in two areas: quantity and price (refer to Figure 1).

Quantity in this case meant a change in the volume of shares traded. A change in the volume traded meant that a higher (or lower) quantity of the security was changing hands, and therefore one portion of the shift in the demand curve could be evaluated. To confirm whether trade volumes are abnormally high (or low) a modified version of Palmon *et al's* method (1994) and Chae's (2006) logarithmic transformation was used.

A change in the price (in other words a move from P1 to P2 in Figure 1) was seen as a change in the share price. An absolute change in share price would not serve as proof of a demand curve shift, as there is no control for outside forces or confounding events – such as a recession, a release of financial results or other information changes. The relative increase (or decrease) of the share price was thus evaluated. Relativity was established by use of market models proposed in Wells (2004) and Mushidzi and Ward (2004).

To establish whether a movement of the demand curve had occurred subsequent to announcement of an acquisition, the following hypotheses were formulated:

### **3.2 Hypothesis 1**

H<sub>0a</sub>: announcement of acquisition does not have an effect on the volume traded.

H<sub>0a</sub>: ACAVT = 0

Where:

ACAVT = Average Cumulative Daily Abnormal Trading Volume

H<sub>1a</sub>: There is a change in the quantity demanded of the stock after a JSE listed company announces an acquisition.

H<sub>1a</sub>: ACAVT ≠ 0

This hypothesis gauged whether there is an above normal change in volume traded of shares subsequent to the identified event and will test for the quantity demanded change on the demand curve.



### 3.3 Hypothesis 2

H<sub>0b</sub>: acquisition announcement does not affect share price when a JSE listed company announces an acquisition.

H<sub>0b</sub>: CAAR= 0

Where:

CAAR = Cumulative Average Abnormal Return

H<sub>1b</sub>: There are abnormal returns when a JSE listed company announces an acquisition.

H<sub>1b</sub>: CAAR≠ 0

### 3.4 Hypothesis 3

H<sub>0c</sub>: There is no shift or a move along the demand curve of the traded securities of a firm announcing an acquisition of another.

Or

H<sub>0c</sub>: CAAR x ACAVT =< 0

Where: A decrease in one variable and an increase in the other means a move along the demand curve. If there is no change in either of the variables, it means that the curve would also not have moved.

Or:

H<sub>1a</sub>: There is a shift of the demand curve of the traded securities of a firm announcing an acquisition of another.

H<sub>1a</sub>: CAAR x ACAVT > 0

Where: An increase in both volume traded and returns means a shift to the right of the downward sloping demand curve for traded securities and a decrease in both volume traded and returns means a shift to the left of the downward sloping demand curve for traded securities.

Hypotheses were tested for the entire sample and then rerun for small and large companies individually. The findings for small and large companies were then compared against each other to detect differences relating to company size.

## 4 Chapter 4: Research Methodology

### 4.1 Research Design

The design of the research was quantitative in nature with a search for causal relationships – specifically the extent to which acquisition announcements caused a shift in the demand curve for the companies' shares. As the study comprised of comparison before and after an event, event study methodology was used.

The event in question was the day of announcement of acquisition, as this was the day on which investors first became aware of the planned acquisition. This was consistent with event study works on abnormal volume and returns where information changes are involved. Kim and Verrechia (1991), Lo and Wang (2000), McWilliams and Siegle (1997) and Mushidzhi and Ward (2004) all used this approach.

In equations used throughout this study, the announcement day (or event) was denoted as  $t_0$ . Building on the study mentioned earlier by Mushidzhi & Ward, (2004), the period to be studied before the announcement was 21 trading days for changes to volume traded – this period was used as the benchmark – which is an approximation of available trading days in one calendar month.

This was expected to control for other significant events in the window, as significant announcements rarely occur more than once a month (Hugo, 2011).

The event study methodology often calls for a longer period, but for this study it was critical that no other announcements were made within the identified event window as immediate shifts in the demand curve were to be studied. Furthermore, the use of the demand curve is that of a 'snapshot' of a dynamic market (Holland, 2011), and this further motivated the reasoning for using a relatively short event window.

To ensure the change (if any) to volume traded was relevant, yet allowing for the reaction of slower traders (such as corporate shareholders that take a longer time to make investment decisions (Hugo, 2011), the period studied after announcement was ten trading days (referred to as the measurement period) which was an approximation of available trading days in two weeks. The period after announcement was significantly shorter than prior to announcement, as immediate changes were to be studied, both for the application of the demand curve and the theory of information asymmetry as noted by Frye *et al* (2001) and Chae (2005).

Therefore the event window was defined as  $t_{-21}$  to  $t_{+10}$  or 32 trading days, with  $t_0$  being the day of announcement.

## **4.2 Population and Sampling**

As this study intended to apply the findings across different markets, the universe was all companies listed on a publically traded stock exchange that announced an acquisition of another company.

The sample comprised of companies listed on the JSE which had announced acquisitions of other entities in the past seven years (2005 to 2011) and was limited to acquiring companies, which complied with the criteria of not having any confounding events occurring within the event window. Furthermore, the sample was split into two groups, namely small and large companies.

Large companies were companies that were found in the Top 40 index on the JSE, and were selected on the basis of age of information. In other words, of the top 40 companies, all qualifying acquisition announcements over the last seven years were used as potential observations. The study was limited to seven years in an attempt to keep the information relevant to the current time.

Small companies were companies that fell outside of the Top 40. To identify these companies, unit trust fund allocations were investigated. Certain unit trust funds specialise in small company funds - often called emerging equities, or small cap funds (Old Mutual, 2011 and Rand Merchant Bank, 2011).

This method is a modified version of data collection as proposed by Cha and Lee (2001), which used mutual equity fund flows as a basis for data collection. These were used to compile the potential list of small companies for evaluation and the list was cross referenced against a full list of JSE shares obtained from BFA McGregor to confirm they were indeed smaller market capitalisation companies. From the full list of JSE shares those not included in the original list from the unit trust funds, but still in the bottom half of the JSE main board, were included as potentials for the entire sample.

While the best method would have been to use the bottom 40 companies by market capitalisation, this was not possible as these companies relatively seldom conduct acquisition activities as compared to their larger counter parts. All qualifying acquisition announcements in the last seven years were selected as potential observations.

Qualifying announcements were those made by companies with the following criteria:

- a. Must be listed on the JSE;
- b. Must have made an acquisition announcement publicly;
- c. There must have been no other significant announcements during the selected event window.

The event window was 32 trading days from day  $t_{-21}$  to  $t_{+10}$  with day  $t_0$  the day of announcement of acquisition. The exact dates changed from firm to firm depending on when day  $t_0$  is.

To ensure that share price was evaluated, firms that have made an announcement of and/or released dividends within the event window was left out of the sample. The reasoning behind this was that dividends are not comparable across firms, and is neither predictable nor constant. Therefore, it was expected that dividends would not serve any purpose in analysing price changes to test the presence of demand curve movements.

#### 4.2.1 Confounding Events

Certain events occurring within the firm could have effects on the variables tested in this study. Therefore firms which made other significant announcements within the event window ( $t_{-21}$  to  $t_{+10}$ ) were left out of the study.

Significant announcements included:

- Dividend announcements;
- Announcement of dual or additional listings;
- Announcements of new senior management;
- Releases of financial results;
- Any other announcement deemed to potentially affect share price and volumes traded.

Each announcement in the event window was therefore evaluated against previous literature to identify confounding events. These included BEE (black economic empowerment) announcements, financial reports, key personnel changes and significant dealings by shareholders, as proposed by Thaver and Ward (2011), and Cross (Dual) Listing announcements evaluated in studies by Aybar and Ficci (2009) and Eng, Nabar and Mian (2008).

#### **4.2.2 Units of analysis**

The unit of analysis for both volume traded and share price changes was JSE listed ordinary shares. Volume traded was analysed by evaluating the number of transactions against the expected number of transactions in order to detect differences – referred to as ACAVT (Average Cumulative daily Abnormal Volume Traded). To test changes in price, cumulative average abnormal return (CAAR) was used.

The analysis of a shift in the demand curve was calculated by the use of a third variable, termed the demand curve variable (DCV).



### 4.3 Data Sources

The only sources of data used were secondary data sources. Specifically databases, media articles, press releases and company information in the public domain. It was found that market data is calculated and researched on JSE listed companies by some organisations, and made available via internet download (BFA McGregor, 2011).

The announcement date used, as  $t_0$ , was the first public announcement of an acquisition. This could be in the form of a SENS (Securities Exchange News Service) announcement or a media news brief. In either case the date of the announcement released to the public first was used.

The data was collected from these sources and grouped according to size. Data was consolidated into a master spread sheet with reference to fields for:

- Day of announcement (day  $t_0$ ).
- Trading volumes and share prices for days  $t_{-21}$  to  $t_{-1}$  and for days  $t_0$  to  $t_{+10}$  as well as expected price and turnover for days  $t_0$  to  $t_{+10}$ .

#### **4.4 Calculations of changes to volume traded**

In terms of the type of analysis to be used when evaluating changes to volume of shares traded, two studies - Lo & Wang (2000) and Kim & Verrechia (1991) - suggested that turnover volume be analysed for information changes (or put differently, information of the traded security changes). Effectively they suggested looking at the volume of shares being bought and sold, to determine abnormal trade activity.

Furthermore, building on the work of Thaver and Ward (2009) and Chae (2006), each share was evaluated using share turnover prior to the event and subsequent to the event. The basis was to calculate an expected turnover (based on the average trading volume before announcement) and evaluated actual turnover after the announcement to determine if there was any abnormal volumes traded. The calculations required three phases, namely:

1. Turnover volume calculation;
2. Expected turnover volume calculation;
3. Abnormal turnover calculation.

Calculations were done by logarithmic transformation, as proposed by Thaver and Ward (2009), to allow more robust statistical tests to be conducted; and their notations were also adopted here:

Log turnover:

$$T_{i,t} = \ln\left(\frac{\text{TradingVolume}_{i,t}}{\text{OutstandingShares}_{i,t}}\right)$$

Log expected turnover:

$$\check{T}_{i,t} = \left(\frac{\sum_{t=-21}^{t=0} T_{i,t}}{21}\right)$$

Abnormal turnover was calculated by the difference between log turnover and log expected turnover:

$$\xi_{i,t} = T_{i,t} - \check{T}_{i,t}$$

Values were then consolidated and average daily cumulative abnormal volume turnover (ACAVT) for the period after announcement:

$$\text{ACAVT} = \left(\frac{\sum_{t=10}^{t=0} \xi_{i,t}}{11}\right)$$

where:

i = the share being evaluated;

t = the time in days.

The method of analysis used was that of t-tests (or associated non-parametric tests). Section 4.6 'Data Analysis' details the full method used.

## 4.5 Calculation of Abnormal Changes to Share Price

To evaluate changes to share price, the expected and observed return was compared. The expected return was calculated by use of a model predicting what the share price should be at a given date. The most accurate model is the use of control portfolios (Thaver & Ward, 2011). However, this method requires a powerful tool with which to calculate the expected returns, access to which was not available. Therefore the CAPM – Capital Asset Pricing Model – (Wells, 2004) was used to predict normal returns. This method was employed in multiple studies (for example works by Corrado (2011), Mushidzi and Ward (2004) and Wells (2004)) and it was decided that it would suffice for this study.

The regression model was described by Mushidzi and Ward (2004, p. 21) and given as:

$$\hat{R}_{it} = \alpha_i + \beta_i R_{mt}$$

Where:

$\hat{R}_{it}$  = the predicted daily rate of return on security I on day t.

$R_{mt}$  = the daily rate of return of the market on day t.

$R_{mt} = \text{Log} \left( \frac{ALSIt}{ALSIt-1} \right)$

ALSIt = JSE All Share Index on day t.

ALSIt-1 = JSE All Share index on day t-1.

$\alpha_i$  = measures the constant return on firm  $i$  in the period that is not explained by the market, in other words the return of firm  $i$  when the market does not move.

$\beta_i$  = measures the sensitivity of firm  $i$  to the market, this is the measure of systemic risk of share.

The method used was to compare the  $\hat{R}_{it}$  value to the observed  $R_{it}$  value. If there was a positive difference between  $R_{it}$  and  $\hat{R}_{it}$ , it could be said that abnormal returns were present.

Or:

$$r_{it} = R_{it} - \hat{R}_{it}$$

To reliably state whether price moves (or returns are) positive or negative, the results had to be aggregated. To do this, Wells (2004) provided guidance in the form of a Cumulative Standardised Return model which was used to:

“determine if cumulative returns are statistically different from zero” (p. 66).

Leading from this reasoning, the daily abnormal returns were averaged over the period  $t_0$  to  $t_{10}$  in order to determine Cumulative Average Abnormal Return (CAAR).

The “event engine” developed by Professors Muller and Ward (2011) was used to calculate abnormal returns based on the CAPM model. This data was used to calculate CAAR and evaluate if it was significantly different from zero.

## **4.6 Calculation of a shift in the demand curve**

To evaluate a shift in the demand curve a further variable was constructed. It was called DCV (Demand Curve Variable) which was the result of multiplying ACAVT with CAAR. This was done to determine a positive, negative or zero value in accordance with Hypothesis 3.

Therefore:

$$\text{DCV} = \text{ACAVT} \times \text{CAAR}$$

## **4.7 Data analysis**

Data analysis was done in four phases for changes to volume traded; and in four phases for changes to share price. In all cases, a significance level of five percent (5%) was used. If however, a 5% significance level yielded no results, a 10% significance level was used for statistical inferences.

### **4.7.1 Analysis of Abnormal Volume Traded**

#### **4.7.1.1 Phase one**

In phase 1, large and small companies were evaluated together. ACAVT was calculated for observations in the entire sample and a one sample t-test was performed to confirm if findings were significantly different from zero.

#### **4.7.1.2 Phase two**

In phase 2, large companies were evaluated separately. ACAVT was calculated for the sample of large companies and a one sample t-test was performed to confirm if findings were significantly different from zero.

#### **4.7.1.3 Phase three**

In phase 3, small companies were evaluated. ACAVT was calculated for the sample of small companies and a one sample t-test was performed to confirm if findings were significantly different from zero.

#### **4.7.1.4 Phase Four**

The results of phase 2 and 3 were then compared to each other by means of a two sample t-test (or associated non-parametric test) to evaluate if the difference between the two is significantly different from zero and therefore to determine if the size of the company effects volume traded subsequent to an acquisition announcement.

## **4.7.2 Analysis of Abnormal Returns**

### **4.7.2.1 Phase one**

Phase one of the analysis of abnormal returns consisted of the entire sample of small and large companies combined. CAAR for each company was evaluated by the use of a one sample t-test (or associated non-parametric test) to determine if the values were significantly different from zero.

### **4.7.2.2 Phase two**

Phase two of the analysis of abnormal returns consisted of the sample of large companies. CAAR for each large company was calculated and the sample was evaluated by the use of a one sample t-test (or associated non-parametric test) to determine if the values were significantly different from zero.

### **4.7.2.3 Phase three**

Phase three of the analysis of abnormal returns consisted of the sample of small companies. CAAR for each large company was calculated and the sample was evaluated by the use of a one sample t-test (or associated non-parametric test) to determine if the values were significantly different from zero.



#### **4.7.2.4 Phase four**

The results of phase 2 and 3 were then compared to each other by means of a two sample t-test (or associated non-parametric test) to evaluate if the difference between the two is significantly different from zero and therefore to determine if the size of the company affects share price subsequent to an acquisition announcement.

#### **4.7.3 Final analysis**

The findings for phase one, phase two and phase three of each of the two main variables (volume traded and abnormal returns) were then compared to confirm if there was a change to the demand curve of traded securities.

This was done by evaluating DCV. A one sample t-test (or associated non-parametric test) was performed on each of the three phases to establish if results were significantly different from zero, in accordance with Hypothesis 3.

#### **4.8 Data integrity and methodology limitations**

While efforts were made to ensure accuracy of data, some restrictions may apply:

- The main limitation of the methodology was the lack of access to the preferred control portfolio model (Mordant & Muller, 2003). However, for the purposes of this study, it was decided that the CAPM model was sufficient.
- In all cases it was possible that the effects of information passing through the market could not be reliably identified. This included information leaked to the public, or insider trading. While immoral, the possibility of these events occurring does exist (Thaver & Ward, 2011) which may cause inconsistency in the findings.
- Data was evaluated using a fixed event window. In the process of data mining there may be situations where other events happened before day  $t_{-21}$ , which effects' may still be linger into the event window studied.
- While all efforts were made to identify the first announcement, there may be scenarios where the first announcement was not on the databases evaluated, and as such the effect of announcement may be diminished.
- No literature on constructing the DCV variable was found, however, the logic was evaluated as sound and the variable constructed.

## 5 Chapter 5: Results

### 5.1 *Introduction to the results*

This section details all findings and statistical outcomes from the methodology. Statistical findings were used on the basis of rejecting or not rejecting a null hypothesis. These hypotheses (detailed in Section 3) were generated to answer four key questions:

1. Are there abnormal volumes traded subsequent to an acquisition announcement?
2. Are there abnormal returns subsequent to an acquisition announcement?
3. Is the value of DCV different from zero?
4. Does company size affect the findings in 1, 2 and 3?

This chapter is divided into sections for presentation of the samples and data used, descriptive statistical findings and the results of parametric or non-parametric hypothesis testing.

## **5.2 Sample and data**

This section includes all methods of sample selection and data used for statistical testing. The methods of collecting the samples are as described in 'Chapter 4: Research Methodology'.

### **5.2.1 Sample selection**

A list of possible large companies consisted of all companies included in the JSE top 40 index. This changes from time to time, however, after identifying an event, the companies' status as part of the Top 40 index at the time of the event was confirmed.

A list of possible small companies was identified using unit trust fund allocation as detailed in section 4.2 'Population and Sampling'. These companies were selected as potential observations and ranked from smallest to largest (according to market capitalisation). This group was the potential small companies' sample. The smallest companies were evaluated first for events of acquisition announcements. Thereafter larger companies within the potential small companies' sample were evaluated. These larger companies, however, still qualified as small companies in comparison to all companies on the JSE.

SENS announcements and the BFA McGregor news service (BFA McGregor, 2011) were employed to find acquisition announcements. Information of the previous seven years' worth of SENS and news briefs were evaluated for each company and all acquisition announcements were selected. Companies with no acquisitions announcements were immediately discounted. Announcements found were provisionally recorded and the date of the first public announcement was set as  $t_0$ .

The date range was then set where  $t_{-21}$  was noted as 21 trading days before the event and  $t_{+10}$  was noted as ten trading days after the event. Trading days were only days where the JSE was open for trade and therefore public holidays and weekends were excluded.

For each selected announcement, all announcements in the event window were evaluated for confounding events. Using the BFA McGregor news service page (2011), all information released about the share under consideration was evaluated for confounding events. Where confounding events were found (as detailed in 4.2.1), the event was left out of the study.

If there was an initial SENS announcement, and subsequently a media brief of the same acquisition announcement in the same event window, the company was still included in the sample and the first announcement date was used as  $t_0$ .

In some cases the same company made multiple announcements of acquisitions in the seven years being evaluated. Provided that the announcements did not have overlapping event windows, and that the announcements did not have any other confounding events, all announcements were included.

The method produced a total of 65 companies, 33 of which were large companies and 32 small companies. Annexure 1 includes a list of all companies evaluated and indicates the event windows.

## 5.2.2 Data

### 5.2.2.1 Data for evaluation of Abnormal Volume traded

The number of shares in issue at the time of the event was used as the starting point for collating data. This was done by accessing the BFA McGregor “price data” page (BFA McGregor (a), 2011), which assisted in finding historical share data. Companies were only included if they had the same number of shares in issue at the start and end of the event. The number of shares traded for each day from  $t_{-21}$  to  $t_{-1}$  was captured. The natural log ( $\ln$ ) for volume traded for these days were calculated which produced 21 daily trade volumes for each company. These daily volumes were averaged to produce expected volume traded ( $\xi_{it}$ ).

From there the In volume traded for days  $t_0$  to  $t_{+10}$  was calculated and used in the equation to calculate abnormal volume traded. This produced 11 days of abnormal volume traded. For each observation the ACAVT was calculated, producing 33 observations for large companies and 32 observations for small companies. The ACAVT variable was used for statistical testing.

Annexure 1 shows values of ACAVT for all companies used in the sample.

### ***5.2.2.2 Data for evaluation of abnormal returns***

The “event engine” (Muller & Ward, 2011) was used to calculate abnormal returns. The event engine applied the CAPM regression formula on each share on the days around the identified event. This regression formula gave an expected return. The observed returns were obtained from BFA McGregor (2011). The difference between observed and expected return was calculated and this was the residual or abnormal return.

The abnormal returns were obtained for each day from day  $t_0$  to  $t_{+10}$ . These values were then consolidated and Cumulative Average Abnormal Return (CAAR) was calculated as the average abnormal return over days  $t_0$  to  $t_{+10}$ . CAAR was the basis for statistical testing and Annexure 1 includes values for CAAR for all 65 observations.

### **5.2.2.3 Data for evaluation of the demand curve variable**

All values for CAAR were multiplied with ACAVT to obtain the demand curve variable (DCV). This produced 65 observations for DCV and these are contained in Annexure 1.

### **5.2.3 Data analysis**

Statistical tests were conducted with the use of NCSS 2007 statistical software. Outputs consisted of a descriptive statistics section as well as the specific test (one or two sample T-tests or associated non-parametric tests). In all cases the significance level was set to 0.05 or five percent as standard, and if no findings resulted, a 0.1 or ten percent significance level was evaluated. The basis of testing was to determine if each of the null hypotheses ( $H_{0a}$ ,  $H_{0b}$ ,  $H_{0c}$ ) for each set of observations could be rejected or not.

### **5.3 Descriptive Statistics for abnormal volume traded**

The below table reflects the descriptive statistics section of the tests done for abnormal volumes traded.



5.3.1.1.1 Table 2: Descriptive statistics for abnormal volumes traded

Sample	#	Mean	Std Dev	Distribution	Variance	LCL	UCL
ES ACAVT	65	$2.06 \times 10^{-4}$	0.534	Normal	N/A	-0.155	0.110
LC ACAVT	33	$2.22 \times 10^{-4}$	0.357	Normal	N/A	-0.105	0.149
SC ACAVT	32	$6.74 \times 10^{-4}$	0.679	Normal	N/A	-0.312	0.180
LC & SC ACAVT	33 & 32	As above	As above	Normal	Unequal	As above	As above

legend:

# = number of observations tested

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = descriptive statistics for the two sample test of large and small companies for comparison

For all tests conducted for ACAVT, normality of the distribution was not rejected, which meant one sample t-tests were used for inference testing of the entire sample, the large companies' sample and the small companies' sample.

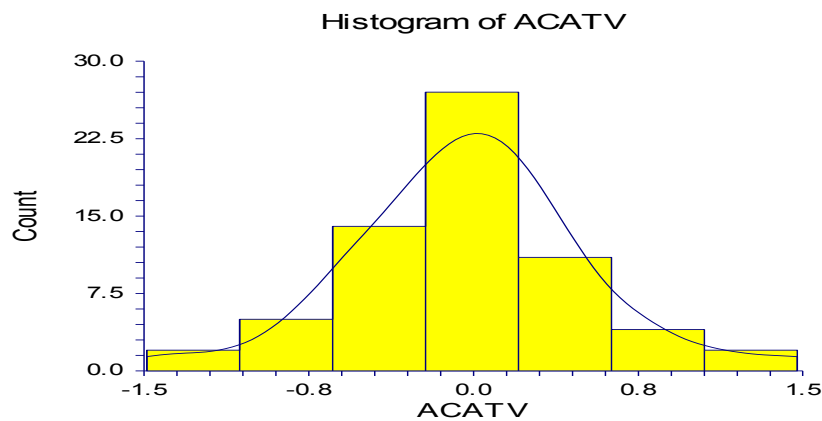
The mean found for the entire sample and the mean for the large companies were similar in magnitude, but the small companies' sample showed a higher mean in comparison. The standard deviation for large companies was the smallest value indicating that the values of the observations lie closer together. The small companies' sample showed the largest standard deviation, which meant values were further apart and this caused a higher standard deviation for the entire sample.

Of the entire sample, 95 percent of values lay between a lower confidence level of -0.155 and an upper confidence level of 0.110. For large companies the values were higher, with the lower confidence level at -0.105 and the upper confidence level at 0.149. Evaluation of the small companies' confidence levels confirmed a wider spread of the values of the observation, with a lower confidence level at -0.312 and an upper confidence level at 0.180.

For comparison of the large and small companies' sample, normality was not rejected. However, equal variance of the samples was rejected which meant parametric testing was to be employed in the form of the Aspen-Welch un-equal variance test.

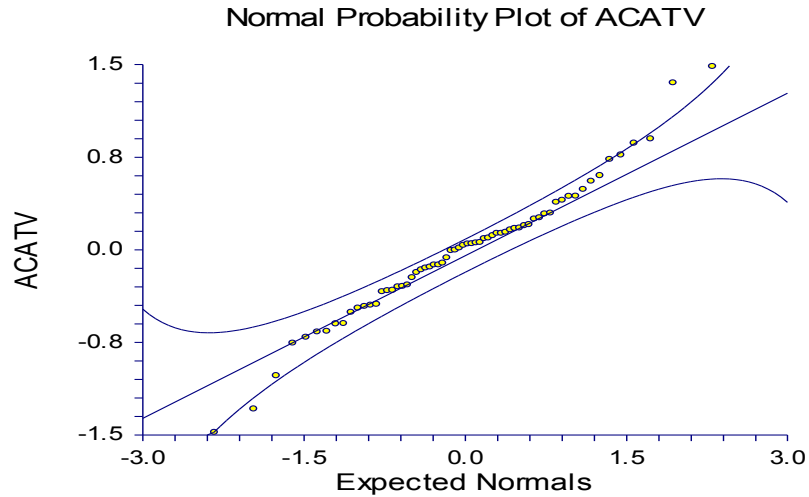
Figures 4 and 5 below illustrate the distribution of the data for the entire sample of ACAVT.

5.3.1.1.2 Figure 4: Histogram of ACAVT observations for the entire sample



The histogram of the entire sample reflected the normal distribution of the sample.

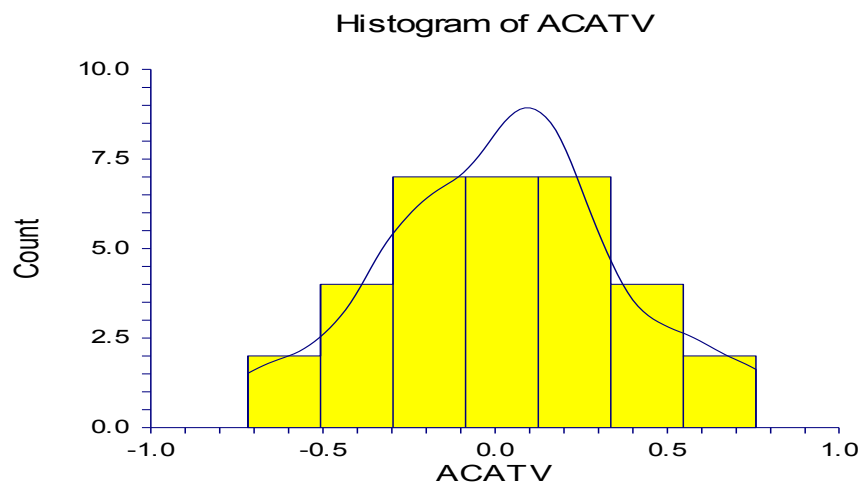
5.3.1.1.3 Figure 5: Normal probability plot of observations for ACAVT for the entire sample



Relatively few outliers were found on the entire sample distribution.

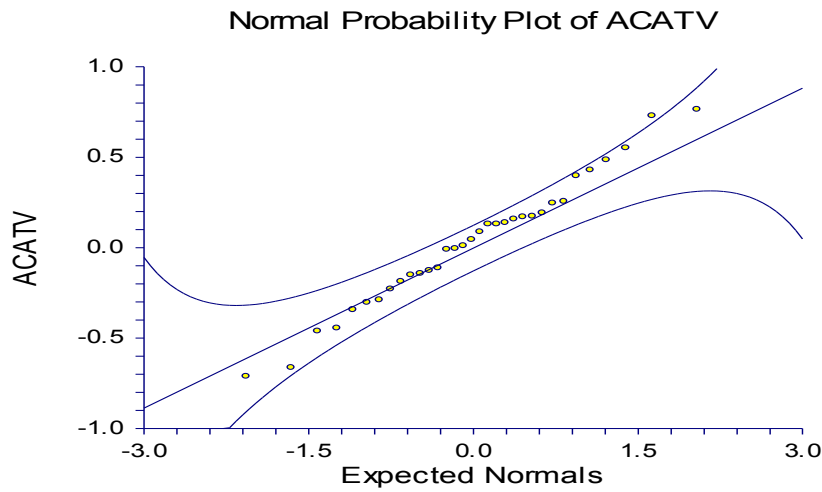
Figures 6 and 7 below show the histogram and normality probability plots for the observations in the large companies' sample.

5.3.1.1.4 Figure 6: Histogram of ACAVT observations for large companies



The histogram of the large companies sample showed shorter tails in comparison to the entire sample.

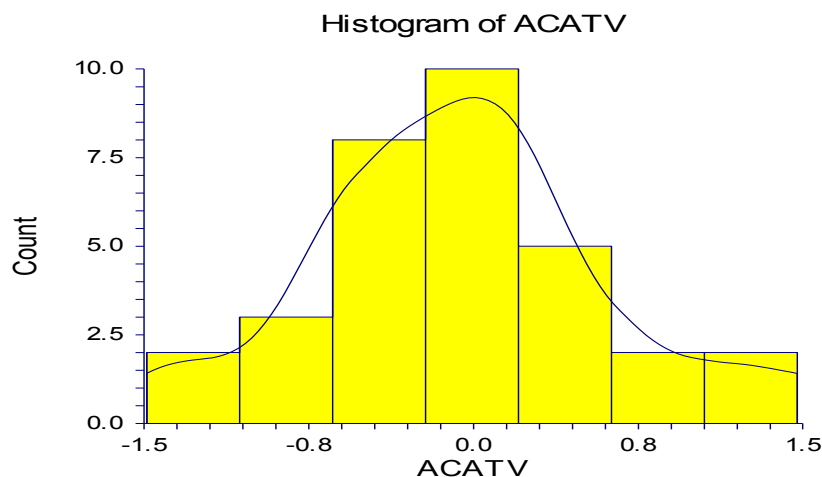
5.3.1.1.5 Figure 7: Normal probability plot of observations for large companies



In comparison to the entire sample, there were fewer outliers and also shorter tails with regards to the distribution of the data.

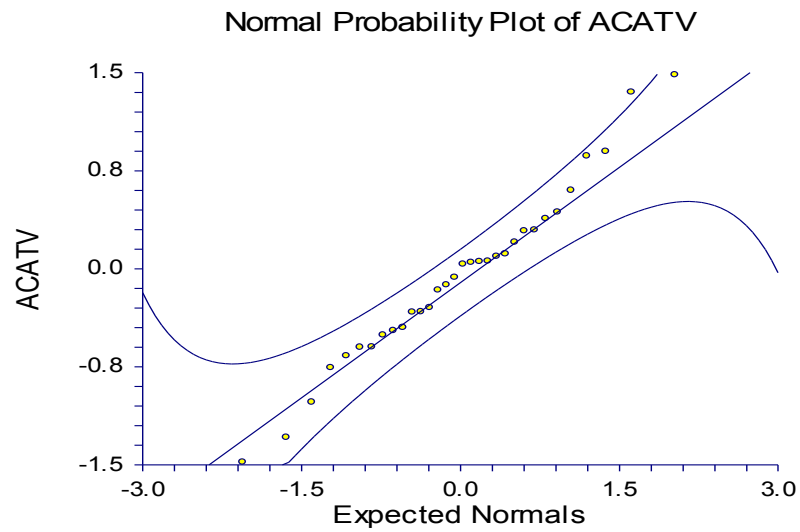
Figures 8 and 9 below show the histogram and normality probability plots for the observations in the small companies' sample.

5.3.1.1.6 Figure 8: Histogram of ACAVT observations for small companies



The small companies' sample of ACAVT showed longer tails (in other words a wider distribution) in comparison to the large companies' sample.

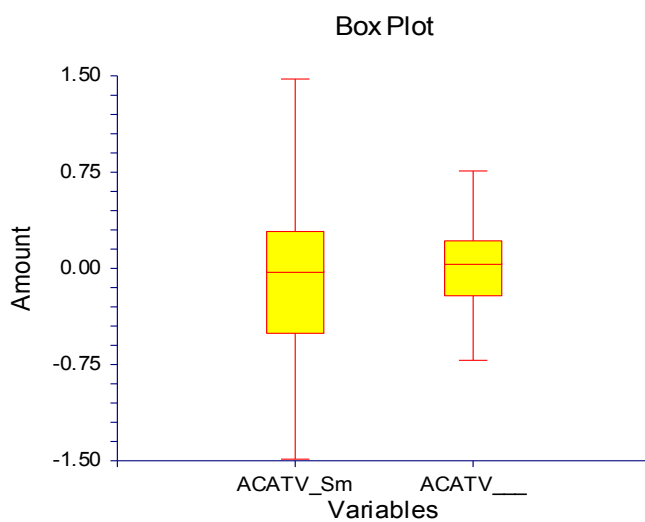
5.3.1.1.7 Figure 9: Normal probability plot of observations for small companies



In comparison to the entire sample, there were relatively more outliers and also longer tails with regards to the distribution of the data.

Figure 10 below displays the box plot for the large and small companies' sample.

5.3.1.1.8 Figure 10: Box plot: Small and large companies



Small companies, plotted on the left, confirmed the wider distribution of values of ACAVT for this sample.

## 5.4 Descriptive statistics for abnormal returns

The below table includes descriptive statistics for all tests conducted to determine abnormal returns.

5.4.1.1.1 Table 3: Descriptive statistics for abnormal returns

Sample	#	Mean	Std Dev	Distribution	Variance	LCL	UCL
ES CAAR	65	$1.150 \times 10^{-4}$	$6.715 \times 10^{-3}$	Not-normal	N/A	$-5.136 \times 10^{-4}$	$2.814 \times 10^{-3}$
LC CAAR	33	$6.351 \times 10^{-4}$	$7.993 \times 10^{-3}$	Not-Normal	N/A	$-2.199 \times 10^{-3}$	$3.470 \times 10^{-3}$
SC CAAR	32	$1.168 \times 10^{-3}$	$5.054 \times 10^{-3}$	Not-Normal	N/A	$-1.767 \times 10^{-4}$	$3.539 \times 10^{-3}$
LC & SC CAAR	33&32	As above	As above	Not-Normal	Equal	As above	As above

legend:

# = number of observations tested

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = descriptive statistics for the two sample test of large and small companies for comparison

For abnormal returns, normality of the distribution was rejected in all cases. This meant that non-parametric tests would be used for inference testing.

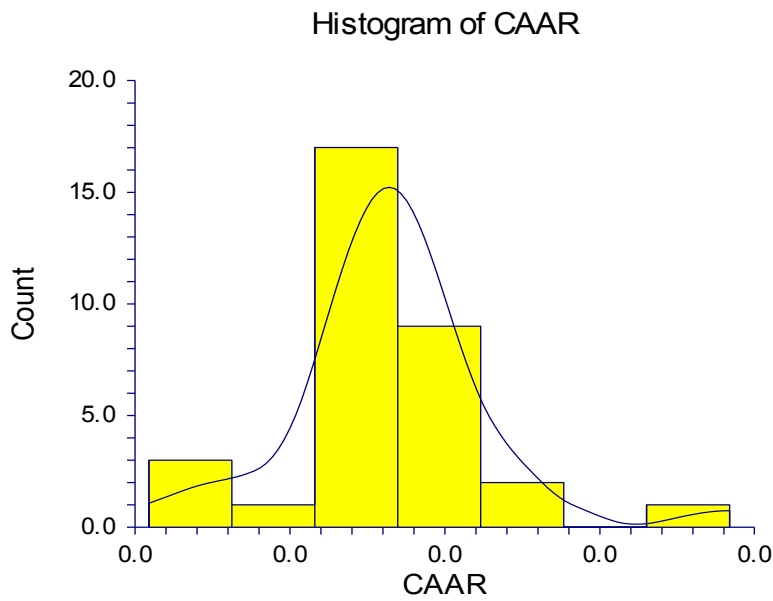
Of the entire sample, 95 percent of the values lay between a lower confidence level of  $-5.136 \times 10^{-4}$  and an upper confidence level of  $2.814 \times 10^{-3}$ . For large companies the values were higher, with the lower confidence level at  $-2.199 \times 10^{-3}$  and the upper confidence level at  $3.470 \times 10^{-3}$ . The small companies' sample had a lower confidence level at  $-1.767 \times 10^{-4}$  and an upper confidence level at  $3.539 \times 10^{-3}$ .

There was an expectation to find more volatile results for small companies; and the wider distribution of small companies compared to large companies as well as the spread of findings for small companies confirmed this. Furthermore, small companies also had the largest mean value as well as the largest standard deviation. In contrast, the large companies' sample showed more outliers as compared to the small companies' sample. This presence of outliers had potential implications for the findings in statistical tests. Given the relatively small number of observations found (33 large companies), it was decided not to control for these outliers as reducing the number of observations may have caused central limit theorem to be violated.

The descriptive statistics section, when comparing the small and large companies' sample, showed that equal variance could not be rejected which held implications for the type of non-parametric test to be used.

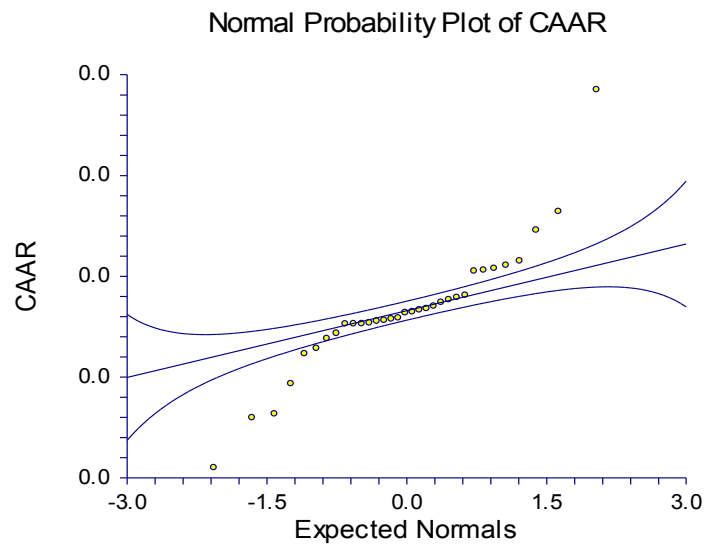
Figures 11 and 12 below show the histogram and normality probability plot for the large companies' sample.

5.4.1.1.2 Figure 11: Histogram of CAAR – large companies



The histogram of the large companies sample showed kurtosis and outliers on the left and right of the distribution.

5.4.1.1.3 Figure 12: Normal Probability plot of CAAR – large companies

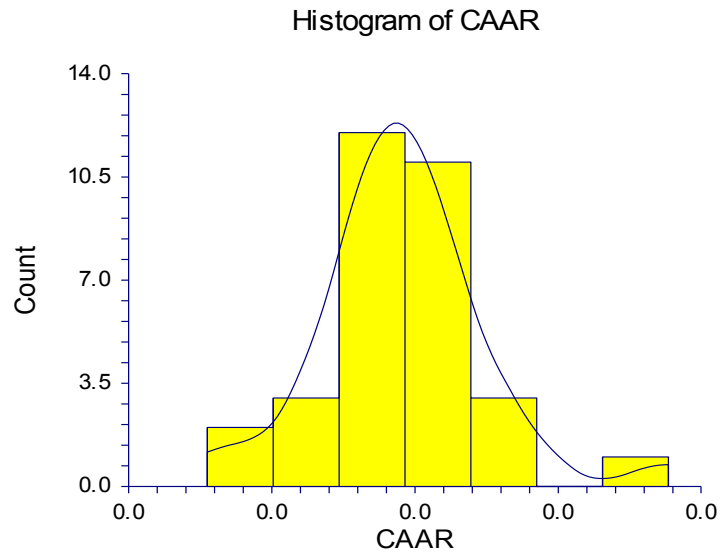


The normal probability plot showed a high amount of outliers in the sample, leading to a measure of uncertainty.



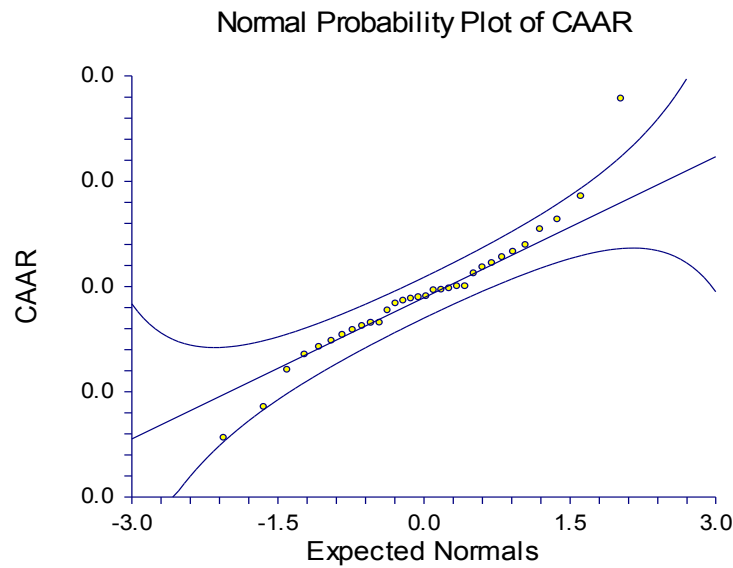
Figures 13 and 14 below show the histogram and normal probability plot of the distributions of observations for the small companies' sample.

5.4.1.1.4 Figure 13: Histogram of CAAR – small companies



*The histogram of the small companies sample showed values closer together.*

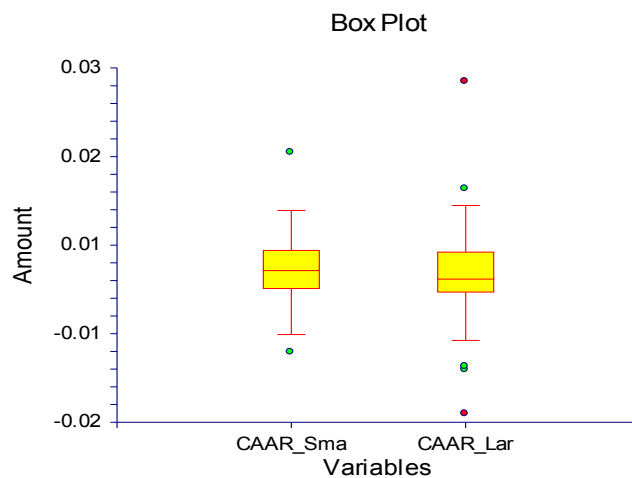
5.4.1.1.5 Figure 14: Normal probability plot of CAAR – small companies



Fewer outliers were found on the small companies a sample, and the normal probability plot confirmed this.

Figure 15 below shows the box plot of CAAR for the small and large companies' sample.

5.4.1.1.6 Figure 15: Box plot CAAR small and large companies' sample



Evaluation of the small companies sample (depicted on the left), confirmed a narrower distribution with fewer outliers.

## 5.5 Descriptive statistics of DCV

The table below illustrates findings in the descriptive statistics section for determining the Demand Curve Variable (DCV).

5.5.1.1.1 Table 4: Descriptive statistics for DCV

Sample	#	Mean	Std Dev	Distribution	Variance	LCL	UCL
ES DCV	65	$-3.397 \times 10^{-4}$	$2.693 \times 10^{-3}$	Not normal	N/A	$-1.007 \times 10^{-3}$	$3.276 \times 10^{-3}$
LC DCV	33	$9.652 \times 10^{-5}$	$2.690 \times 10^{-3}$	Not Normal	N/A	$-8.575 \times 10^{-4}$	$1.051 \times 10^{-3}$
SC DCV	32	$-7.896 \times 10^{-4}$	$2.662 \times 10^{-3}$	Normal	N/A	$-1.750 \times 10^{-4}$	$1.705 \times 10^{-4}$
LC & SC DCV	33&32	As above	As above	Not Normal	Equal	As above	As above

legend:

# = number of observations tested

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = descriptive statistics for the two sample test of large and small companies for comparison.

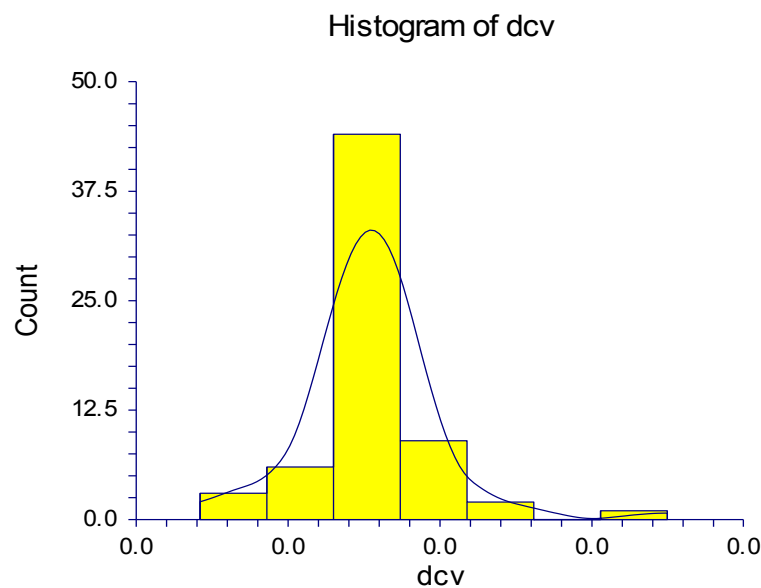
Normality of the distribution of the entire sample as well as the large companies' sample was rejected. Normality for the small companies' sample was not rejected. When the small and large companies' samples were compared to each other, un-equal variance was not rejected. This meant that non-parametric testing with equal variance would be used.

The large companies' sample had a mean value which was positive, in contrast to the entire sample and small companies' mean value. The DCV was constructed to measure a positive or negative value, and therefore the difference in mean values of small and large companies was noted.

The differences in the distributions between the upper and lower confidence limits were similar in magnitude. And no significant difference was evident. However, the box plot section did show a large number of outliers, and a wider distribution of observations for the large companies' sample.

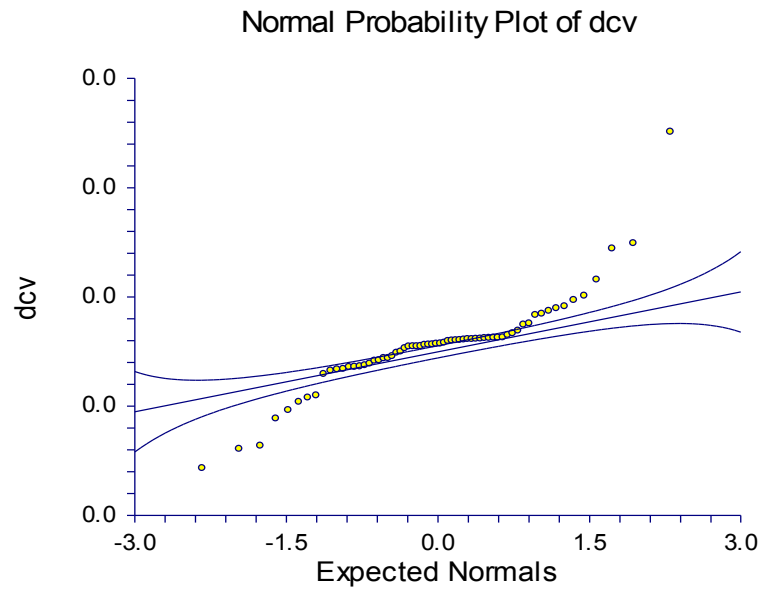
Figures 16 and 17 below show the histogram and normal probability plot of the distribution for DCV for the entire sample. Figure 17 in particular showed a high number of outliers.

5.5.1.1.2 *Figure 16: Histogram of DCV – entire sample*



*The entire sample reflected a very narrow distribution with a level of kurtosis on the upper end of the distribution.*

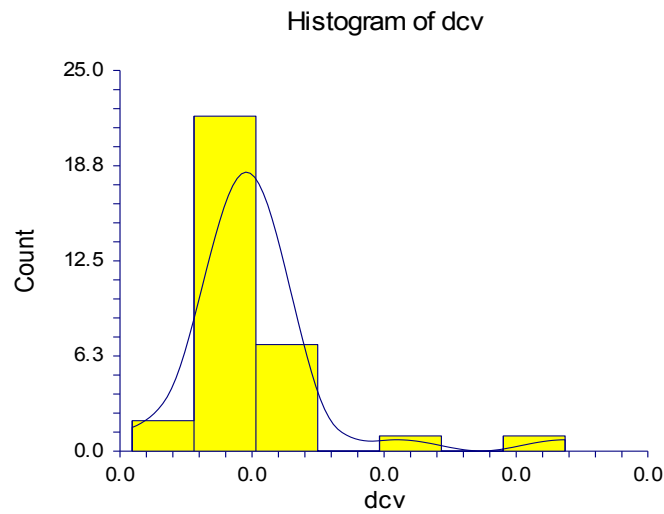
5.5.1.1.3 Figure 17: Normal probability plot of DCV – entire sample



The normal probability plot reflected some outliers present and graphically illustrated how close values were to each other.

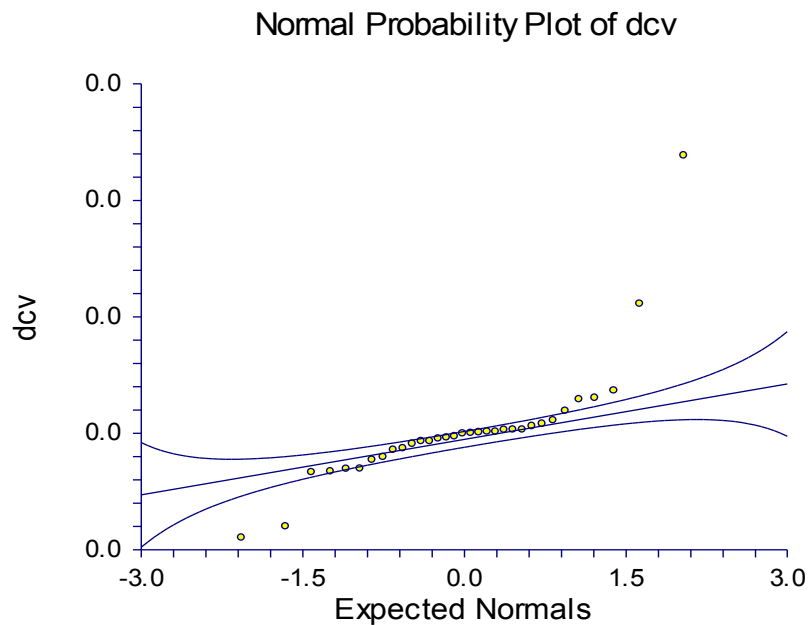
Figures 18 and 19 below show the histogram and normal probability plots for DCV of the large companies' sample. Figure 18 shows the level of skewness of the distribution. Fewer outliers were found compared to the entire sample, as displayed in Figure 19.

5.5.1.1.4 Figure 18: Histogram plot for DCV large companies' sample



The large companies sample showed skewness to the left, and the histogram graphically showed why normality was rejected.

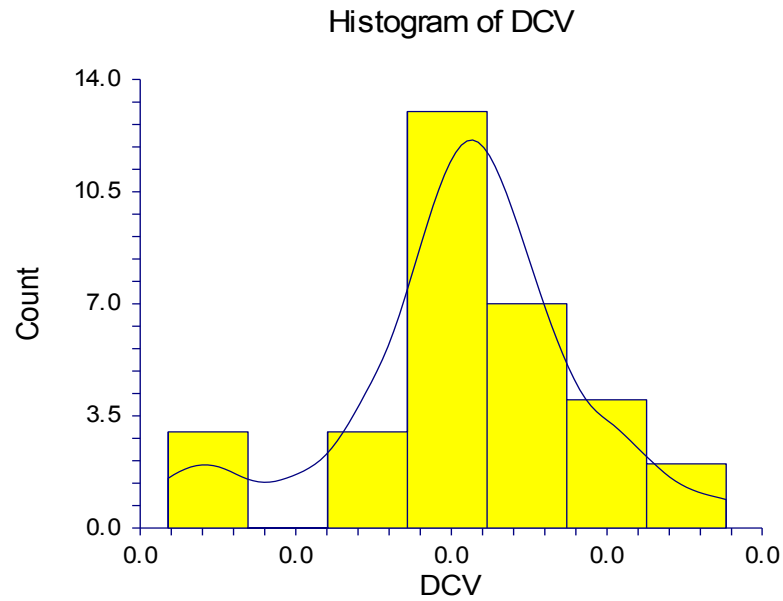
5.5.1.1.5 Figure 19: Normal probability plot for DCV large companies



The normal probability plot reflected few outliers, however, the magnitude of some of the outliers was high.

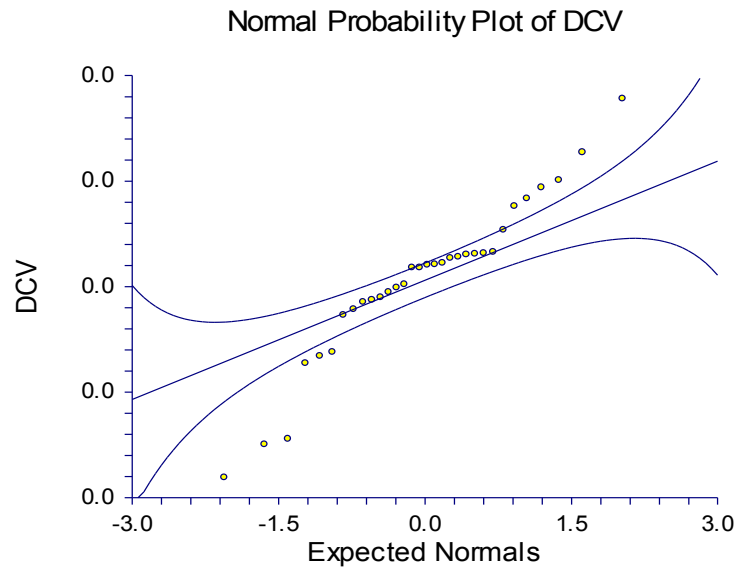
Figures 20 and 21 below show the histogram and normal probability plot of DCV values for the small companies' sample.

5.5.1.1.6 Figure 20: Histogram of DCV for small companies



*The histogram for small companies reflected less skewness as compared to the large companies sample; however, more kurtosis was evident.*

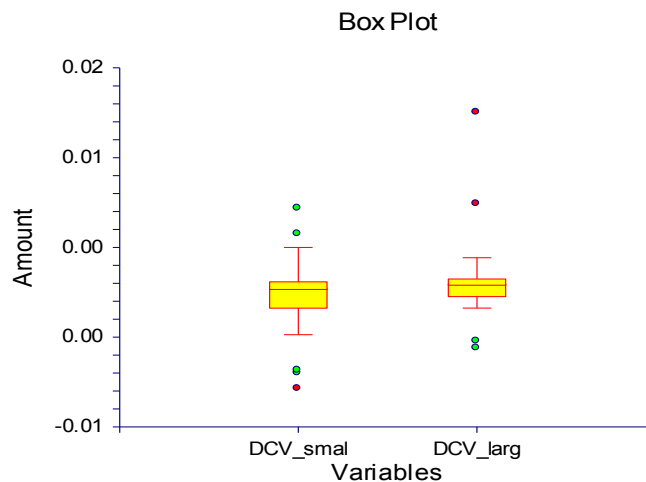
5.5.1.1.7 Figure 21: Normal probability plot of DCV for small companies



The normal probability plot reflected the greater number but lesser magnitude of outliers in the small companies' sample.

Figure 22 below is the box plot for both samples.

5.5.1.1.8 Figure 22: Box plot for DCV small and large companies



The box plot of DCV-large companies (depicted on the right above) reflected the greater magnitude of outliers present in the large companies' sample.



## 5.6 Results of statistical tests for abnormal volumes traded

Table 5 below indicates all tests conducted for abnormal volume traded. It includes tests for the entire sample, large companies' sample and small companies' sample as well as the two sample tests for comparison of the small and large companies' sample.

5.6.1.1.1 Table 5: Results of inference testing for ACAVT

Sample	Test name	Hypothesis tested	Reject at 0.05	Reject at 0.1	Probability level	T-value
ES ACAVT	One Sample t-test	ACAVT = 0	No	No	0.734	-0.341
LC ACAVT	One Sample t-test	ACAVT = 0	No	No	0.723	0.357
SC ACAVT	One Sample t-test	ACAVT = 0	No	No	0.567	-0.578
LC & SC ACAVT	Aspin Welch unequal variance	ACAVT <sub>SC</sub> – ACAVT <sub>LC</sub> = 0	No	No	0.501	-0.6840

legend:

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = large and small companies comparison.

### 5.6.2 Findings related to ACAVT

The one sample t-test which evaluated if the observations for ACAVT were significantly different from zero, indicated that at the significance level of 0.05 the null hypothesis could not be rejected. This held true for testing of the entire sample, the large companies' sample and the small companies' sample.

At a significance level of 0.1 the null hypothesis could still not be rejected. The interpretation was that the values for ACAVT were not significantly different from zero for each of the samples.

The Aspen Welch test for unequal variance was used to test for differences between the two samples. Again, the null hypothesis could not be rejected, showing that the two samples were not significantly different from one another.

### ***5.7 Results of statistical tests for abnormal returns***

Table 5 below includes the results of inference testing for abnormal returns. In all cases the hypotheses tested were as used in section 3, and tested whether the variable (CAAR) was significantly different from zero. This table includes tests for the entire sample, the small and large companies' sample separately as well as a comparison between the small and large companies' sample.

5.7.1.1.1 Table 5: Results of inference testing for CAAR

Sample	Test name	Hypothesis tested	Reject at 0.05	Reject at 0.1	Probability level	Z-Value
ES CAAR	Wilcoxon Signed-Rank	CAAR = 0	No	Yes	0.080	1.748
LC CAAR	Wilcoxon Signed-Rank	CAAR = 0	No	No	0.623	0.491
SC CAAR	Wilcoxon Signed-Rank	CAAR = 0	Yes	Yes	0.049	1.963
LC & SC CAAR	Mann-Whitney U	CAAR <sub>SC</sub> – CAAR <sub>LC</sub> = 0	No	No	0.338	0.958

Legend:

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = large and small companies comparison.

## 5.7.2 Findings related to abnormal returns

At a significance level of 0.05, the large and entire sample tests indicated that the null hypothesis could not be rejected. For the large companies' sample, raising the significance level to 0.1 also had no effect. It could therefore be said that the value of CAAR for large companies is not significantly different from zero.

The results for the entire sample at a significance level of 0.1 and for the small companies' sample at 0.05 significance level revealed that the hypothesis of CAAR = 0 was rejected. This meant that the values for CAAR for these tests were significantly different from zero. Specifically, further analysis revealed that CAAR tended to be less than zero.

The Modified-Levene equal variances test revealed that equal variances could not be rejected. Therefore the Mann-Whitney U test was used for comparison of the small and large companies' samples. When large and small companies were compared, the Mann-Whitney U test indicated that there was no significant difference between the two samples. This was evident from the fact that the null hypothesis was not rejected at both a 0.05 and a 0.1 significance level. While there was some qualitative cause for speculation that the values for the small companies' sample were less than those of the large companies' sample, statistically this could not be proven.

### ***5.8 Results of statistical tests for evaluation of DCV***

Testing of DCV was done with the aim to determine whether the value of DCV was positive or not. Therefore the hypotheses tested were twofold, namely  $DCV = 0$  or  $DCV < 0$ . If DCV was found not to be significantly different from zero, no further testing was done, as this would confirm that no move in the demand curve had occurred in accordance with reasoning in 'Chapter 4: Research Methodology'. If it was found to be significantly different from zero then the second hypothesis of  $DCV < 0$  was tested.

Table 6 below shows the results for all tests conducted relating to the demand curve variable.

Table 6: Results of inference testing for DCV

Sample	Test name	Hypothesis tested	Reject at 0.05	Reject at 0.1	Probability level
ES DCV	Wilcoxon Signed-Rank	$DCV = 0$	Yes	Yes	0.046
ES DCV	Wilcoxon Signed-Rank	$DCV < 0$	Yes	Yes	0.023
LC DCV	Wilcoxon Signed-Rank	$DCV = 0$	No	No	0.321
SC DCV	Wilcoxon Signed-Rank	$DCV = 0$	No	Yes	0.094
SC DCV	Wilcoxon Signed-Rank	$DCV < 0$	No	Yes	0.052
LC & SC DCV	Mann-Whitney U	$DCV_{SC} - DCV_{LC} = 0$	No	No	0.270

legend:

ES = Entire Sample

LC = Large Companies

SC = Small Companies

LC & SC = large and small companies comparison

### 5.8.1 Findings related to a shift in the demand curve

Due to the fact that normality was rejected for the entire sample, the Wilcoxon non-parametric test was used for evaluation of the one sample tests. The entire sample showed that the hypothesis  $DCV \leq 0$  was rejected at a significance level of 0.05. This meant that statistically the value of DCV for the entire sample was significantly different from zero, and was more likely to be positive in value.

Testing of the large companies' samples revealed that the hypothesis of  $DCV = 0$  could not be rejected. No further testing was required, as statistically the value of the DCV for large companies was neither positive nor negative. The hypothesis, at both a 0.05 and a 0.1 significance level, was not rejected.

For the small companies' sample, the values of DCV revealed that the hypothesis  $DCV = 0$  could not be rejected at a significance level of 0.05, but could be rejected at a significance level of 0.1. This meant that statistically the values for DCV of small companies was significantly different from zero and was positive.

When the Mann-Whitney U test was conducted to compare the two samples, it was found that there was no significant difference. As the findings of the samples separately did yield results, this test result was supplementary information, but did not hold true to expected values. Given that the DCV value for small companies was statistically more likely to be positive, and there was no significant difference from zero for large companies' DCV, it was expected that the two sample test would indicate a difference between the two. This was however not the case.

In conclusion, the value of DCV for the small companies' sample and the entire sample' reflected that there was statistical significance in saying the value of DCV is different from zero. The large companies' sample showed no significance and reflected that DCV was not different from zero. It could therefore be said that for small companies there is a move in the demand curve whilst the same could not be shown for the large companies' sample.

## 6 Chapter 6: Discussion of results

### 6.1 Introduction

The statistical tests conducted allow for inferences to be made about each area tested, with the goal to establish whether a shift in the demand curve for traded securities occurred and whether company size had any impact thereon. This chapter was divided into four broad sections, namely discussions or evaluation of:

- Event study methodology;
- Results of abnormal volume traded;
- Results of abnormal returns;
- Changes to the demand curve for traded securities.

The effect of company size is discussed under each subsection as it was viewed as an integral part to the interpretation of the statistical tests.

### 6.2 Discussion of event study methodology

The event study methodology proved useful in making differently timed events comparable to each other. The main concern was, however, that it relied on expected or forecast values, with three underlying principles:

“Markets are efficient; [t]he event was unanticipated and; [t]here were no confounding events during the event window.” (McWilliams & Siegle, 1997, p. 629).

While confounding events could be controlled for to a large extent, the other two principles were under question. For example, the prevalence of insider trading as mentioned by Thaver and Ward (2011), may imply that the event was not unanticipated to the market as a whole. Furthermore, the concept of information asymmetry as described by Chae (2005) and Frye *et al* (2001) could imply that markets are perhaps not in fact efficient, or at least not enough so as to give fully accurate and predictable results. However, event study methodology, with the use of predictive values, remained the best method found for this study and it did yield useful, if not concrete, results.

### ***6.3 Discussions of results of changes in volume traded (Hypothesis 1)***

#### **6.3.1 Discussion of volumes traded for the entire sample**

Using the entire sample as a departure point, the most prominent theme was the fact that no immediate abnormal volume traded subsequent to an acquisition announcement was detected. In general terms, this may point to the fact that the share continued to trade at the usual volumes for at least ten days subsequent to the announcement.

The fact that there was no immediate reaction found in volume traded on the entire sample, could lead to speculation that potential investors are delaying investment decisions following an acquisition announcement.



Battacharya *et al* (2000) provided potential reasons for the lack of reaction. One was that there is a delay in investor reaction in the case of an emerging market, and other reasons include insider trading or simply information flow inefficiency. The reasons for this delayed reaction was outside the scope of this study, however, the results assisted with guiding thinking in terms of reactions to acquisition announcements.

Therefore, purely from a statistical perspective, when considering the entire sample, abnormal volumes traded appeared to be non-existent.

The hypothesis was that company size could affect the general impact, and therefore the effect of the size of the company was evaluated.

### **6.3.2 Discussion of volumes traded for large companies**

When volumes traded for large companies were considered, it was clear that the large companies and the entire sample's findings were similar. It was interesting that there was a significantly lower probability of abnormal volumes traded on the positive side, as compared to the entire sample's findings. Statistically, there was no immediate change detected. A potential reason for this could be the effects of regulations and commissions on the South African business landscape, causing investors to delay their investment decisions. But no literature specifically related to regulations and share performance subsequent to an announcement in South Africa was found and therefore this supposition was largely speculative in nature.

Large companies have historically been the target of investigation and approval by the Competition Commission (Cranston, 2010). The finding that there is no significant change to volumes traded for large companies strengthened the supposition that potential investors are delaying their investments in large organisations, perhaps until they are confident that a deal will actually be struck. This is again in line with the work of Bhattacharya *et al* (2000) which showed that there is a delay in investor reaction subsequent to an announcement.

Reading the output from the t-test of ACAVT for the large companies' sample qualitatively, there was a higher probability of the value of ACAVT being less than zero as opposed to greater than zero. It can therefore be said that there may be undetected changes to volume traded given the variables and methodology in this study, but, the results showed that large companies did not show an *increase* in trading volumes when making an acquisition announcement.

### **6.3.3 Discussion of volumes traded for small companies**

For the small companies' sample, there was significantly less power in the rejection of the hypothesis that  $ACAVT = 0$  (probability of 0.56 as opposed to 0.72 for the entire sample and 0.73 for large companies). On a qualitative basis there was a higher probability of the ACAVT being greater than zero. While not statistically relevant, the variations in probability values suggested alignment with the findings of Floyd *et al* (1995) and Draper and Puadyal (2008) which indicated more volatile results when small companies announce acquisitions.

Qualitative speculation was that there was a stronger probability that volumes traded actually reduced subsequent to the announcement. Yet, statistically, there was no significant change when evaluating volume traded for small companies. Statistically, company size did not seem to matter when evaluating the large and small companies' sample separately. This is in contrast to Bhattacharya *et al* (2000), who proposed that size was important and in their study this was one of the variables controlled for before doing statistical tests. However, to confirm that there was no significant difference between the samples of small and large companies' ACAVT, the two sample t-test results were investigated.

#### **6.3.4 Discussion of comparison of small and large companies' volume traded**

In terms of a purely quantitative analysis of the findings when comparing the samples of small and large companies, there was no significant difference between the two samples.

This finding is central to the evaluation of abnormal volumes traded subsequent to the announcement of an acquisition, in that it showed that there was no immediate significant change in volume traded.

It was expected that there would be some form of increased liquidity to the trades of the companies, specifically to the small companies' sample – in line with the information asymmetry hypothesis (Chae, 2006) as well as results proposed by studies related to company size in acquisitions (Floyd *et al*, 1995)). However in this case, a definite result could not be found, which may be due to the fact that studies noted here focused on developed markets and not emerging markets.

### 6.3.5 Summary of volumes traded analysis

If Palmon *et al*'s (1994) suggestion that the effects of information changes take between three and ten days to be noticed is correct, the result here was that there was no statistical effect on volume traded in the case of acquisition announcements of the acquiring company. It could be argued that perhaps there are changes, but they would take place over a longer period, more in line with the findings of Moeller *et al*'s (2003) longer event window of one year.

This study shows that, statistically, company size does not affect changes in volume traded as no significant abnormal volume traded was found for companies of various sizes. At this juncture it should be noted that this was an evaluation of volumes traded in isolation, but may be different when viewed in conjunction with abnormal returns to establish a shift in the demand curve. Due to the fact that the demand curve relies on simultaneous changes to volume traded and share price, the construction of DCV may pick up differences that evaluation of each variable in isolation does not.

## **6.4 Discussion of Results for changes to share price (Hypothesis 2)**

### **6.4.1 Discussion of abnormal returns for the entire sample**

The first point of interest when evaluation shifts to price (or abnormal returns) was that there was a wider range of observations when compared to volumes traded. This was primarily due to logarithmic transformation of the ACAVT values and not of the CAAR values; which meant lesser robust statistical results for CAAR. Any other explanation would be speculative in nature. As with ACAVT the abnormal returns for the entire sample were discussed first.

The entire sample showed that there were no abnormal returns – at a significance level of 0.05. However, the increase of the significance level to 0.1 meant that inferences could be made. The most obvious finding in terms of probabilities was that there were no abnormal returns on the positive side. At the higher significance level of 0.1, it was found that share prices were not at expected levels. If prices had been as expected (based on the CAPM model) then CAAR would not be significantly different from zero. Statistically, however, the entire sample showed that they were.

It was found that there was statistical significance in the fact that the value of CAAR tended to be negative. Statistically this meant that the share price subsequent to the announcement was below expected.

Practically this meant that the act of announcing an acquisition was value destroying for the acquiring company in the short run (in general terms). This is directly in line with the findings of Hayward and Hambrick (1997). Their study showed that the results found in 1997 still holds true under current conditions – when evaluating the entire sample. In contrast, the results found by Bartholy and Flugt (2003) - that the bidders have positive returns - could not be replicated here. While they claimed that the bidder fares worse than the target, they did find some level of positive returns.

To further understand the statistical results, large and small companies were evaluated separately and comparatively.

#### **6.4.2 Discussion of abnormal returns for large companies**

For the large companies' sample, what was most notable was that the distribution was normal, which was different to both the entire sample and the small companies' sample.

The one sample t-test showed that in the case of large companies, the null hypothesis of  $CAAR = 0$  could not be rejected. This meant that there was no significant immediate change to the large companies' share prices. This result alluded to the fact that investors are not lured into speculation with large companies' shares the moment an announcement occurs.

This is in line with Moeller *et al's* (2003) finding that large companies have more predictable reactions. Furthermore, one could speculate that investors would rather wait until more information is available such as the way in which the deal will be funded. This type of information should have an effect according to Mushidzhi and Ward's (2004) study on cash versus share funded acquisitions. In this study the type of funding was not evaluated, and the earliest announcement was used, which may cause this delay in price reaction. Effectively the results showed that large companies' share prices do not react *immediately* subsequent to an acquisition announcement.

#### **6.4.3 Discussion of abnormal returns for small companies**

In the case of small companies, there was a clear indication that there were no positive returns. The hypothesis of  $CAAR = 0$  was rejected. Further evaluation revealed that there was no indication of  $CAAR$  being greater than zero either. The only hypothesis which could not be rejected was  $CAAR < 0$ . With a probability level of 0.96 of  $CAAR$  being less than zero it could be said that statistically, share prices were less than predicted by the CAPM model. This is again in line with the findings of Hayward and Hambrick (1997).

However, this result was directly in contrast to Moeller *et al*'s (2003) study, which reported better results for small companies. Their claim that small companies fare better than large ones when announcing an acquisition could not be replicated here.

In fact the opposite was found, that large companies showed neither positive nor negative differences to expected share prices, while for small companies there was a definite negative price trend.

However, the purpose here was to determine if there was statistical difference between the large and small companies' sample. Therefore, the two samples were compared against each other.

#### **6.4.4 Discussion of results of comparing small and large companies' abnormal returns**

The comparison of the two samples in this case revealed that there was not a significant difference between the two samples. In a qualitative sense, the strength of the finding was not so high as to be fully conclusive, as statistically it was not significant. Moeller *et al* (2003) proposed that small companies fare better than large companies in acquisition announcements. However, when comparing the two samples, this study showed that they were in fact very similar.



It was found that the effects of company size in acquisition announcements are evident in the values of CAAR when the results from the one-sample tests are separately evaluated. Yet, comparison of the two samples through the use of two-sample testing revealed no significant difference.

In Floyd *et al's* work (1995), they noted more volatile reactions in small companies' returns. This appeared a more accurate statement as opposed to that of small companies faring better, as the change was detectable in small companies (evaluated in isolation), while in large companies initial analysis did not reveal any change.

#### **6.4.5 Summary of discussion of abnormal returns**

Using the methodology and data as detailed earlier, it was found that at best there is no change to the share price of the bidder and at worst the bidder's share devaluates. Given this result, the suggestion that managers use acquisition announcements as a tool if they consider their shares to be undervalued, as proposed by Draper and Paudyal (2008), is not effective practice in the short run.

The conclusion here was that new investments in the bidder (acquiring company) would not provide immediate gains, similar to the findings of Hayward and Hambrick (1997). Practically, current shareholders can anticipate a drop in the price of their shares (relative to anticipated returns) immediately subsequent to the announcement.

As an illustration, Draper and Paudyal (2008) found positive gains (CAAR) to the bidder of "...0.618%, 0.721% and 0.853% during the three days, five days and 11 days surrounding an acquisition announcement..." (p. 387), a result which could not be replicated here. In fact, the opposite was suggested by the results. If the drop in the relative share price does in fact hold true, the implication for the acquiring company is substantial. Specifically, if a company were planning to use share capital to fulfil the acquisition, they might find themselves with less funds available immediately after announcing the acquisition.

It would therefore be more wise to make the announcement as early as possible, to give the share price chance to recover and for the company to see the positive returns over a longer period, as predicted by Moeller *et al* (2003).

### ***6.5 Evaluation of changes to the demand curve of traded securities (Hypothesis 3)***

The basis of this study was the assumption that a downward sloping demand curve for traded securities does in fact exist. The literature reviewed supported this notion, to the extent that four studies (Kaul *et al* (2000), Levin and Wright (2006), Liu (2000) and Petajisto (2009)) out of the five reviewed confirmed the existence of such a curve.

The construction of DCV proved useful in using statistical testing to evaluate the effect of two separate variables. It does not have use in terms of determining the magnitude of change, but it did reveal the statistical probability of whether a change along, or shift of, the demand curve has occurred.

### **6.5.1 Discussion of changes to the demand of the entire sample**

In terms of the entire sample, the DCV values revealed strong statistical motivation that there was a shift in the demand curve. The basis of this study was to determine such a shift, and to determine the direction thereof. For the entire sample, the null hypothesis of  $DCV = 0$  was rejected. This meant that the value was positive, statistically speaking.

As described by Hypothesis 3, it can be said that either both volume traded and share price changes were positive, or both were negative. The tests revealed that statistically there were no positive abnormal returns, and so the only way that the value of DCV could be positive was if there had been a negative move in volumes traded as well. The test statistics showed that there was no change to volumes traded, while there was cause to speculate on a qualitative basis that there was a reduction in volume traded.

The total analysis revealed that results were inconclusive and in contrast to one another. Specifically, testing for abnormal volume traded revealed no change, while the test for DCV meant that the only way the value of DCV could be positive was if ACAVT was negative, given the negative value of CAAR. It was therefore suggested that the DCV variable detected changes to ACAVT that was not detected in testing for ACAVT on its own. Statistically the results were inconclusive to the point where it could not be definitively stated that a move in the demand curve has occurred or not.

### **6.5.2 Discussion of changes to the demand curve for the large companies' sample**

In the large companies' sample, evaluation of DCV revealed a value of equal to or less than zero. This meant that the demand curve does not move, or that there is a move along the demand curve. However, the fact that there were no significant findings in either CAAR or ACAVT, meant that according to this study there was no change to the demand curve for large companies' shares.

The implication was that, for large companies, the demand curve as a tool to determine immediate changes might not be appropriate. Alternatively, the findings indicate there may not be such definitive changes to share performance in comparison to small companies. In other words, the fact that no abnormal returns or volumes traded were detected, indicated that the dynamic nature of the demand curve (Baye, 2009), does not lend itself to a product (or share in this case) that does not show immediate or dynamic changes.

### 6.5.3 Discussion of changes to the demand curve for small companies

In the small companies' sample, it was anticipated that some results would be had in line with Fraye *et al's* (2001) finding of higher volatility associated to smaller companies – mostly due to the level of information asymmetry prevalent in relation to small companies. The statistical tests revealed that at the initial significance level, the demand curve did not shift. However, when the significance level was evaluated as 0.1 a result was found. Specifically, it was found that as with the entire sample the value of DCV was positive meaning that both the value of CAAR and ACAVT had to be positive or negative.

In the case of small companies, there was strong evidence that there was a reduction in the share price relative to expected returns, and there was some evidence (although not statistically significant) to support the notion that there was a relative reduction in volumes traded as well.

Again, the volatility of small companies' shares was seen. The speculation was that this was largely due to the information asymmetry when evaluating small companies' shares. There was therefore some indication of a size effect working on both volumes traded and share prices when an acquisition is announced.

While a Mann-Witney U test was run to compare the two samples to each other, the results were inconclusive. It revealed no difference between the samples at a probability level of 0.27. When the two samples were evaluated separately however, there was a distinction, as discussed above. As no studies found tested for a shift in the demand curve, direct comparisons could not be made.

## ***6.6 Concluding comparison of the effects of size on the demand curve and the use of the demand curve***

The demand curve was used in this study in its most basic form, which is a simple straight line, downward sloping curve. This is not necessarily the case for the market for traded securities, and models could be constructed to determine the exact extent and nature of the curve. The full extent and magnitudes of shifts were outside the scope of this study.

The fact that returns were below expected in certain cases, and that changes in volumes traded could not be concluded, means that Petajisto's (2009) hypothesis that the demand curve for securities is over estimated appeared to be accurate.

In other words, simultaneous changes to both variables may be happening, but for one of the variables they are so slight as to be almost insignificant. However, the fact that volume traded (quantity on the demand curve) was the variable that hardly changed, pointed to a more vertical curve as opposed to the horizontal demand curve for traded securities proposed by Cha and Lee (2001).

In summary, the demand curve had some use as a model for evaluation of companies of various sizes, in that it alluded to the impact company size has on share performance subsequent to acquisition announcements. Specifically, there was the suggestion that volumes traded and share prices move simultaneously in the same way that price and quantity demanded would move on the market demand curve of a product.

The results in general proved inconclusive. Where shifts in the demand curve were detected by the use of DCV, it could not be proven by statistically showing that both variables on the curve moved. This indicated a need for further financial models in future studies of the demand curve, specifically those evaluating the magnitude by which each variable changes. By combining magnitude and simple directional changes, more extrapolations could potentially be made about the nature of the curve, as well as the relationship between price and volume in acquisition announcements.

## 7 Chapter 7: Conclusions

### 7.1 *General concluding remarks*

This study utilised the concept of the market demand curve to determine the reaction of shares to acquisition announcements. The demand curve relies on the evaluation of two variables namely price and quantity demanded. For proxies of these two variables in a stock market sense, abnormal returns and abnormal volume traded were used.

Using event study methodology, changes to share price and volume traded was evaluated and with the use of statistical testing, conclusions were sought to determine whether there were significant differences from zero. Furthermore, the 65 company sample was divided into small and large companies of 32 and 33 observations respectively, and statistical testing was done jointly as well as separately.

Acquisition announcements included only announcements (that had no confounding events) made by JSE listed companies over the last seven years. In accordance to previous literature, acquisitions of both domestic and international companies were considered and not treated separately. In all cases the first announcement of a proposed acquisition was used as the starting point for evaluation. Changes, amendments and operational announcements related to the acquisition were not evaluated.



There were relatively more interesting results found in the small companies' sample than in the large companies' sample across all variables tested, however, in general it remained inconclusive. What was found was that to a large extent, large companies' shares showed no immediate reaction to an acquisition announcement.

The results were in line with previous studies, specifically those proposing reductions in relative price (Hayward & Hambrick, 1997) and those that found no reaction to certain announcements (Bhattacharya *et al*, 2000).

In contrast to some studies ((Floyd *et al*, 1995), (Draper & Paudyal, 2008) and (Bartholy & Flugt, 2009)) there were no results found to support the notion that the share price of the bidder increases subsequent to an acquisition announcement. The studies mentioned here had longer event windows (ranging between six months and three years). It could be that this study's short event window did not yield results because of inadequate time to generate expected values. Also, there was a contrast to studies claiming a horizontal demand curve for traded securities (Cha & Lee, 2001), where this study showed there is suggestion that the demand curve for stocks is more vertical.

The use of the demand curve as a tool in this study to conceptualise immediate changes to share performance was useful. At a conceptual level, there is a connection between the way that shares react to an acquisition announcement and the way in which a product would react in certain market circumstances. The dynamic nature of the demand curve led to more conclusive results for small companies as opposed to large companies.

The shift in the demand curve for small companies was as would be expected of a product where the price of a substitute product's price reduces. For example, a reduction in the price of red meat would cause a shift of the demand curve for white meat to the left. Related to companies' stocks, it could mean that investors choose other stocks to invest in when an acquisition announcement is made, which causes reduction in both volume and price. The results, however, remained statistically inconclusive and much of the speculations had to be made on a qualitative basis.

The short event study period did not yield the conclusive results for large companies that were hoped for. Working on the principle that no finding is a finding, there was some insight to be gained. Specifically that the shares of large companies take perhaps longer to react, or react over a longer period, when an acquisition announcement occurs.

Evaluation of the two main variables in isolation did not prove as significant as was hoped at the start of the study. This could be due to data problems, or if the findings are accurate, it leads to the need for further study to find out exactly what happens with shares prices and volumes traded of the bidding company.

Perhaps the most significant implication from a theoretical perspective is that acquisitions theory for small and large companies simply cannot be dealt with under the same umbrella. It was shown that, in the short term, small companies have differing results from those of large companies.

In a practical sense, the implications are strongest for shareholders and managers of small companies. The implication is that there are immediate effects occurring (decrease) on the share subsequent to the acquisition. Shareholders will thus be wise to anticipate this decrease. And likewise, the managers of the company could find it beneficial to plan for this immediate decrease if the intention is that the acquisition will be made by means of share capital.

## **7.2 Limitations of the study**

There were certain limitations to the study and these are discussed here.

The first limitation was referred to in section 4.7 'Data integrity and methodology limitations'. The most apparent was the fact that the best model for predicting share return, as is widely regarded, was not available for use. A further limitation here was that event windows were viewed in isolation and did not consider the effects of events that occurred before day  $t_{-21}$ . This meant that all 'noise' in the event window was potentially not controlled for, which could lead to a level of uncertainty in the results.

The use of the variable DCV was not found in any previous literature, and therefore the use of it was untested. In the end it proved useful as an analysis tool, but is yet to be placed under academic scrutiny. Other studies merely tested abnormal returns and abnormal volumes traded separately, and therefore direct comparisons were difficult to be made.

The nature of the study itself may have also been a limitation. Previous studies showed results where long events windows were used. The fact that this study had a short window (in order to detect immediate changes in line with the dynamic nature of the demand curve) may have meant that inferences could not be conclusively made. This led to, in some instances, changing the significance level from 0.05 to 0.10, which in itself weakened the statistical results.

Data received from the “event engine” (Muller & Ward, 2011) and from the news service page (BFA McGregor, 2011) was taken at face value and not scrutinized for errors. While both sources are highly reputable, the possibility of mistakes cannot be completely excluded.

Unfortunately, time was not always available to check and cross check findings, and to do further analysis of portions of the study which may have been under question.

### ***7.3 Recommendations for further study***

The use of the demand curve proved to be a novel way of evaluating reactions of shares to the market. The most obvious recommendation for further study would therefore be to evaluate the supply side of the theory of demand and supply. By measuring the availability of tradable shares, and combining it with share price, a similar variable to DCV could be constructed. It could be useful to understand if equilibrium pricing exists where the demand and supply curves meet, and if an acquisition announcement changes this equilibrium price.

To address the model’s shortcomings, it could be useful to redo the study as is, but use the control portfolio model for determining expected and abnormal returns. In addition, the wide variety of methods available with which to evaluate volume traded, means that another method of determining abnormal volume traded could be utilised to determine if this would yield more concrete results.

Additional recommendations revolve around the effect of company size in acquisitions. As a considerable amount could be perceived in a qualitative sense in this study, there is cause for further qualitative study testing the same phenomena as was tested in this study. Perhaps a small number of large companies and a small number of small companies who have made acquisitions could be selected and compared in the form of a case study.

The results found in terms of large companies should be investigated further. In the South African context there is cause to first evaluate changes to the share price and volume traded upon announcement of the acquisition, and then re-evaluate the same acquisition upon approval by the South African Competition Commission. This may conclusively prove or disprove any effects that the Commission has on share performance in large acquisition deals.

In practice there could be cause to use the demand curve over the entire period of an acquisition deal. For example, it should be useful to apply the curve as this study did on the initial announcement, then do it again on announcement of how the deal will be funded, then again on approval by the Competition Commission and again on deal conclusion. This may reveal a conclusive shift from start to end. Not only will this show investors the short terms effect of each announcement, but also the effects over the entire process. As such it would allow them to make investment decisions at the time of announcement, based on what is expected to happen at the conclusion of the deal.

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## 9 Annexures

### 9.1 Annexure 1: Sample, event windows and data

#### List of data used

<i>Company Name</i>	$t_0$	$t_{-21}$	$t_{+10}$	ACAVT	CAAR	DCV
<b>Large Companies</b>						0.0005
Absa	06-Oct-10	06-Sep-10	20-Oct-10	0.723864317	0.07%	-0.0007
African Bank Investments	07-May-08	03-Apr-08	21-May-08	0.75853806	-0.09%	-0.0017
African Rainbow Minerals	16-Jul-07	16-Jun-07	30-Jul-07	- 0.131793834	1.29%	0.0055
Anglo Platinum	02-Jul-09	02-Jun-09	16-Jul-09	- 0.450228081	-1.22%	0.0000
Arcelomittal	06-Aug-10	08-Jul-08	23-Aug-08	- 0.015354729	-0.06%	0.0001
Aspen Pharma Care	20-Nov-07	21-Oct-07	04-Dec-07	- 0.117360552	-0.07%	-0.0002
BHP Billton	22-Feb-11	23-Jan-11	08-Mar-11	- 0.717702943	0.03%	-0.0004
Bidvest	22-Dec-10	22-Nov-10	06-Jan-11	0.391703664	-0.10%	0.0002
Bidvest	01-Aug-07	01-Jul-07	15-Aug-07	0.545846022	0.05%	0.0000
Capital Shopping Centers	02-Feb-11	03-Jan-11	16-Feb-11	- 0.010396219	-0.10%	0.0000
Compagnie Finance Richemond	01-Apr-10	02-Mar-10	19-Apr-10	0.005112974	-0.29%	0.0119
Exxaro Resources	23-May-11	15-Apr-11	06-Jun-11	0.423790389	2.80%	-0.0041
Gold fields ltd	11-Sep-08	12-Aug-08	25-Sep-08	0.479987503	-0.85%	-0.0045
Growth Point properties	18-May-09	14-Apr-09	01-Jun-09	0.240381584	-1.89%	-0.0016
Harmony Gold	26-Jun-09	27-May-09	10-Jul-09	0.124684258	-1.27%	0.0009

		09				
Impala Platinum	02-Oct-09	02-Sep-09	16-Oct-09	0.164531724	0.55%	0.0003
Remgro	23-Jun-09	22-May-09	07-Jul-09	- 0.155892513	-0.22%	0.0001
MTN	27-Mar-09	26-Feb-09	14-Apr-09	0.081965459	0.11%	-0.0003
Mondi LTD	27-Jan-10	28-Dec-09	10-Feb-10	- 0.148381481	0.19%	0.0015
Naspers	29-Sep-09	28-Aug-09	13-Oct-09	0.250243712	0.58%	-0.0017
Naspers	14-Jul-10	14-Jun-10	28-Jul-10	- 0.307959909	0.56%	0.0014
Naspers	10-Jun-09	12-May-09	25-Jun-09	- 0.294421513	-0.47%	-0.0004
Nedbank	15-Oct-09	15-Sep-09	29-Oct-09	- 0.467310985	0.08%	-0.0008
Old Mutual	21-Aug-08	23-Jul-08	04-Sep-08	- 0.348437324	0.22%	0.0001
Reinet	16-Apr-09	16-Mar-09	05-May-09	0.038631083	0.25%	-0.0016
Remgro	13-Jun-07	15-May-07	27-Jun-07	- 0.234544109	0.68%	-0.0001
RMB	17-Oct-07	17-Sep-07	31-Oct-07	0.152858954	-0.04%	-0.0005
SABMILLER	08-Sep-09	07-Aug-09	22-Sep-09	0.125057321	-0.41%	-0.0011
Sanlam	12-Feb-08	13-Jan-08	26-Feb-08	-0.66845940	0.16%	0.0000
Sasol	20-Dec-10	18-Nov-10	04-Jan-11	0.132572417	-0.03%	-0.0012
Standard bank	24-Jul-07	24-Jun-07	07-Aug-07	-0.19263326	0.62%	-0.0002
Steinhoff	09-Dec-10	10-Nov-10	24-Dec-10	0.186700677	-0.10%	0.0018
Tiger Brands	15-Feb-11	16-Jan-11	01-Mar-11	0.167998339	1.06%	-0.0012
Tiger Brands	24-Jul-08	25-Jun-08	07-Aug-08	0.01058544	1.67%	-0.0074
<b>Small Companies</b>	<b>t<sub>0</sub></b>	<b>t<sub>-21</sub></b>	<b>t<sub>+10</sub></b>	<b>ACAVT</b>	<b>CAAR</b>	<b>-0.0018</b>
Omnia Holdings	28-	30-	11-Feb-	0.376455295	-0.33%	0.0000

	Jan-11	Dec-10	11			
Omnia Holdings	16-Aug-07	17-Jul-07	30-Aug-07	-1.02860687	0.72%	-0.0004
Omnia Holdings	26-Aug-09	27-Jul-09	09-Sep-09	-0.51571207	-0.16%	-0.0003
AECI	26-Jul-11	26-Jun-11	09-Aug-11	1.47560937	-0.12%	0.0001
Datatec	17-Mar-11	16-Feb-11	01-Apr-11	0.050073226	0.04%	-0.0003
Datatec	24-Jan-11	23-Dec-10	07-Feb-11	-0.33960333	0.12%	0.0019
Datatec	09-Apr-10	08-Mar-10	23-Apr-10	-0.13229935	0.24%	-0.0020
Santam	08-Dec-10	09-Nov-10	23-Dec-10	-0.17142197	-0.06%	0.0001
Santam	28-Jun-10	27-May-10	12-Jul-10	-0.30541464	0.10%	-0.0001
Hudaco	29-Jan-08	28-Dec-07	12-Feb-08	0.889482077	0.21%	-0.0003
Hudaco	23-Jun-10	24-May-10	07-Jul-10	-0.45725751	0.43%	-0.0001
Imperial Holdings	29-Sep-09	28-Aug-09	13-Oct-09	0.046885797	0.14%	-0.0004
Imperial Holdings	30-Nov-10	31-Oct-10	14-Dec-10	0.08720154	-0.06%	-0.0032
Imperial Holdings	13-Jul-10	11-Jun-10	27-Jul-10	-0.07401935	0.35%	0.0052
Allied Electronics Corp	08-Jun-07	10-May-07	22-Jun-07	0.105497523	-0.09%	-0.0033
Allied Electronics Corp	24-Oct-07	24-Sep-07	07-Nov-07	0.039966742	-1.02%	-0.0010
Wilson Bailey Holmes - Ovcon	26-Sep-07	27-Aug-07	10-Oct-07	-0.60862644	0.53%	-0.0011
Pan African Resources	09-Feb-09	09-Jan-09	23-Feb-09	0.288314346	1.80%	-0.0016
Pan African Resources	31-Mar-10	01-Mar-10	14-Apr-10	-0.33763323	0.99%	0.0034
Afgri Limited	11-Aug-10	12-Jul-10	25-Aug-10	-0.60673412	0.16%	0.0025
Afgri Limited	01-	30-Jan-	15-Mar-	-0.48132709	0.22%	-0.0063





	Mar-11	11	11			
Astral Foods	02-Jul-08	02-Jun-08	16-Jul-08	0.59178275	-0.26%	0.0022
AfriMat	16-Jul-07	15-Jun-07	30-Jul-07	0.854454965	0.40%	0.0000
AfriMat	04-May-10	31-Mar-10	18-May-10	0.425889699	0.58%	-0.0061
Invicta	04-Jun-09	06-May-09	19-Jun-09	-1.29819694	0.48%	-0.0015
Invicta	15-Mar-10	12-Feb-10	30-Mar-10	0.282003222	0.80%	0.0016
Grindrod	08-Apr-10	09-Mar-10	22-Apr-10	0.027797666	0.15%	-0.0036
AdCorp	04-Apr-08	05-Mar-08	18-Apr-08	1.342714714	-0.45%	-0.0014
AdvTech	22-May-08	18-Apr-08	05-Jun-08	0.19487877	-0.76%	<b>dcv</b>
AdvTech	20-Apr-09	21-Mar-09	04-May-09	-0.76436775	-0.21%	0.0005
African Media Entertainment	30-Jul-10	01-Jul-10	16-Aug-10	-1.48760053	0.24%	-0.0007
Woolworths Holdings	11-Nov-09	13-Oct-09	25-Nov-09	-0.67398457	0.21%	-0.0017