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# The long run performance of initial public offerings in South Africa

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# Abstract

The current research was undertaken to determine the long run performance of Initial Public Offerings (IPOs) listed on the Johannesburg Stock Exchange (JSE) in South Africa. The three year abnormal returns were assessed for IPOs listed between 1995 and 2006 comprising a sample of 229. Using the Buy and Hold Abnormal Return (BHAR) and Cumulative Abnormal Return (CAR) methods, it was found that the IPOs underperformed the market by 50% and 47% for BHAR and CAR respectively. The JSE All Share Index was used as a benchmark. The research also investigated the effect of firm size on IPO performance. The relationship between IPO activity and performance was analysed as well as the performance of IPOs from different sectors. Gross proceeds of the offers were used as a proxy for firm size and it was shown that by splitting the sample into different size groups, there were significant differences between the returns from these groups. There was no relationship found between IPO activity and performance using a linear regression. Using an Analysis of Variance (ANOVA) it was determined that there were significant differences between the performance of IPOs in the different sectors of technology, industrials, financials and mining.

Keywords:

IPO, long run performance

# 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 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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# 1 Introduction

## 1.1 Research Title

The long run performance of Initial Public Offerings in South Africa.

## 1.2 Research Problem

Initial Public Offerings (IPOs) present potential investors with a vehicle to earn superior returns, however the potential performance of these investments for South African IPOs in the long run is not known. There have been numerous studies performed on the performance of IPOs in many different markets. The long run underperformance is a common phenomenon that has been found in almost all of these studies, ranging in magnitude across the different markets.

The IPO is an important milestone in the life cycle of a private organisation and it has significant consequences on the ownership structure and controlling rights of the firm (Zheng and Li, 2008). There are a number of reasons why companies *go public,* such as diversification of ownership, liquidity etc. (Bessler and Thies, 2007). The founders have to surrender a portion of the ownership of the organisation in exchange for equity that they can use to grow the business. This may be a more feasible option of raising capital as opposed to increasing debt levels.

The performances of IPOs have received an elaborate amount of attention in the past two decades. The interest may be related to the value of IPOs for economic growth and employment, but more often than not the focus is on the substantial profit opportunities that they offer to investors (Bessler and Thies, 2007).

Underpricing of IPOs has been a subject of considerable academic and practical interest, and this will continue to dominate the research directed to IPOs (Kennedy, 2006). Underpricing can be seen as a fundamental feature of IPOs and is existent in almost every economy. Long run performance, however, depicts different characteristics in different countries. Ritter (1991), based on a study of 1526 IPOs issued between 1975-1984 found that the average holding period return to be 34.4% in three years while a control sample of similar companies based on industry and market capitalisation returned 61.9%. Corhay, Teo & Rad (2002) on the other hand found that for 258 IPOs issued between 1992-1996 in Malaysia the result was the opposite with the IPOs outperforming the market with a positive cumulative abnormal return (CAR) of 41.7% over three years from the listing day.

It is thus important to understand the long run performance of IPOs in a specific market, not only from an investment perspective but also for the interest of the issuer as this will give the owners an understanding of future valuation prospects for the organisation in terms of market capitalisation.

## 1.3 Research Purpose

The knowledge of the potential performance of South African IPOs in the long run may provide investors with the necessary knowledge to make informed decisions regarding the choice of investment opportunities. The aim of this research is thus to provide this information based on an empirical study of past IPO performance.

The study analyses the return that can be gained from investing in IPOs over a three year period. Most research on long run performance of IPOs consider the period up to three years, and hence this period was considered for the current research. The research on IPO performance in emerging markets is also limited and the results for South Africa will therefore also contribute to this field.

The primary focus of this research is on the long run performance of IPOs in South Africa. The results for 229 IPOs listed between 1995 and 2006 on the main board of the Johannesburg Stock Exchange (JSE) will be analysed for 36 months after the listing. A broad benchmark in the form of the All Share Index will be used to assess the abnormal returns from these listings.

Performance of IPOs with regard to their size, i.e. offer size, is a variable that is used to categorize the performance of companies that are listed. The information is readily available for investors and can be a vital factor in determining the potential performance without having to perform an in depth analysis into the organisation. One of the secondary objectives of this research will thus be to determine if there is any relationship between the long run

performance of IPOs and the size of the issuing firm based on gross proceeds from the listing.

The number of listings in a specific period (also referred to as IPO activity) is sometimes related to the performance of IPOs. Given the sample size that spans 12 years, the number of IPOs per year will be used as a factor to determine if any relationship exists with the long run performance of these listings. Therefore another sub objective of this study is to determine if there is any relationship in South Africa between IPO activity and long run performance.

This phenomenon is referred to in the literature as the ‘hot issue’ effect which shows a positive correlation between strong initial returns and high IPO activity within a target period. The high initial returns are often associated with poor long run performance (Kiymaz, 2000). The present investigation will thus aim to verify if poor long run performance is associated with strong IPO activity.

Companies that are listed are not limited to a particular sector and usually span across all sectors in a specific market. From an investment perspective it is also valuable to determine if one sector differs from another with regard to the returns from IPOs within that sector, and thus another secondary objective will be to conclude if IPO performance differs across sectors.

To summarize, the aim of this research is to:

- Determine the long run performance (after 36 months) of IPOs in South Africa.
- Determine if there is a correlation between the size of issue and the long run performance of IPOs.
- Verify if there is a relationship between strong IPO activity ('hot issue' market) and the magnitude of long run underperformance.
- Determine if there are differences in after market returns between different sectors.

# 2 Literature Review

There have been numerous studies executed on the performance of IPOs. Early research concentrated mainly on the underpricing phenomenon, however there have also been many studies dedicated to long run performance of IPOs. The performance of IPOs is consistent across different markets, i.e. initial underpricing (high initial returns) and low long run performance.

The literature review will proceed by documenting the results of research aimed at specifically determining the long run performance. This is completed to put into context the results obtained for South Africa. As the present study is performed from an investor's perspective, the segregation of the vast market needs to be considered. For this reason the literature will also address the 'hot' market issue. This is when a large volume of IPO activity within a predefined time period results in high initial returns and low long run performance.

Subsequent to these results, the effect of the gross proceeds of the offer will be reviewed from previous research. This is defined as the number of shares issued multiplied by the offer price.

Finally, the performance of different industries or sectors from the literature will be reviewed. The segregation of the IPO market by the above categories can easily be achieved by information that is readily available to the potential investor without the need for in depth research into the firm that is going public. In order for the study to be considered complete, other factors that are used to determine the long run performance of IPOs will be briefly discussed to indicate

the depth of information potential investors can analyse if they have the resources available. These will not be discussed further in the present research.

## 2.1 Long run performance

The first significant study to measure long run performance based on return of shares was performed by Ritter (1991) and has been cited by numerous research papers and hence formed the benchmark for literature on IPOs. Ritter calculated returns based on cumulative average adjusted returns (CAR) as well as three year buy-and-hold abnormal returns (BHAR) and found that firms substantially underperformed (29%) in the three year post issue period. Overoptimistic investors based on fads were seen as a factor for this underperformance, along with risk miss-measurement and bad luck.

Drobetz, Kammerman and Wälchli (2005) estimated the long run performance of 109 Swiss IPOs from 1983 to 2000 and found that the underperformance after three years was only about 7.5% using a broad market index as the benchmark. It increased to 21% after four years and to 101% after ten years.

They also found that the underperformance was eliminated when a capitalization index was used indicating that the underperformance was due to the size of the firms which they claimed were small, and that similar sized firms that did not issue equity performed comparably.

The long run performance of German IPOs for the period of 1977 to 1995 was analysed by Bessler and Thies (2007) and the return was calculated as -12.7% for a BHAR period of three years. They also found that subsequent financing activity in the equity market after the listing had a positive effect on the performance; however they recommended that further investigations be performed to assess the strength of this correlation.

It is interesting to note that a similar study performed by Jaskiewicz, González, Menéndez and Schiereck (2005) using a sample of 153 firms over the period 1990 to 2001 revealed a BHAR of -32.8% over three years.

This is not surprising, as it indicates that the performance of IPOs is sensitive to the time that it was issued, and the various factors affecting the economy at that time as well as the general business environment and investor sentiment. In the same study Jaskiewicz *et. al* (2005) also showed that for the same period, 43 firms in Spain provided a BHAR of -36.7%.

Goergen, Khurshed and Mudambi (2007) reported on the performance of 252 IPOs that were listed on the London Stock Exchange from 1991 to 1995. The CAR that they observed over the first 36 months was -21.3%. Other findings from these IPOs were that there was a negative link between positive pre IPO accounting performance and post IPO stock returns. This is surprising as one would expect that favourable pre IPO performance would attract investors in the long run, however it may be that this only attracts short term investments.

Goergen *et. al* (2007) also observed that firms with a higher degree of multinationality showed more favourable long run returns than firms with a

lesser degree of multinationality. The performance of small firms was also found to be different from larger firms.

Further evidence of the long run underperformance was provided for Thailand by Vithessonthi (2008). His study reveals that a sample firm, on average, underperforms the benchmark used by 41.7%. His sample of firms was taken from the post Asian financial crisis era between 1999 and 2005.

Vithessonthi subdivided his sample into three subcategories based on firm size and the study was similar to Goergen *et. al.* and Drobetz *et. al* (above) in that he found that the group with the smallest sized firms showed the worst long term performance results.

Cai, Liu and Mase (2008) showed that the return observed from 335 companies listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange in China for a BHAR period of three years was -29.6%. This was better than the return observed by Vithessonthi for a similar period after the Asian crisis (1997-2001).

Another study of IPOs in emerging markets was performed for India by Mayur and Kumar (2009). They, however, implemented a different approach to other researchers in that they only evaluated the operational performance of the individual firms one year prior to listing, during the year of listing and two subsequent years after listing.

Although the results they observed cannot be compared to the previous studies, they found that the return on net assets and return on capital employed

deteriorated significantly after going public. Another finding by Mayur and Kumar was that the firms whose owners relinquished the largest proportion of ownership after the issue were shown to display lower levels of operational performance as compared to other companies in the sample.

A study of the Japanese IPO market between 1998 and 2001 revealed a long run underperformance of 18.3% based on a CAR over three years using a sample of 433 firms (Kirkulak, 2008).

Thus far all the studies reflected on have shown underperformance. Corhay *et.al.* (2002), as highlighted earlier, showed that the 258 IPOs issued between 1992 and 1996 in Malaysia outperformed the market with a substantial positive CAR of 41.7% over three years from the listing day. The authors also suggested that this figure was lower compared to previous studies indicating that there was a decline in performance over the years. They also attributed this positive performance to the fact that the Malaysian market had become more efficient and mature showing a lower level of underpricing, which was due to the Kuala Lumpur Stock Exchange efforts to revamp the listing requirements facilitating greater efficiency, better corporate governance and more transparency.

This is not the only case, as was shown by Tsangarakis (2004). He estimated that during the period from 1993 to 1997 when 108 IPOs were issued, the adjusted return was a healthy 54.9% above the market. It must be noted that this return was observed over a twelve month period, however all other underperformance figures summarised above also indicated an underperformance after the first year.

The reasons for this performance are not clear as the authors claim that improvements were made in the regulatory IPO market; however high underpricing was still evident, contrary to that reported by Corhay *et.al.*, which might suggest that after a year the IPOs were still in a lockup period and the reversal of the initial underpricing would only occur at a later stage.

A summary of the three year performance of IPOs that was described above is shown in Table 1. The results that were obtained from observations during the largest sample periods are shown to have had the lowest underperformance, with Switzerland showing a 7.5% underperformance over 17 years and Germany 12.5% below the market over 18 years. This may suggest that investors that require long buy and hold investments will achieve better results than if held for a shorter time, however this argument is not viable as investments should obviously be made on market related instruments. It is also interesting to observe that results for Thailand, China and Japan all show significantly different results over a similar period after the Asian crisis, with the emerging economies of China and Thailand displaying much lower returns compared to Japan.

**Table 1: Summary of IPO long-run performance**

| Country | N | Period | Return | Measurement tool |
|---|---|---|---|---|
| United States | 109 | 1975-1984 | -29% | CAR/BHAR |
| Switzerland | 1526 | 1983-2000 | 7.5% | BHAR |
| Germany | 218 | 1977-1995 | -12.7% | BHAR |
| Germany | 153 | 1990-2001 | -32.8% | BHAR |
| Spain | 43 | 1990-2001 | -36.7% | BHAR |
| United Kingdom | 252 | 1991-1995 | -21.3% | CAR |
| Thailand | 43 | 1999-2005 | -41.7% | BHAR |
| China | 335 | 1997-2001 | -29.6% | BHAR |
| Japan | 433 | 1998-2001 | -18.3% | CAR |
| Malaysia | 258 | 1992-1996 | +41.7% | CAR |
| Greece | 108 | 1993-1997 | +54.9% | BHAR – 1 year period |

## 2.2 The effect of size of issue on performance

The majority of studies regarding the performance of IPOs also attempt to assess the potential factors that contribute to this return. Some factors that may affect the performance in one market may not have a similar affect in a different market. Several factors that were identified by researchers performing long run performance of IPOs in specific markets were identified in the previous section together with the quantitative results that they estimated. Some of the more pertinent factors will be discussed here, as well as other factors that were identified from research not discussed previously.

The size of the firm has been shown to have an effect on the long run performance of IPOs. The larger the offer characterised by the IPO (offer size is used as a proxy for firm size in this context) the less risky the offer as it is indicative of a more established firm (Carter, Dark and Singh, 1998). Vithessonthi (2008) in his investigation of IPOs in Thailand (2008) divides his sample into three subsamples based on the size of the firms. He noticed that differences in returns were observed across his three different subsamples in the long run. Drobetz et. al. (2005) also showed that the small firms in his study contributed significantly to the underperformance. He proved this by using a small market capitalization index to eliminate the underperformance.

Goergen *et. al* (2007) also found from his study of IPOs in the UK that small firms suffered from a greater level of underperformance than larger firms. Corhay *et. al.* (2002) investigated companies with low book-to-market ratios in Malaysian IPOs and reported on the correlation with low long run performance.

In his research into the emerging Chinese market Cai *et. al.* (2007) found a negative coefficient for offer size in his regression model. This implied that the larger the offer size of IPOs in his sample, the worse the long run performance was. This result is contrary to the results obtained by the studies discussed above by Drobetz *et. al* (2005) and Goergen *et. al.* (2007). However it does agree with research performed by Bessler and Thies (2007) where they found that the magnitude of the abnormal returns increases; i.e. becomes more negative as the proceeds of an IPO increase. However, this was not consistent as the group with the largest proceeds did not reflect the group with the largest underperformance.

## 2.3 The 'hot issue' effect

Another phenomenon also observed is that of the 'hot issue' markets. This approach suggests that there is a window of opportunity where companies take advantage of bullish markets where IPOs are highly valued (Jaskiewicz *et. al*, 2005). Due to the high demand for stocks that are created by these optimistic investors, 'immature' companies issue IPOs in an attempt to raise capital. IPOs that are issued during these years are likely to underperform other IPOs that were issued in pre or subsequent years (Ritter, 1991).

One of the first investigations into the 'hot issue' effect was performed by Ibbotson and Jaffe (1975). There have been numerous studies that followed which were dedicated to the study of 'hot issue' markets.

Bessler and Thies (2007) also investigate the 'hot issue' market effect and found no evident relationship between the number of issues in a specific period and the performance of the IPO. They did however consider IPOs in specific periods rather than specific years. The results could also be influenced by the time period chosen. In this respect there was a distinct difference between the performance of IPOs listed in different periods, with IPOs listed in the last period displaying negative results and the initial IPOs indicating positive results with the intermediate periods showing a similar trend.

There have also been suggestions that hot and the subsequent cold IPO periods are actually cyclical. The actual cyclical nature and frequency and signalling will be unique for each market. Guo *et. al.* (2009) aimed to determine these cycles for IPOs in China. One of the rationales is that following periods of

high returns are high IPO volumes. They also argue that issuers prefer to go public immediately after a period of high returns as they aim to raise more money than if they issued shares at another time when subsequent lower returns in the IPO market was achieved.

Ritter's study (1984) over a 23 year period, in attempting to account for the high returns shown during a 15 month window starting in 1980, also indicate strong evidence for the cyclical nature of hot and cold cycles. His time series data indicates a strong auto correlation coefficient for the monthly average initial returns. The coefficient is even stronger when the volumes of IPOs per month were considered. His data also suggests that periods of high volume tend to follow periods of high returns.

By employing a Markov regime switching model, Guo *et. al.* (2009) found that there were two hot periods, three 'quasi' hot periods, five cold periods and one 'quasi' cold period for the period between 1994 and 2004. A 'quasi' period was defined as a period between three and six months; this was done as a hot or cold period was defined in the design of the study to be a period of six months.

How (2000), in her study of mining IPOs in Australia finds that the return for these companies was highly dependent on the year of listing. Although she reports only on initial returns (underpricing) in her research, this is still an indication that the hot issue effect exists for IPOs in Australia. The highest initial returns were observed during the years with the highest IPO activity indicating the correlation between IPO performance and IPO activity.

Derrien (2005) attempted to model the pricing of IPOs in hot market conditions. His study was pre-empted by the large volume of IPOs issued in the US in 1999 and 2000. The model uses investor sentiment after periods of high initial returns to create a bullish market for current IPOs resulting in higher issue prices. The combination of this public information and the private information collected during the IPO process show that these IPOs are overpriced (in relation to the intrinsic value of the company) and yet still show high initial returns. For this reason, Derrien proposes that IPO issuers during hot periods are not concerned about leaving money on the table as they know their IPOs have been overpriced due to the prevailing favourable market conditions.

Although the reasons for 'hot' and 'cold' cycles are unclear, Alti (2005) suggests that this phenomenon can be attributed to information spill overs. By this he implies that information generated for a set of pioneers, makes it easier for the valuation of followers and hence makes those IPO processes easier.

This is reiterated by Ritter (1984) (see section 2.4 below) who says that 'hot' markets are usually dominated by IPOs in a specific industry. Alti (2005) explains further by implying that many firms do not necessarily go public during 'hot' cycles because they need funding at that time, but because they aim to take advantage of the prevailing market conditions and thus aim to capitalise on the sentiment by pricing their offers higher and thus leaving less money on the table.

The inference of 'hot' markets by Alti (2005) is not only specific to a defined industry in the market but also according to the pioneering IPOs to those of

emerging or new industries. The hypotheses that IPOs in new or emerging industries outperform IPOs in established industries was investigated by Ang and Boyer (2009) and Finkle and Lamb (2002). Their research is further discussed in section 2.4 below.

Using a sample of IPOs between 1975 and 2000, Helwege and Liang (2004) use a three month moving average of IPO volume to detect 'hot' and 'cold' cycles. Their research reaffirms the theory that IPOs in 'hot' cycles have lower long run performance than those from 'cold' cycles.

They also find that IPOs of companies in 'hot' cycles have lower capital expenditure, lower Research and Development ratios, are the same age at the time of going public and do not exhibit higher sales growth or profits in the five years after going public than cold market IPOs. There is thus no evidence that 'hot' cycle IPOs are more likely to be start-ups in highly innovative industries, i.e. new or emerging industries as investigated by Ang and Boyer (2009) and Finkle and Lamb (2002).

## 2.4 Performance of IPOs in different sectors

IPOs are used to allow a company to go public. Companies can be in any industry or sector, and for this reason several researchers investigated if the performance or returns from one sector differed from the returns of IPOs from other sectors.

A study by Kiymaz (2000) on the listing of IPOs on the Istanbul Stock Exchange between the years 1990 and 1996 showed differences in initial returns and after market returns between the different sectors of Industrials, Financials and others. Each sector was further subcategorised and analysed. He found that initial returns were higher for the financial sector (15%) than for industrials (11%).

He also noticed that sectors that enjoyed high initial returns showed lower (negative) returns after three months, so the higher the initial returns the worse was the longer term underperformance.

Another study by Ritter (1984) indicates a distinct industry effect for natural resource IPOs in 1980 in the USA. Initial returns of 48.7% were observed for this industry. His paper looks at the hot issue period during 1977-1982, where a specific 15 month window period encompassed IPOs that showed an initial 48.7% return whereas the remainder of the years in his sample period only showed returns of 16.3%.

Ritter (1984) initially proposes that this return can be attributed to unusually large risk associated with these companies; however his research dismisses this theory in favour of the one that supports the fact that these IPOs were specific to one industry at that time, i.e. the natural resources industry.

Ang and Boyer (2009) look at the industry segmentation in a different way, by not looking at different sectors, but by comparing IPOs in new industries to those in established industries. Their argument for this is that companies in new industries can be viewed as growth companies, and will attract investors, which

will include venture capitalists due to their promise of higher returns. This choice was also pre-empted by the dot.com bubble, where the new industry at that stage was internet based companies that enjoyed exceptional returns before their inevitable demise.

Ang and Boyer (2009) reported in their research into US IPOs listed between 1970 and 2002 that IPOs in new industries provided a return of 17.5% over five years whereas IPOs in established industries only showed a return of -10.1%. The return for IPOs in new industries also showed positive returns from year three to five and only the first two years indicating negative returns. The return for IPOs in established industries were negative over all five years.

A similar study was done by Finkle and Lamb (2002). They compared the long run aftermarket performance of IPOs in emerging industries to those in non-emerging industries. Emerging industries during the period between 1993 and1996 included the population of biotechnology, semiconductor and internet IPOs. Contrary to the results of Ang and Boyer (2009), Finkle and Lamb found that the returns from emerging IPOs after a year were worse than that of non-emerging IPOs. Performance for both industries was negative.

How (2000) performed research into the performance of 130 mining IPOs in Australia between 1979 and 1990. Although she does not prepare a comparable investigation between different sectors in her research, she compares her findings to that of a previous report performed on IPO performance of companies in the industrial sector.

Her sample of data was also collected over the same period as those from the industrial sector study. She cites Finn and Higham (1988), who found in their study of Australian IPOs a return of -6.5% over the first year after listing.

A three year study Lee, Taylor and Walter (1996) also found a poor long run performance after three years. How (2000) finds that over 36 months mining IPOs underperform the market by 36% using CAR and 20% when BHAR was used. Thus the mining sector in Australia displayed a marked difference in performance between the long run performance of companies listed in the mining sector and those in the industrial sector.

The results are also similar to those reported by Kiymaz (2000) where the IPOs that displayed poor long performance showed high initial underpricing. The mining IPOs were more highly underpriced than the industrial IPOs.

Helwege and Liang (2004) find in their research into IPOs listed between 1975 and 2000 that those in ‘hot’ and ‘cold’ cycles are drawn from the same handful of industries. They also find that there is more evidence of industry concentration in ‘cold’ markets as opposed to ‘hot’ markets. They explain this anomaly by suggesting that many industries have their ‘hot’ cycles at the same time, and that innovations are likely to be enjoyed across industries rather than by one specific industry only. This theory is further emphasised by the fact that ‘hot’ cycle IPOs were not dominated by start-up companies, implying weak support of the new or emerging industries theory discussed above.

There are many other factors that have been shown to have an influence on the long run performance of IPOs. Bessler and Thies (2007) found that there was a

positive correlation between subsequent financing activities and the future performance of IPOs. Cai *et. al.* (2008) stated that Chinese companies can manipulate the issue process with the knowledge that earnings per share prior to listing, the decision to switch investment banks at the time of issue and the availability of shares to foreign investors were all variables that influence the underperformance of IPOs.

Singh and Van der Zahn (2009) found from their study of Singapore IPOs that there was a negative association between the level of intellectual capital disclosure and the long run returns for investors. The writers suggested that this could be related to investors' optimism which increased the initial underpricing in the short run. However, as the share price was driven upward, investors were likely to discount their shares more aggressively to correct the initial higher mispricing.

Yip, Su and Ang (2009) found that IPOs that were backed by leading investment banks indicated more pronounced short term price momentum and long term price reversal (i.e. long term underperformance). However they suggest that investors could earn above market related returns if they divest just before the lockup period. Their study was only performed for an investment period of one year and hence was not discussed in the previous section.

Daily, Certo & Dalton. (2005) indicated several other factors that could also contribute to long-run performance of IPOs. For example, the Chief Executive Officer (CEO) of the firm, who will be scrutinised with regards to his ability to adapt to a more professional management role. The business acumen of both

the CEO and other managers will thus be tested. Firms of CEOs who are perceived as ill equipped to make this transformation, will be seen as more risky in terms of investment.

The proportion of equity that is retained by the CEO at the time of the IPO is another variable and can be seen as an indicator of the confidence he has in the organisation. The board size and composition can also be contributing factors. The influence of venture capital on the performance of a firm is also important. A firm that has a large proportion of venture capital funds is seen as less of a risk as venture capitalists are seen as active investors who will tend not to pursue uncertain investments (Daily et. al., 2005). This was not substantiated by Wong and Wong (2008), as they did not observe any correlation between venture-backed IPOs and performance in Hong Kong.

# 3 Research Hypotheses

The primary aim of this research is to investigate the long run performance of IPOs in South Africa. Following from the literature, an assessment of this performance over a three year period will be employed as this was shown to be a standard evaluation period. Secondary objectives include the effect of offer size on the long run performance. The 'hot issue' effect will also be analysed for its effect on after market returns. The final objective is to determine whether or not IPOs in different sectors or different industries provide different long run performances.

## 3.1 Hypothesis 1

To evaluate the long run performance, the buy and hold abnormal return (BHAR) measurement technique as well as the cumulative abnormal return (CAR) will be used. Both these results will be compared to a benchmark to determine the level of performance. A BHAR and CAR of zero indicates that there is no difference between the IPO and the benchmark. A description of the measurement techniques as well as the relevant benchmark will be discussed in Chapter 4.

Hypothesis 1: The CAR and BHAR for IPOs in South Africa are equal to zero.

H0: $\mu_{IPO} = 0$

Ha: $\mu_{IPO} < 0$, $\mu_{IPO} > 0$

### 3.2 Hypothesis 2

One of the main factors affecting IPO performance which was highlighted in section 2 was the size of the offer. Therefore the effect of offer size on long run performance of South African IPOs will be evaluated. The gross proceeds will be used as a proxy for firm size. A reasonable assumption for this proposition to be feasible is that the long run underperformance exists, therefore BHAR will be negative. The method adopted is to segment the gross proceeds into different groups and then to determine if there are significant differences between these groups of proceeds. This was the same approach adopted by Vithessonthi (2008).

Hypothesis 2: Groups of different size proceeds do not provide different returns.

H0: $\mu_1 = \mu_2 = \mu_3 = ... \mu_n$ (where 1,2...n are the number of groups of gross proceeds)

Ha: $\mu_1 \neq \mu_2 \neq \mu_3 \neq ... \mu_n$

### 3.3 Hypothesis 3

The prevalence of any 'hot issue' period is also an area of interest to investors, as this will give them insight of the future performance on an IPO based on when it was issued. The phenomenon can be investigated for years that display higher than normal IPO activity. From section 2.3 it was noted that the 'hot' cycles produce high initial returns, however the long run performance was poor.

Hypothesis 3: There is no relationship between BHAR and IPO activity.

Model: $BHAR = \beta_o + \beta_1 X$

H0: $\beta_1 = 0$.

Ha: $\beta_1 \neq 0$

### 3.4 Hypothesis 4

The long run performance of IPOs in different sectors of a market can produce different results. The objective here is to determine if these differences are present for IPOs across the different sectors that exist in the South African market.

Hypothesis 4: The long run performance of IPOs across different sectors is the same.

H0: $\mu_{si} = \mu_{sj} = ... = \mu_{sn}$ (where $\mu_{si,j}$ = BHAR for sector i, j, $i \neq j$. i,j = 1 to n, n = number of sectors in sample)

Ha: $\mu_{si} \neq \mu_{sj} \neq ... \neq \mu_{sn}$

# 4 Methodology

## 4.1 Research design

The aim of the study is to determine the long run performance of IPOs in South Africa. The research design adopted is thus a quantitative one due to the data analysis required. In order to determine the long run performance of IPOs, information on share price history and that of a benchmark is required.

Information on new issues was obtained from the Johannesburg stock Exchange (JSE). Monthly share price data was then downloaded from the McGregor BFA website. The raw monthly return for each company was then calculated. A broad market index in the form of the JSE All Share Index (ALSI) was used as the benchmark to adjust the data and provide the abnormal returns required. This is the general procedure used to estimate IPO performance and adopted by most researchers as discussed in section 2.1 when long run performance of IPOs was estimated.

A descriptive quantitative design was used for hypothesis 1 and a causal quantitative design was used for hypothesis 2, 3 and 4.

To determine the long run performance, descriptive statistics were used to determine the mean return (CAR and BHAR) and using t-statistics for the level of significance.

An analysis of variance (ANOVA) will be used to determine if there are differences between the performances of IPOs in groups of different gross proceeds.

To determine if a 'hot issue' period exists in the sampling period, years that indicate high IPO activity will be used to estimate if the companies that listed during these years will show higher levels of underperformance compared to companies listed in other years. Thus a regression analysis was used to determine if a relationship exists.

An ANOVA will be used to assess differences in performance between different sectors.

## 4.2 Population, Sampling and Unit of Analysis

### 4.2.1 Unit of analysis

The unit of analysis for this study is a recently listed company's monthly closing share price. The company had to be listed within the sampling period of the research.

### 4.2.2 Population

The population consists of all IPOs that have been issued in South Africa.

### 4.2.3 Sample

For the purposes of this study the sample is all new listings on the main board of the JSE from July 1995 to 2006. The end date was chosen as it will provide the required three years of return information. The start date was chosen as this

was the period from which the All Share Index data was available. The IPOs listed on the Alternate Exchange (AltX) of the JSE were not considered as the AltX index data was only available for 1996. There are therefore 12 years of data available. The initial sample from July 1995 to December 2006 contained 375 IPOs. However, due to companies delisting within the 36 months of going public, the sample was reduced to 229 IPOs. The number of IPOs per year is shown in Table 2.

**Table 2: Number of IPOs per year (www.jse.co.za)**

| Year | No. of new listings | Year | No. of new listings |
|---|---|---|---|
| 1995 | 4 | 2001 | 8 |
| 1996 | 20 | 2002 | 8 |
| 1997 | 35 | 2003 | 6 |
| 1998 | 61 | 2004 | 11 |
| 1999 | 40 | 2005 | 11 |
| 2000 | 8 | 2006 | 17 |

### 4.3 Measurement Techniques

The two most important aspects in determining the performance of IPOs is the selection of the appropriate methodology and secondly to compare these results to an appropriate benchmark for the firm. Results obtained from previous

studies have been shown to be sensitive to both the methodology used as well as the benchmark (Bessler and Thies, 2007).

The benchmark that was used is the All Share Index (ALSI) for companies listed on the main board of the JSE. It was decided to use the ALSI as it provides a simple yet robust method of assessing the abnormal returns. Using a broad index also allows comparisons to be made across different sectors.

The BHAR and the CAR have been the most popular measurement tools used to estimate the long run performance of IPOs. For this study an attempt will be made to calculate both. BHAR measures a compounded return and CAR is a summing return, however the results obtained over a shorter period are similar as depicted by Ritter (1991).

Buy and hold returns are frequently used in modern event studies. Fama and French (1992) caution that problems with long-term BHARs are most acute due to the fact that such returns compound any model's inability to accurately describe short term returns. BHARs can lead to long-term statistically significant abnormal performance even when none are present due to short-term influences. Kothari and Warner (1997) also find that long-horizon buy and hold abnormal returns are significantly right-skewed, although cumulative returns are not. Fama (1998) and Mitchell and Stafford (2000) reiterate that CARs and time-series regressions are less likely to yield spurious rejections of market efficiency than BHARs by compounding single period returns at a monthly frequency. The buy-and-hold method can magnify underperformance even if it occurs in only a single period as a consequence of compounding single-period returns.

Therefore the main advantage of looking at BHARs is that, of our abnormal performance measures, they most accurately simulate the effect of an event on an investor's portfolio (due to compounding). CARs, however, help avoid the problems of extreme skewness introduced by BHARs and therefore are helpful in double-checking any conclusions presented by BHARs results. Performing both techniques also provides a test of robustness for the results obtained (Choi and Nam, 2006). This test of robustness was therefore the motivation for using both techniques.

Fama and French's (1996) three factor model is a new model compared to BHAR and CAR and is becoming popular in some studies; however Loughran and Ritter (1995) argue that this model is the least powerful test of market efficiency and hence will not be used in this study. The debate on the applicability of the different models is further investigated by Moshirian, Ng and Wu (2008) who find that BHARs, CARs and returns based on matching firms all produce different results.

The matching firm approach may be seen as more robust model, however it is not as widely employed in the research as in most cases it is difficult to find firms that match those in the sample.

### 4.3.1 Long run performance

For the purposes of this study, it was decided that the utilisation of the BHAR and CAR will be sufficient as it will provide a general outlook on the performance of IPOs. A recommendation for further research will be for a matching firm approach to be used to compare the results obtained with this assessment.

A summary on the derivation for BHAR is given by Singh and Van Der Zahn (2009) which is outlined below.

The holding period return (BHR) for a single stock is calculated for the period T as follows:

$$\mathrm{BHRT_{i,T}} = [(1 + \mathrm{Ri}, 1)(1 + \mathrm{Ri}, 2) \ldots (1 + \mathrm{Ri}, \mathrm{T})] - 1$$

Which can be rewritten as:

$$\mathrm{BHRT_{i,T}} = [\prod_{t=1}^{T}(1 + \mathrm{R_{i,t}})] - 1$$

Where $R_{i,t}$ is the return of stock *i* at time *t* and *T* is the time period for which the *BHR* is calculated. For an equally weighted portfolio of stocks, returns are calculated as follows:

$$\mathrm{dBHR_{P,T}} \frac{1}{N} \sum_{i=1}^{N} BHR_{i,T}$$

where $dBHR_{P,T}$ is the average *BHR* of the portfolio, *N* is the number of stocks in the portfolio and *T* is the time period for which the *BHR* is calculated.

In order to calculate BHAR, the return of the benchmark is subtracted from the return of the IPO.

$$\text{BHAR} = \frac{1}{N}\sum_{i=1}^{N}[\prod_{t=1}^{T}(1+R_{i,t})) - (\prod_{t=1}^{T}(1+R_{M,t}))]$$

The advantage of using this method was that the terminal values of investing in both the IPO and the benchmark were compared (Bessler and Thies, 2007).

A simple t-test is used to test the null hypothesis of zero mean market adjusted (Kirkulak, 2008):

$$\text{t} = \frac{\overline{\text{BHAR}_{\text{t}}}}{\sigma(\text{BHAR}_{\text{i,t}})/\sqrt{\text{n}}}$$

Where $\sigma(BHAR_{i,t})$ is the standard deviation of the buy and hold market adjusted returns and n is the sample size.

Kirkulak (2008) also provides the following summary on the derivation for CAR. The market adjusted return for stock i in event month *t* is defined as:

$$\mathrm{ar}_{i,t} = \mathrm{r}_{i,t} - \mathrm{r}_{m,t}$$

The average market adjusted return on a portfolio of *n* stocks for event month *t* is the average of the market adjusted returns:

$$\mathrm{AR}_t = \frac{1}{n}\sum_{i=1}^{n} \mathrm{ar}_{i,t}$$

The CAR from month *q* to month *s* is thus defined as:

$$\mathrm{CAR}_{q,s} = \sum_{t=q}^{s} \mathrm{AR}_t$$

The t-statistic for CAR in month *t* is computed as:

$$t_{\mathrm{CAR}_t} = \mathrm{CAR}_t \text{ x } \sqrt{\frac{n_t}{t \text{ x var} + 2 \text{ x } (t-1)\text{x cov}}}$$

Where *var* is the average of the cross sectional variances over 36 months of the $ar_{i,t}$ and *cov* is the first order auto covariance of the $AR_t$ series.

### 4.3.2 Determining the effect of offer size on performance

After the BHAR was calculated the results were used to determine the effect of offer size on the long run performance. An ANOVA was used to determine if differences existed between groups of different size firms.

The offer size or gross proceeds was calculated as follows:

Gross proceeds = Offer price x number of shares in issue

### 4.3.3 Determining the 'hot issue' effect on long run performance

A regression model with BHAR as the dependent variable and number of IPOs per year as the dependent variable was used to determine if any relationship between these variables existed.

### 4.3.4 Determining if different sectors provide different returns

The IPOs listed in the sample period were provided by the JSE according to the sector that they were in. These sectors were classified on a low level and hence were large in number, with many sectors only consisting of a few firms. The

IPOs were therefore reclassified on a higher level, thereby allowing more companies to be grouped together so that a better comparison could be made between the sectors. Once the IPOs were grouped according to sectors, the BHAR for each was calculated and the difference in means was determined to assess if there was any significant difference in long run returns between the different sectors.

# 5 Results

The long run performance for the IPOs in the sample period was calculated using BHAR and CAR. Both of these measures were only used to satisfy the primary objective. For the secondary objectives only the BHAR variable was used, as it was not necessary to adopt both measures to establish any relationship between the returns and the variables in question. This was justified by the robustness test that will be discussed later on.

## 5.1 Long run performance

The sample period used was for IPOs listed between 1995 and 2006. Only those listings that provided three years of share price data was included in the sample. Where companies were delisted within the three years, these listings were not included in the sample.

Table 3 shows the results per month for BHAR and CAR. The BHAR values revealed below were estimated by first calculating the BHAR per month for each company and then averaging these over the number of samples. This was done for months 1 to 36. The CAR values were calculated in a similar way as for BHAR, however a further step was required to cumulate the results for each month from month 1 to 36.

**Table 3: Monthly returns for BHAR and CAR**

| Month | BHAR | t stat | CAR | t stat |
|---|---|---|---|---|
| 1 | 0.02 | 0.476 | 0.02 | 0.452 |
| 2 | 0.04 | 0.717 | 0.02 | 1.382 |
| 3 | 0.04 | 0.790 | 0.01 | 0.871 |
| 4 | 0.06 | 1.011 | 0.02 | 1.501 |
| 5 | 0.09 | 1.329 | 0.03 | 1.799 |
| 6 | 0.14 | 1.972 | 0.06 | 4.113 |
| 7 | 0.13 | 1.825 | 0.05 | 4.616 |
| 8 | 0.09 | 1.285 | 0.03 | 2.180 |
| 9 | 0.09 | 1.190 | 0.03 | 1.829 |
| 10 | 0.08 | 0.982 | 0.03 | 1.546 |
| 15 | -0.01 | 0.146 | -0.11 | -8.970 |
| 20 | -0.09 | 0.772 | -0.26 | -18.002 |
| 25 | -0.34 | 3.372 | -0.37 | -17.407 |
| 30 | -0.40 | 3.774 | -0.43 | -17.277 |
| 31 | -0.44 | 4.145 | -0.45 | -28.521 |
| 32 | -0.43 | 3.806 | -0.44 | -25.189 |
| 33 | -0.45 | 3.972 | -0.44 | -25.918 |
| 34 | -0.48 | 4.417 | -0.46 | -23.874 |
| 35 | -0.48 | 4.217 | -0.47 | -20.290 |
| 36 | -0.50 | 4.187 | -0.47 | -28.308 |

The above results are shown graphically in Figure 1 and Figure 2.

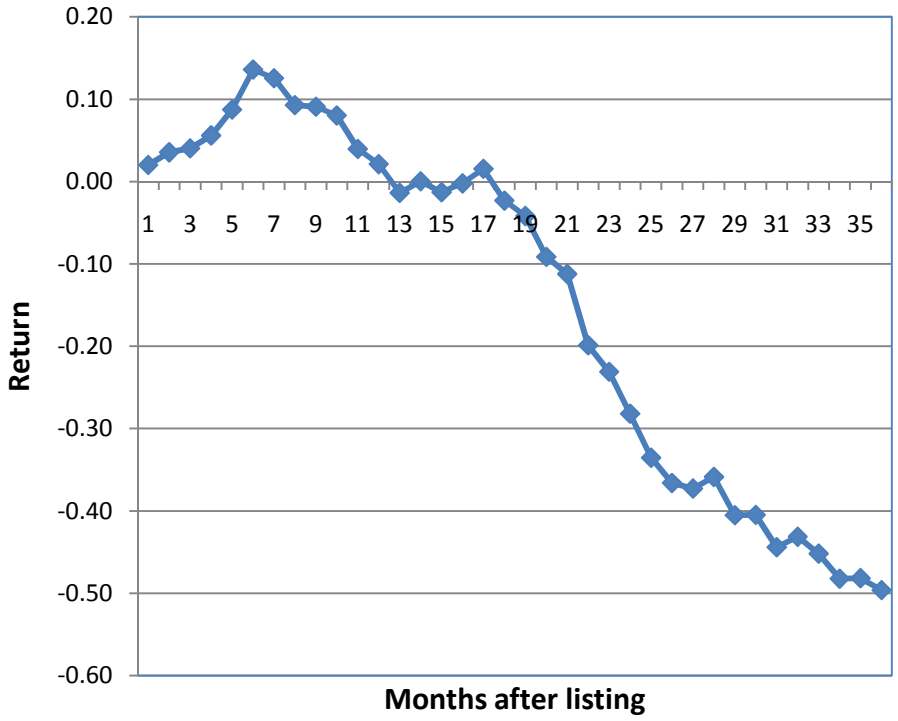


**Figure 1: Buy and Hold Abnormal Returns per month**

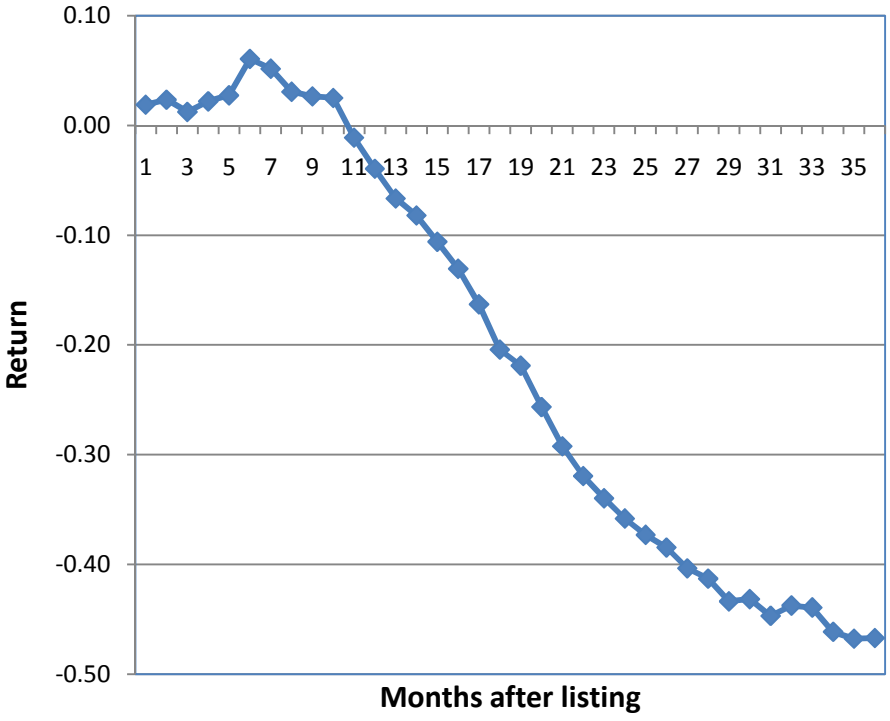


**Figure 2: Cumulative Abnormal Returns per month**

## 5.2 Effect of offer size on performance

The offer size was calculated by using the gross proceeds of the listing. This was estimated by the product of the share price and the number of shares on issue. The largest firm represented by the largest proceeds was Kumba Iron Ore Limited with gross proceeds of R31.1billion. The smallest firm had gross proceeds of R316000.

Figure 3 shows a scatter plot for BHAR vs. gross proceeds. The data is plotted for the 36 month return for all listings against its offer size. The x –axis represents the gross proceeds of the offer in Rands. The notation implies tens of billions, i.e. 10, 20, 30 and 40 billion Rands.

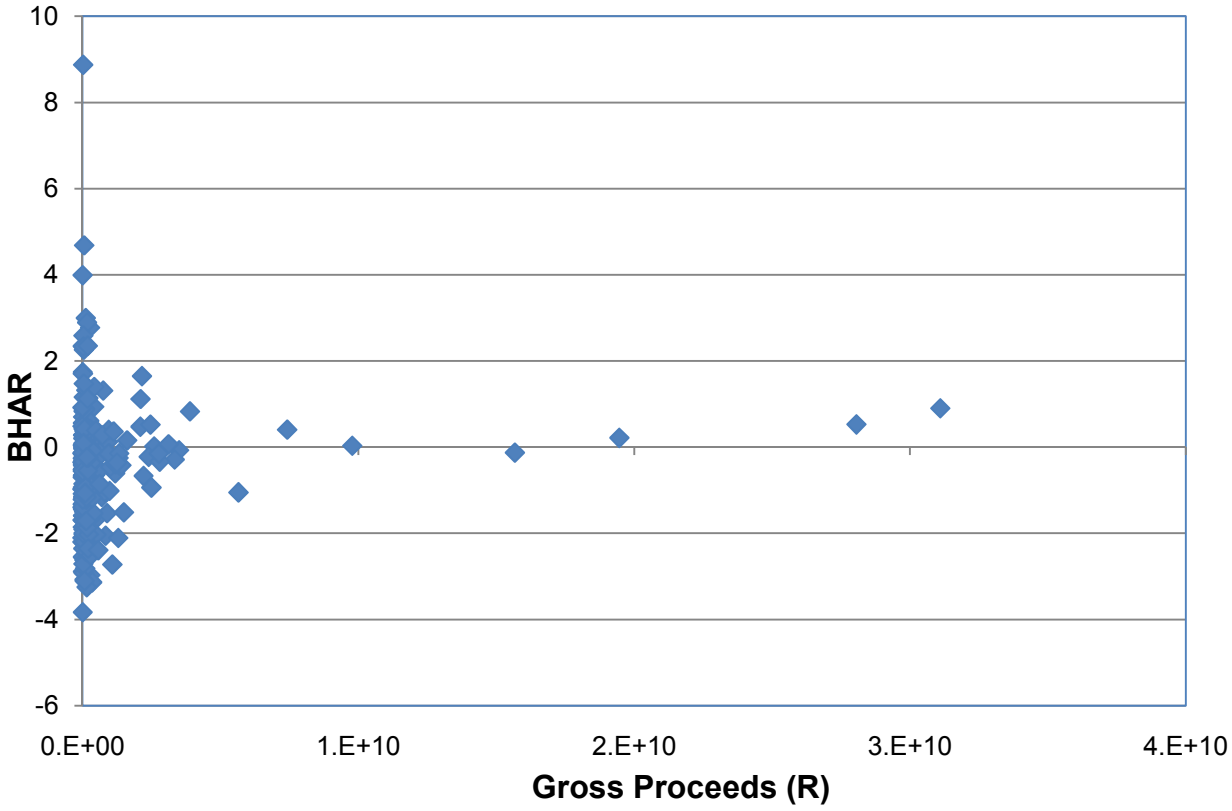


**Figure 3: BHAR for gross proceeds**

The scale in Figure 3 does not allow the data to be seen very clearly. Using a log scale does not provide any clear trends as the log scale would be applied to the independent axis rather than the dependent axis. It was thus necessary to show the data below R5bln as this was where the cluster was evident and this information is displayed in Figure 4.

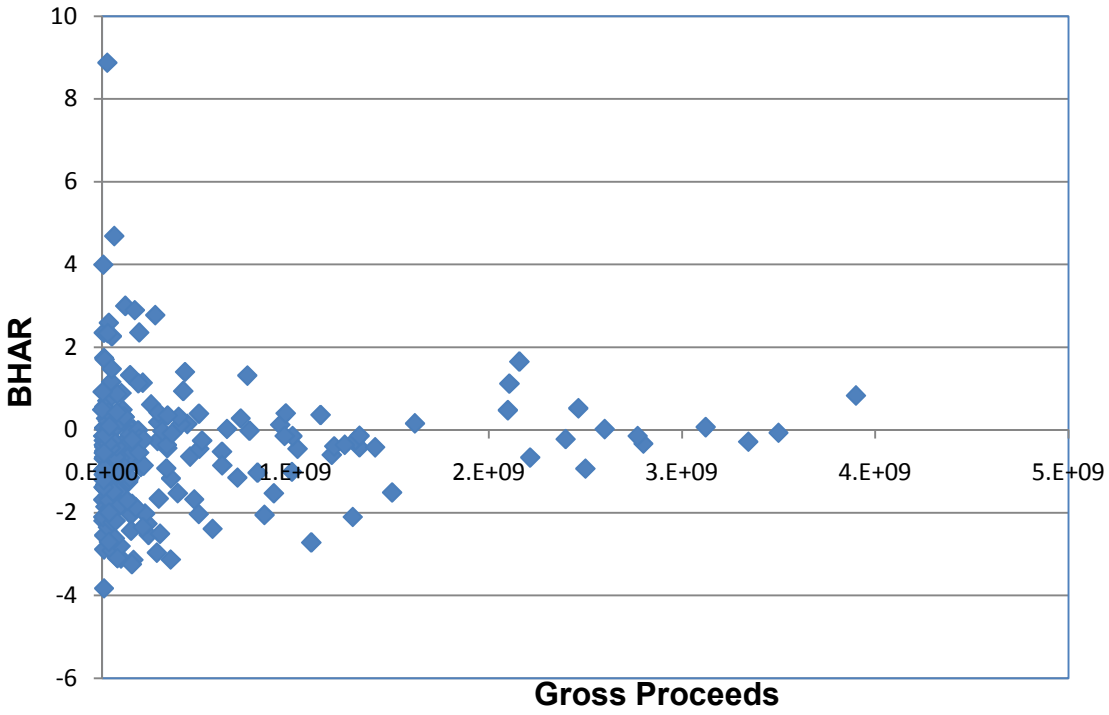


**Figure 4: BHAR for gross proceedings below R5bln**

The above scatter plots do not provide any useful information and it was thus decided to segment the data, and to analyse the results of each segment separately. These segments or categories were gross proceeds up to R100m, R100m to R1bln, and finally those listings with gross proceeds greater than R1bln. These results are shown in Table 4.

.

**Table 4: BHAR for the segmented gross proceeds**

| Gross Proceeds | BHAR | t-stat | n |
|---|---|---|---|
| < R100 M | -0.57 | 2.895 | 104 |
| R100 M - R1 Bln | -0.57 | 3.250 | 86 |
| > 1 Bln | -0.13 | 0.528 | 34 |

It is required to determine if there are any significant differences between the means of these different categories of data. Since there are three different groups, the statistical difference can be tested by using an Analysis of Variance (ANOVA). The results for this ANOVA are shown in Table 5.

**Table 5: ANOVA for difference in BHARs for gross proceeds**

| Groups | Count | Sum | Average | Variance |
|---|---|---|---|---|
| < R100 M | 104 | -59.7221 | -0.57425 | 4.092564 |
| R100 M - R1 Bln | 86 | -49.401 | -0.57443 | 2.686339 |
| > 1 Bln | 34 | -4.53905 | -0.1335 | 2.170771 |

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 23.16419 | 3 | 7.721396 | 3.128758 | 0.026758 | 2.648863 |
| Within Groups | 503.4473 | 204 | 2.467879 | | | |
| Total | 526.6115 | 207 | | | | |

## 5.3 'Hot Issue' effect on performance

The 'hot issue' effect was estimated by considering the number of IPOs that were issued in a particular year. The BHAR for each year was then calculated and the results plotted against the number of issues. The BHAR per year is shown in Table 6. A plot of the BHAR over 36 months from the year of issue against the number of issues are demonstrated in Figure 5

**Table 6: BHAR per number of issues per year**

| Year | n | BHAR | t-stat |
|---|---|---|---|
| 1995 | 4 | 0.22058 | 0.40645 |
| 2003 | 6 | 2.794785 | 1.59663 |
| 2000 | 8 | -0.32007 | 1.59092 |
| 2001 | 8 | 0.631054 | 0.871792 |
| 2002 | 8 | 3.296693 | 1.815406 |
| 2004 | 11 | -0.93032 | 3.631986 |
| 2005 | 11 | -0.19302 | 0.262521 |
| 2006 | 17 | -0.06995 | 0.358379 |
| 1996 | 20 | -0.00183 | 0.004906 |
| 1997 | 35 | -0.68084 | 2.02096 |
| 1999 | 40 | -0.76489 | 6.753448 |
| 1998 | 61 | -1.34552 | 23.25765 |

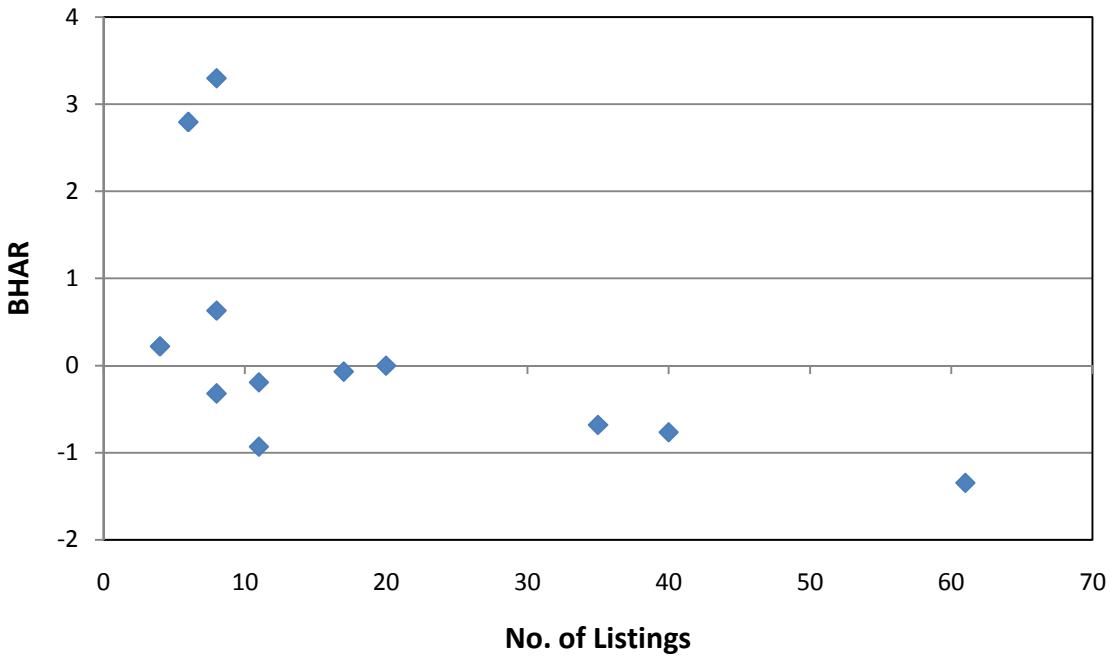


**Figure 5: BHAR vs. the number of listings**

To determine the relationship between the two variables shown in Figure 5, a linear regression analysis was performed. From an initial observation of the above figure a linear relationship is discernible for data points below 1.

A linear trend line was added to the plot and this is shown in Figure 6. The statistical analysis in regression is summarized in Table 7.

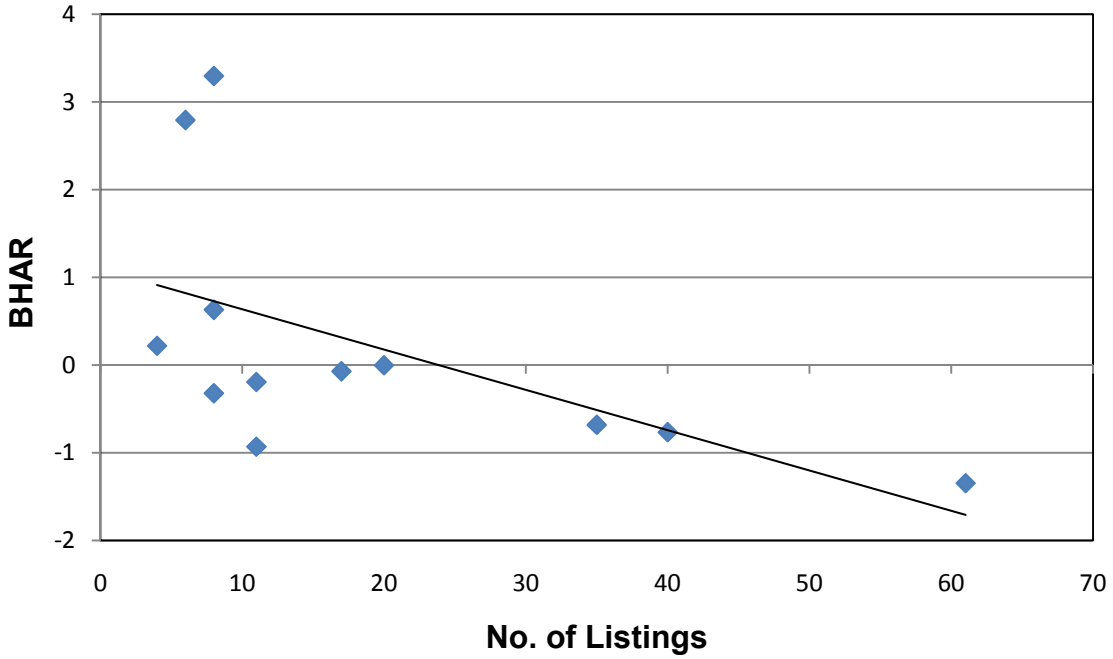


**Figure 6: BHAR vs. the number of listings including linear trendline**

**Table 7: Regression statistics for 'hot issue' effect**

| | | | | | | |
|---|---|---|---|---|---|---|
| Multiple R | 0.561497 | | | | | |
| R Square | 0.315279 | | | | | |
| Adjusted R Square | 0.246807 | | | | | |
| Standard Error | 1.23889 | | | | | |
| Observations | 12 | | | | | |
| ANOVA | | | | | | |
| | df | SS | MS | F | Significance F | |
| Regression | 1 | 7.067197 | 7.06720 | 4.6045 | 0.057469 | |
| Residual | 10 | 15.34849 | 1.53485 | | | |
| Total | 11 | 22.41569 | | | | |
| | Coefficient | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
| Intercept | 1.096109 | 0.542872 | 2.01909 | 0.0711 | -0.11348 | 2.3057 |
| X Variable 1 | -0.04592 | 0.021402 | -2.14581 | 0.0575 | -0.09361 | 0.0018 |

## 5.4 Sector Performance

The sample of 229 IPOs were listed according to 85 different sectors as classified by the JSE. These sectors are shown in Appendix A. This number of sectors was too large to analyse and therefore the sectors were reclassified into broader categories. This was a fairly straightforward exercise and required some judgement from the researcher. The revised list after this process consisted of 20 sectors. These sectors are shown in Table 8.

**Table 8: Long run performance per sector**

| Sector | n | BHAR | t-stat |
|---|---|---|---|
| Construction | 5 | -0.37689 | 1.470201 |
| Agriculture and Fishing | 2 | -0.83586 | 18.02537 |
| Education | 1 | -1.76961 | |
| Electronics | 22 | -1.07479 | 7.615613 |
| Energy, Chemicals and Oil | 5 | -0.55137 | 4.143391 |
| Engineering | 2 | -0.23859 | 0.47224 |
| Financial | 52 | -0.76455 | 2.701906 |
| Investment | 6 | -1.2779 | 10.34688 |
| Food | 8 | -0.69559 | 1.263364 |
| Hotel and Leisure | 14 | 0.300159 | 0.322291 |
| Information Technology | 19 | -1.19901 | 10.32085 |
| Media | 8 | -1.02636 | 6.709787 |
| Mining | 21 | 0.75666 | 1.192094 |
| Packaging, Printing and Textiles | 5 | -0.97305 | 5.47589 |
| Pharmaceutical and Medical | 7 | -0.12058 | 0.172087 |
| Property | 23 | -0.31887 | 2.040922 |
| Retail | 19 | -0.4305 | 1.883615 |
| Service | 1 | -0.99215 | |
| Telecommunication | 3 | 1.084885 | 0.887516 |
| Transport | 6 | -0.06438 | 0.081118 |

At a first glance it can be seen that the financial sector with the highest number of observations in the sampling period indicates a very poor return of -76%. The mining sector depicts the opposite return with positive results of 76%. The number of samples in the mining sector was however only 21.

As can be seen from Table 8, the number of samples per sector is insufficient to establish any significant statistical results. It was thus decided to further group the sectors outlined into broader sectors, which provided a higher number samples per sector. This process resulted in the following broad sectors being outlined: technology, industrial, financials and other. It was decided not to group mining into any of these sectors. Firstly, mining does not fit into any of the broad sectors, and secondly, the positive return offered by the mining sector is not reflected by any of the other sectors and hence this positive result will be diluted if grouped unnecessarily.

The new sectors defined above are shown in Table 9. The revised sector is shown in bold, with the sub sectors that it encompasses listed above. A new BHAR and t statistic was calculated for these sectors and is indicated in the table.

**Table 9: New sector groupings**

| Sector | n | BHAR | t-stat |
|---|---|---|---|
| Electronics | 22 | -1.07479 | 7.615613 |
| Information Technology | 19 | -1.19901 | 10.32085 |
| **Technology** | **41** | **-1.13235** | **12.266734** |
| Energy, Chemicals and Oil | 5 | -0.55137 | 4.143391 |
| Construction | 5 | -0.37689 | 1.470201 |
| Packaging, Printing and Textiles | 5 | -0.97305 | 5.47589 |
| Pharmaceutical and Medical | 7 | -0.12058 | 0.172087 |
| Food | 8 | -0.69559 | 1.263364 |
| Engineering | 2 | -0.23859 | 0.47224 |
| **Industrial** | **32** | -0.512265 | 2.458726 |
| Financial | 52 | -0.76455 | 2.701906 |
| Investment | 6 | -1.2779 | 10.34688 |
| **Financials** | **58** | **-0.81765** | **3.212107** |
| **Mining** | **21** | **0.75666** | **1.192094** |
| Agriculture and Fishing | 2 | -0.83586 | 18.02537 |
| Education | 1 | -1.76961 | |
| Hotel and Leisure | 14 | 0.300159 | 0.322291 |
| Media | 8 | -1.03874 | 7.259593 |
| Retail | 19 | -0.4305 | 1.883615 |
| Property | 23 | -0.31887 | 2.040922 |
| Service | 1 | -0.99215 | |
| Telecommunication | 3 | 1.084885 | 0.887516 |
| Transport | 6 | -0.06438 | 0.081118 |
| **Other** | **77** | -0.26368 | 1.323751 |

The results for these sector returns are also shown graphically in Figure 7. The differences between the various sectors can easily be seen from this bar chart, however how significant are these variations in returns? To determine this statistical significance an Analysis of Variance (ANOVA) was performed using Excel. These results are shown in Table 10.

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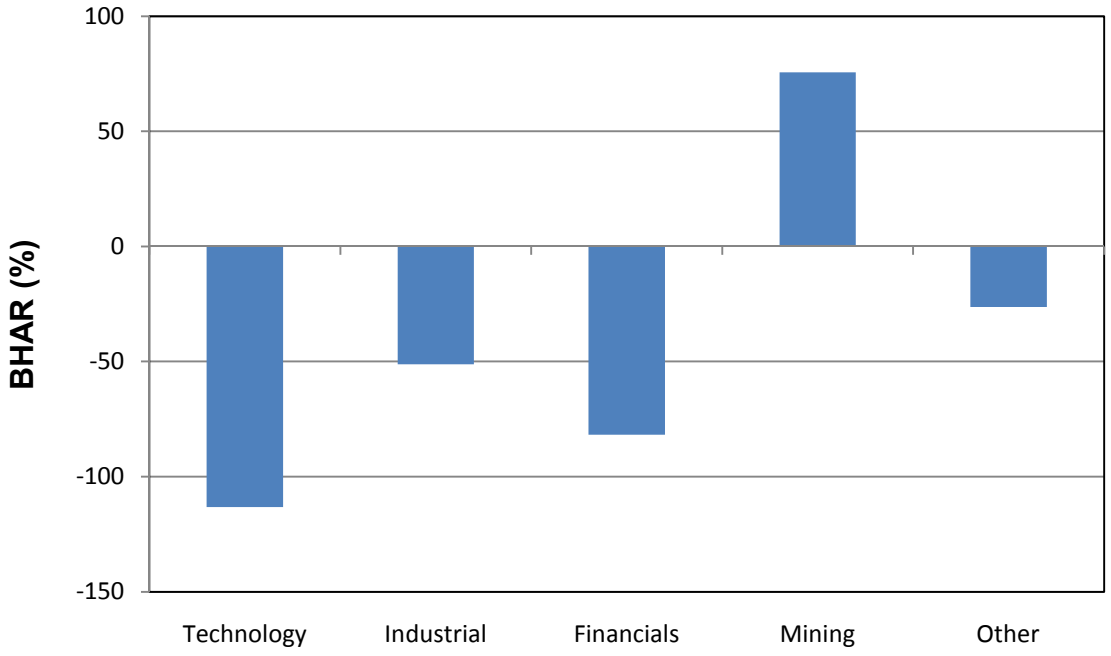


**Figure 7: Calculated BHAR per sector**

**Table 10: ANOVA results for difference in means between sector BHARs**

| Groups | Count | Sum | Average | Variance |
|---|---|---|---|---|
| Technology | 41 | -46.4265 | -1.13235 | 0.349373 |
| Industrial | 32 | -16.3925 | -0.51226 | 1.389053 |
| Financials | 58 | -47.424 | -0.81765 | 3.758266 |
| Mining | 21 | 15.88986 | 0.75666 | 8.460571 |
| Other | 77 | -20.3033 | -0.26368 | 3.055139 |

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 59.71514 | 4 | 14.92878 | 4.971388 | 0.000739 | 2.411948 |
| Within Groups | 672.6587 | 224 | 3.002941 | | | |
| Total | 732.3738 | 228 | | | | |

The high return from the mining sector will lead one to believe that these ANOVA results will be influenced by this single return. It was therefore decided to perform a second ANOVA by excluding the mining sector and to determine if there is any statistical significance between the returns of all the sectors that display negative BHARs. The results from this ANOVA are shown in Table 11.

**Table 11: ANOVA results for sector BHARs (excluding Mining)**

| Groups | Count | Sum | Average | Variance |
|---|---|---|---|---|
| Technology | 41 | -46.4265 | -1.13235 | 0.349373 |
| Industrial | 32 | -16.3925 | -0.51226 | 1.389053 |
| Financials | 58 | -47.424 | -0.81765 | 3.758266 |
| Other | 77 | -20.3033 | -0.26368 | 3.055139 |

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 23.16419 | 3 | 7.721396 | 3.128758 | 0.026758 | 2.648863 |
| Within Groups | 503.4473 | 204 | 2.467879 | | | |
| Total | 526.6115 | 207 | | | | |

# 6 Discussion

The results obtained in the process of meeting the objectives that were set out in chapter 4 were presented in the previous chapter. The context of these results within the scope of the present study as well as in meeting the hypotheses defined earlier will now be discussed. The discussion will follow the same sequence that the results were presented.

## 6.1 Long run performance

The objective for this part of the research was to determine what the actual long run performance of IPOs in South Africa was during our sample period. The long run performance was estimated using both the BHAR and CAR methods. The hypothesis for this objective was the following:

H0: $\mu_{IPO} = 0$

Ha: $\mu_{IPO} < 0$, $\mu_{IPO} > 0$

As a starting point we assumed the null hypothesis was zero for both BHAR and CAR, which implied that the long run performance was the same as the broad market index, which in this case was the JSE All Share Index (ALSI). The long run performance is shown in Table 3 and the results for the BHAR and CAR are shown separately in Figure 1 and Figure 2.

The results for BHAR and CAR follow a similar profile over the 36 month period. Both measures show positive abnormal returns initially consistent with the underpricing and high initial returns prevalent in other markets. BHAR increases steadily to a peak of 14% after 6 months.

CAR also reaches a peak after 6 months; however it does not depict a steady rise to the return of 6%. The return for CAR becomes negative between the tenth and eleventh months after listing. BHAR provide positive returns for a further month before it also becomes negative. The return 'lingers' around the zero mark for a further five months, increasing twice before its steady decline. The return again shows some volatile behaviour after 28 months. The CAR performance shows some erratic performance for the first six months; however it thereafter follows a steep decline.

The reasons for these differences between CAR and BHAR can be seen in the formulas used which were described in section 4.3.1. CAR does not consider compounding and uses the arithmetic average over the sampling period rather than the geometric average used by BHAR. The compounding effect ensures that BHAR is always higher than CAR (see Figure 8). It is only from month 32 that BHAR is observed to fall below CAR.

From Table 3 it can be seen that the returns for BHAR are only statistically significant after 23 months after listing. CAR on the other hand shows significant returns after only 12 months. This is not a concern with regards to this study as we are primarily concerned with the performance after 36 months. These results are very significant as the high t-statistics imply for both BHAR and CAR. The

results are highly significant and negative, despite the positive t-statistic values for BHAR. Recall that these were calculated using an absolute value for BHAR (section 4.3.1), so the high t-statistic implies a significant and negative BHAR, when BHAR was negative.

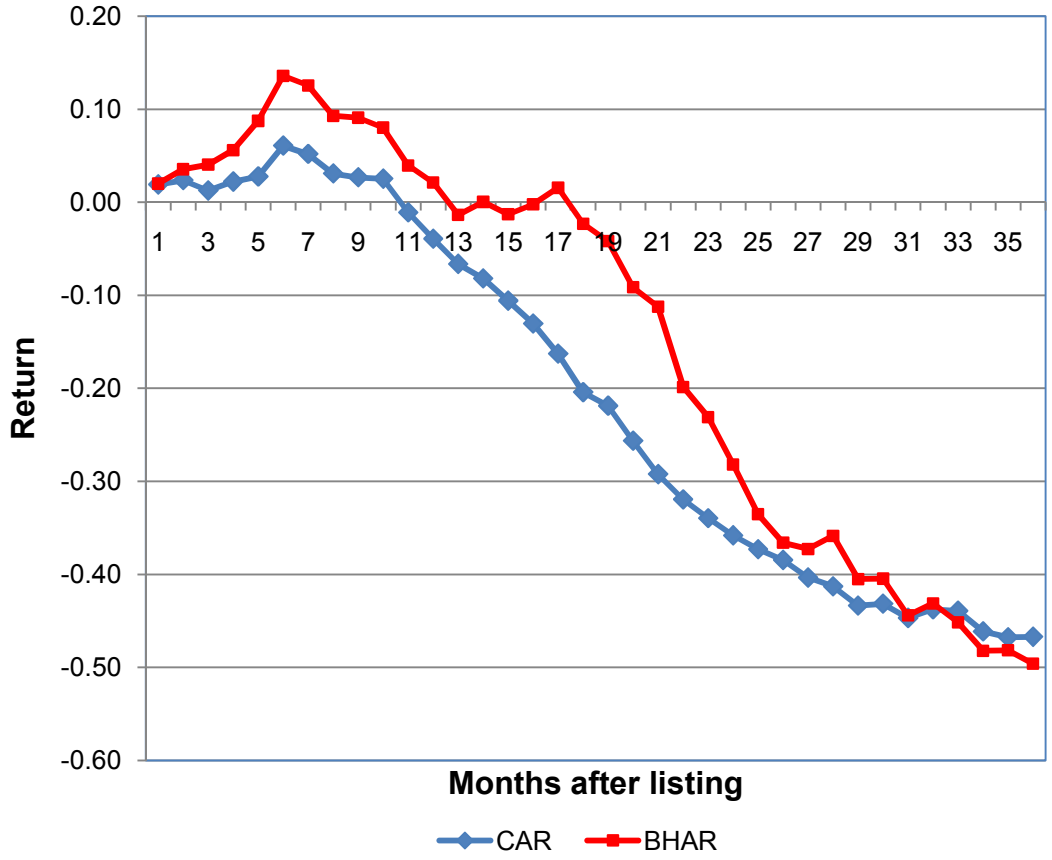


**Figure 8: BHAR vs. CAR performance over 36 months**

The results obtained are consistent with other research as reviewed in Chapter 2 with regards to the negative returns. The returns though are much larger (negative) for both BHAR (-50%) and CAR (-47%) compared to the results shown in Table 1. The results for these two methods are within 3% and therefore over the 36 month period we can assume that this level of consistency

satisfies our robustness test, and BHAR can also be used with a high level of confidence for the remainder of the research objectives.

Comparing the returns above to studies reviewed in chapter 2, the results for Thailand come closest at -42% BHAR (Vithessonthi, 2008). These returns were also obtained within the sampling period used for the present study, and represent that of another emerging economy. The results of China with -30% now look more favourable considering this group of developing countries that it is being compared with (Cai, Liu and Mase, 2008.

In the study undertaken by Drobetz, Kammerman and Wälchli (2005), they estimated the long run performance of 109 Swiss IPOs from 1983 to 2000 and found that the underperformance after three years was only about 7.5%, it increased to 21% after four years and then to 101% after ten years. Based on this trend, the underperformance would have reached 50% after about 6 years of listing.

It therefore took IPOs in South Africa half the time to reach a 50% underperformance that was shown by Swiss IPOs. Of course it may not be practical to compare results across markets as the Swiss IPOs would have used the Swiss market as a benchmark and this study uses the South African market. The time period is also different for both investigations.

IPO or any stock market performance is very dependent on the time period adopted. The political, economic, social and legal environment during the sample period of the country assessed will all have an influence on the expected returns.

South Africa experienced mixed growth rates during the sampling period (see Appendix B) with the period during 2000 to 2006 showing a favourable growth rate and the period 1995 to 1999 showing a declining rate with a low of 0.5% in 1998. Despite the initial poor growth in the sample period, the poor long run performance of IPOs over the 12 years in light of the 'boom' years of growth experienced from 2000 to 2006 is still surprising.

It must also be noted that these results were derived using a broad market index, as noted by Bessler and Thies, (2007). Results may differ if a matching firm approach was used or if specific sector indices were adopted for each different sector. Future research could be performed using other benchmarks or methods and comparing the results to the present research.

The hypothesis that was defined earlier now needs to be accepted or rejected based on the preceding analysis. The null hypothesis for the long run performance stated that the abnormal long run performance measured by BHAR and CAR is equal to zero. From the results it was found that both BHAR and CAR significantly underperformed the market which was approximated with the ALSI as a benchmark. Based on these results the null hypothesis must be rejected. IPOs in South Africa therefore underperform the market.

There are many factors that could explain this underperformance. These were discussed as a supplementary note in chapter 2, and included factors like board composition and venture capital backing. A more concise study is required where these factors need to be explored to determine its effect on the performance of IPOs in South Africa. For such an analysis the long run

performance needs to be calculated using more specific benchmarks which include industry or sector indices as well as a matching firm approach where more accurate estimates of performance can be made.

## 6.2 Effect of offer size on performance

The offer size in terms of the gross proceeds from the listing was used as a proxy for the size of the firm. From Figure 3 it can be seen that the majority of listings were clustered below about R5bln, with no apparent trend visible. Returns appear to be symmetrical about the axis implying positive and negative returns for most of the listings.

The higher offer sizes indicate better returns, with all the offers above about R10bln hovering on the positive return quadrant of the graph. Figure 4 shows the returns for gross proceeds below R5bln which was identified earlier as the area where most of the clustering of data was concentrated. From this figure it is evident that the data is skewed more towards the negative returns which were expected from the results discussed from section 6.1.

Due to the limited information available from these scatter plots and with no distinct pattern evident, it was decided to segment the proceeds as shown in Table 4.

From these results it can already be seen that the difference in returns between the first group (<R100m) and the second group (R100m to R1bln) was the

same with a BHAR of -57%. The group of proceeds above R1bln showed a return of -13%.

To test if there were any differences between the 3 groups of data, an ANOVA was used. The results for the ANOVA was summarised in Table 5.

The null hypothesis defined for this objective of the study is:

H0: $\mu_1 = \mu_2 = \mu_3$ , for the three groups identified, implying that the three means must be equal for the null hypothesis to be true.

The Alternate hypothesis is therefore:

Ha: $\mu_1 \neq \mu_2 \neq \mu_3$

For the hypothesis to be accepted one of the groups must be different from any of the other two. The f-value calculated and shown in Table 5 was higher than the f critical value. This implies that the variance between the means of the three groups of data is larger than the average of the three variances. We can therefore reject the null hypothesis that the means are the same and conclude that there are significant differences at the 95% confidence level between the different groups of gross proceeds.

This essentially suggests that firms with the larger gross proceeds provide better returns than those of smaller sized firms. These results are similar to those of Drobetz et. al. (2005) and Goergen *et. al* (2007) who also found in their

research that smaller firms had higher levels of underperformance in the long run than did larger firms.

Vithessonthi (2008) however found for his study of IPOs in Thailand that the segment he defined for medium sized firms (gross proceeds between 300 million and 600 million Baht) showed the best return of -23%. The small size firm category (less than 300 million Baht) showed a return of -32%. The large firm category (proceeds larger than 600 million Baht) generated returns that underperformed the market by 136%. These results for an emerging market are significantly different from the results found here.

Similar results to Vithesonthi (2008) were reported by Cai *et. al.* (2007) for an evaluation of Chinese IPOs. They also found that the smaller sized firms showed a better performance than the larger sized firms.

Although South Africa is classified as an emerging market, its financial services sector is backed by a sound regulatory and legal framework and so compares favourably to other developed countries. It may therefore not be reasonable to compare IPO performance to other developed countries.

The evidence of larger sized firms producing better results than smaller firms may suggest that investors in South Africa are risk averse and would prefer investing in larger firms where they would expect their money to be safe. Larger firms may also allow bulk buying from asset managers who may look to these large organisations to hedge the risk on their portfolios.

The stronger long run performance of these larger organisations may also imply that the initial returns are low, where investors are looking to hold on these shares for the long run. The initial returns and long run performance should be investigated for different size firms to determine if there are specific patterns in the initial and aftermarket trading of these shares. This was beyond the scope of the present research.

The group of proceeds above R1bln shows returns of -13%, which is significantly different from the returns offered by the other two segments. It will thus be interesting to see if there are noticeable differences within this group. This was not done initially as it would have reduced the sub sample size, which was already small (n = 34) and thus any inferences drawn would not have been statistically significant.

However, having already established that there are differences between small and large firms, it is worth performing a check to see if there are differences within this group. In keeping with our factor of 10 principle of segmenting the IPOs by size, the group of IPOs with proceeds of R1bln and over was further segmented into IPOs with gross proceeds above R10bln.

These results are shown in Table 12. For gross proceeds larger than R10bln which comprised only four firms, the returns were a healthy 37% over 36 months. Although these results are not significant, due mostly to the small sample size, this is still something that investors should be aware of.

There may not be many of these listings in the future, so achieving a healthy sample to draw statistical significant inferences may not be possible in the near

future. For passive investors these IPOs may be desirable as they look to beat the market without having to actively manage their assets.

**Table 12: BHAR for gross proceeds larger than R10bln**

| | BHAR | t-stat | n |
|---|---|---|---|
| R1bln - R10bln | -0.20098 | 0.711045 | 30 |
| > R10 Bln | 0.372607 | 1.313902 | 4 |

## 6.3 'Hot Issue' effect on performance

The results for the 'hot issue' effect are presented in section 5.3. The 'hot issue' effect in essence refers to the high initial returns provided by the higher than normal IPOs listed in a specific period. As discussed by Helwege and Liang (2004) hot cycles are found to result in poor long run performance. Kiymaz (2000) also show that strong initial returns are followed by poor long run performance. This was therefore the underlying theoretical background used to test for the relationship between strong IPO activity and long run performance. The objective here was thus to test if the poor long run performance of IPOs got worse with increased levels of IPO activity. The analytical approach allows a positive return to be accepted; however following the results from section 6.1 a positive return is unlikely.

The number of IPOs listed per specific year is shown in Table 6. The highest number of IPOs was listed in 1998. It should be noted that these are only the

IPOs that were included in the final sample, after IPOs of companies that have delisted before the 36 month window period were removed from the sample. It is thus important to consider the sample IPOs to the total IPOs listed per year.

Figure 9 confirms that the omission of IPOs due to delisting within the 36 month period did not change the trend of the graph, i.e. the number of IPOs relative to other years remained the same. Figure 9 displays a high trend of delisting, with the highest percentage evident in year 1995 with 69%; year 2006 was second with 54%. Year 1995 only considered IPOs from July as this was when the All Share data was available. There were no companies that were delisted within the 36 month period for those IPOs that were listed in 1996 and only one delisting for those companies that listed in 2002. The highest number of companies delisted were from those companies listed in 1998 with 40, however as this was also the year with the largest IPO activity (101) this delisting only represented 40% of all the IPOs.

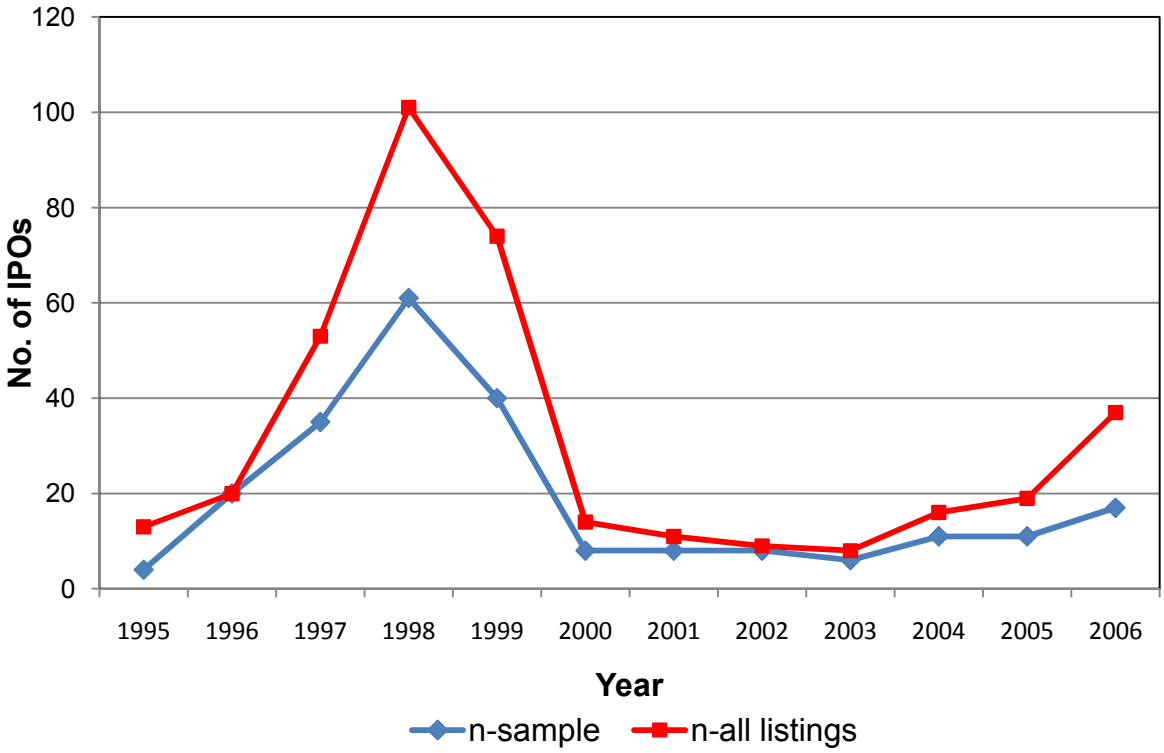


**Figure 9: Sample IPOs vs. all IPOs listed**

Having confirmed that the trend has been maintained with the sample, the results from 5.3 can now be analysed. Figure 5 displays the results for BHAR plotted against the number of IPOs listed in the sample. The number of IPOs shown on the independent axis is for each year of the sample period as shown in Table 6. A 'hot issue' period does not have to be a specific year, it could be any period that displays a high volume of IPOs, this period can be defined by the researcher, and in this case it was decided to look at specific years. From an initial observation there seems to be a trend which relates a more negative return with the higher number of IPOs.

A linear trend line was added to the data and a regression analysis was performed to quantify this apparent relationship. The linear trend line is superimposed on the data in Figure 6. The line is seen to be skewed upwards at the lower number of IPOs and high BHAR recorded for these years. The results of the regression analysis are shown in Table 7.

It is important at this point to recall our hypothesis:

Model: $BHAR = \beta_o + \beta_1 X$ (where X = number of IPOs)

H0: $\beta_1 = 0$.

Ha: $\beta_1 \neq 0$

The null hypothesis states that a linear relationship does not exist between the variables of long run performance and the number of IPOs listed. The linear relationship is based on the model above. The coefficient of the slope must not be equal to zero for a linear relationship to exist.

According to the results from Table 7 the model will now look like the following:

$BHAR = 1.096 – 0.046X$

The negative $\beta_1$ implies that there is a negative relationship between BHAR and the number of IPO, i.e.: which confirms our assumption that the greater the IPO activity the worse the long run performance. However, it needs to be assessed whether or not this result is significant. The p value for the slope is 0.0575 which is greater than 0.05 (using a 95% confidence limit) we must therefore accept the null hypothesis that $\beta_1 = 0$. This is further emphasized by the $R^2$ value of only 0.31. There is thus no significant relationship between the long run performance of IPOs and IPO activity.

The obvious tendency when observing Figure 6 is to eliminate the two data points that look to pull the trend line upwards. These data points may be assumed to account for the poor regression results that have been generated. The two outliers occur in 2002 and 2003. These high BHAR values also represent the lowest number of IPOs listed for the corresponding years of 8 and 6 respectively. The t statistic of 1.8 and 1.6 also suggest that these BHAR estimates are not significant.

It should also be remembered that 2002 and 2003 were the two periods that indicated the lowest number of delisting over the subsequent 36 month period (apart from 1996 where there was none). The one and two firm delisting in 2002 and 2003 also represents the lowest delisting ratio of 11% and 25% respectively. The two years in question are also in the middle of our sample period, and simply rejecting these will leave a gap in our data. The urge to reject these outliers was therefore resisted and the current results maintained.

Guo *et. al.* (2009) found that following periods of high returns are high IPO volumes. Figure 10 shows a plot of BHAR per year together with the number of IPOs issued per year. The year with the highest IPO activity was 1998 and consequently we find that the highest return was recorded the year prior to this in 1997 with a BHAR of 180%. Years 1997 and 1999 also displayed high IPO volumes and they were also preceded by years with high BHARs of 54% and 41% respectively in 1996 and 1997. In years 2002 to 2004 there were also high BHARs; however these were not followed by particularly high number of new listings. The argument put forward by Guo *et. al.* (2009) therefore appears to hold true for one part of the sample but not for the other.

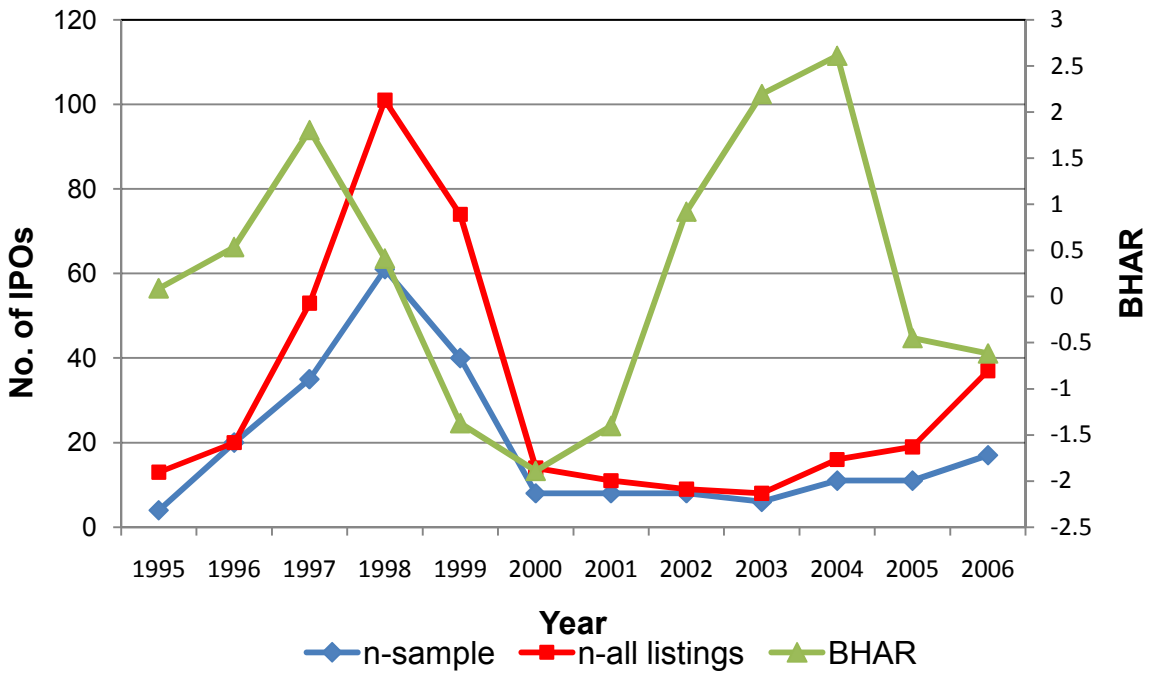


**Figure 10: BHAR per year**

Unlike the research performed by Guo *et. al.* (2009), Ritter (1984) and Helwege and Liang (2004), there does not appear to be any cycles evident in the data.

The highest IPO activity occurs in the period from 1997 to 1999. This three year window showed particularly high IPO activity in the 12 year sample period. For cycles to be easily identified the sample period needs to be sufficiently long enough like those of Ritter (1984) and Helwege and Liang (2004) who considered a 23 and 25 year period.

## 6.4 Sector Performance

The results for the sector analysis are presented in Table 8. The financial sector has the highest number of observations in the sampling period; however it indicates a poor return of -76%. The large number of IPOs in the financial sector may be an indication of the advanced state of this sector which makes it compare favourably to other developed markets.

For the analysis of the sector performance, adopting a broad index such as the ALSI was ideal as it allows a fair comparison between them. This would not have been possible if individual indices were used, or if a matching firm approach was used, as they would not all be compared to the same benchmark, and would render this exercise fruitless.

The mining sector depicts an opposite return to that of the financial sector with positive results of 76%, even though the number of listings was only 21. This may be attributed to the rich resources available in the country, especially with regard to gold and platinum which will have the highest weighting based on the

price of these commodities. The firm with the highest offer size was also from the mining sector: Kumba Iron Ore. This firm had gross proceeds of over R31bln. Billiton PLC was the second largest firm with gross proceeds of over R28 Bln.

As reported in section 5.4, the sectors were re-categorised in order to allow a reasonable number of IPOs per sector. After this reclassification exercise, the following sectors were defined:

- Technology
- Industrial
- Financials
- Mining
- Other

From Figure 7 it can be seen that all the sectors, except for the mining sector show a negative return over the three year period. The BHAR shown are -113% for financials, -51% for industrials, -82% for financials, 76% for mining and -26% for all the other sectors that do not fall into the previous four sectors. For a list of all subsectors that are included in the above general sectors, see Appendix A.

Recall the null hypothesis: The long run performance of IPOs across different sectors is the same.

H0: $\mu_{si} = \mu_{sj} = ... = \mu_{sn}$ (where $\mu_{si,j}$ = BHAR for sector i, j; i ≠ j. i,j = 1 to n, n = number of sectors in sample)

Ha: $\mu_{si} \neq \mu_{sj} \neq ... \neq \mu_{sn}$

The null hypothesis tests whether the mean values for BHAR of all the sectors are the same. Rejecting the null hypothesis will thus result in the alternate being accepted implying that there are significant differences between the long run performance of different sectors.

To determine if the reported BHAR values above are significant, an ANOVA was performed. The results for this ANOVA are presented in Table 10. The important figure to note here is the F value, and the critical F value. The critical F value is based on a 95% confidence level. The calculated F value is higher than the F critical value which implies that we reject our null hypothesis that all means are equal, and we can deduce that there are significant differences between the BHARs of different sectors.

The return from the mining sector was high compared to all the other sectors and there may be a concern that the weighting of this value would have had an influence on the results of the ANOVA. It was therefore decided to perform an additional test without the results of the mining sector. These ANOVA results

are included in Table 11. These results indicate that even without the strong positive return of the mining sector the calculated F value is still higher than the critical F value for all the sectors which have provided negative returns. The null hypothesis can therefore also be rejected based on the results of this ANOVA.

The results of this sector analysis may be subjective when taking into consideration the process that was used to classify the different sectors. The re-categorization was transparent, and information on new IPOs can easily be compared to the five general sectors following the step shown in Appendix A. A similar process was also followed by Kiymaz (2000) in his study of IPO performance in Turkey. He also found that the financial sector provided initial returns of 15% compared to industrials with 11%.

The long run performance was opposite to the initial returns, i.e.: The higher the initial returns of the sector, the lower the long run performance. This would have meant that the financial sector performed worse than the industrial sector in the long run which is consistent with this study for South Africa.

The findings by Ang and Boyer (2009) and Finkle and Lamb (2002) reviewed in section 2.4 can be compared to the current results if one has to consider the technology sector as a new industry or emerging industry, which may be true for the sample period, especially the first half. The industrial sector displayed the worst results in this study, and although Finkle and Lamb (2002) found a similar trend which was contrary to that of Ang and Boyer (2009), the magnitude of their underperformance may not have been similar.

The results for the long run performance emphasizes that the initial returns would have been high as investors look to reap the rewards of these new technologies. Long run performance may have been affected by the dot.com bubble event that occurred within the sample period of the current study. New industries may also attract investors for short term rewards; however these may seem riskier in the long run.

The study performed by How (2000) reports markedly different results where the mining sector underperforms the market by 20% as opposed to the industrial sector which only showed a 7% underperformance.

The period from 1997 to 1999 was identified as a 'hot issue' period as 60% of all IPOs in the sample were listed during these years. Helwege and Liang (2004) found that IPOs listed during periods of high IPO activity are usually drawn from a few industries.

For the present study, the number of IPOs from the financial sector that were listed between 1997 and 1999 was 45, which accounts for 78% of all financial sector IPOs listed in the sample period. The majority of technology IPOs were also listed during this period with 37 out of 41 (90%).

The remaining 40% of IPOs listed during this period comprised of the industrial sector which was only represented with 34% of all the industrial IPOs. There were also only six out of the 21 mining firms listed during this period. The IPOs from all the other industries were also fairly well represented between 1997 and 1999 and accounted for 58%, the return from this sector was neither in the best

performing nor worst performing category and hence did not warrant any further discussion.

The two sectors of technology and financials therefore dominated the 'hot issue' period, representing 60% of the IPOs listed between 1997 and 1999. The poor results for this period can thus also be attributed to the overall performance of these sectors which was shown earlier in this section to be the two worst performing sectors.

These results therefore confirm the results obtained by Helwege and Liang (2004), with the sectors of technology and financials dominating the 'hot issue' period that was recognised for this study.

The results of this section may be subjective to a certain extent as it was based on broad categories of sectors defined for the present analysis. For a more accurate analysis to be performed a larger sample period should be used or a shorter test period (less than 36 months) where a larger number of IPOs are represented per sector.

# 7 Conclusions

The aim of this research was to:

- Determine the long run performance (36 months) of IPOs in South Africa
- Determine if there is a correlation between the size of issue and the long run performance of IPOs
- Verify if there is a relationship between strong IPO activity ('hot issue' market) and the magnitude of long run underperformance
- Determine if there are differences in after market returns between different sectors.

The design of the research required to address the objectives above, and the subsequent results have been presented in chapter 4 and 5. Within the scope of this study, the following conclusions can therefore be drawn based on the analysis discussed in the previous chapter.

## 7.1 Long run performance

IPOs in South Africa significantly underperformed the market. The underperformance was 50% below the market for BHAR and 47% underperformance for CAR.

## 7.2 Performance of different sized firms

There were significant differences in long run performance between different size firms.

## 7.3 Relationship between BHAR and IPO activity

There was no significant linear correlation between the level of underperformance and IPO activity.

## 7.4 Difference in sector performance

There are significant differences in performance of IPOs between different sectors.

The sector with the best performance was the mining sector with a positive 76%.

Based on the above results the following IPO investment strategies are recommended:

- Shares in larger firms (proceeds greater than R1 Bln) should be considered over smaller or mediums firms. Firms with proceeds greater than R10 Bln may offer positive returns.

- Investment in periods of high IPO activity should be avoided as they produce worse. This however was not statistically proven

- Long run investment in the mining sector should be considered above any other sector as this will produce positive returns over a 36 month buy and hold period.

Based on the current study, the following are recommendations for future research:

- A similar study should be performed using more specific benchmarks like sector specific industries as well as a matching firm approach
- Factors influencing long run performance should be investigated.
- The relationship between initial returns and long run performance should be studied.
- The influence of firm size on IPO performance should be performed using other proxies
- The 'hot issue' effect should be investigated using a longer sample period and other periods other than calendar years.
- For a more accurate sector performance analysis a larger sample period should be considered or a shorter test period (less than 36 months) where a larger number of IPOs are represented per sector.

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# Appendix A – Sector Categories

Table A-1: Original Sector Classification

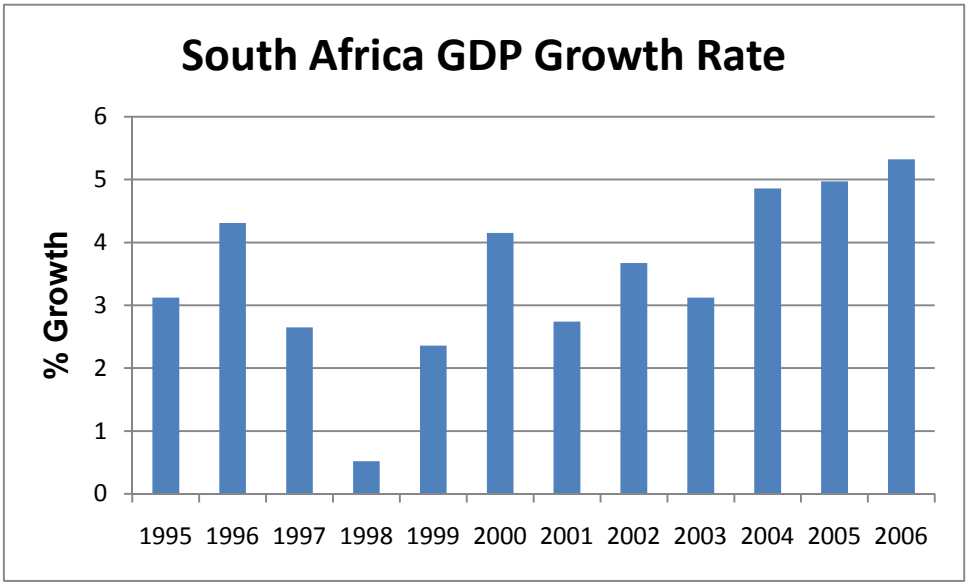
| Sector | Sector | Sector |
|---|---|---|
| A-COAL | Diamonds | OIL INTEGRATED |
| A-PHARMACEUTICALS | Diversified Industrial | Other Mineral Extractors and Mines |
| INVESTMENT COMPANIES ELIGIBLE | Education & Staff | Packaging & Printing |
| RETAILERS MULTI DEPARTMENT | Electron & Elect | Pharm & Medical |
| A-Business Support Services | Engineering | Platinum |
| A-Heavy Construction | Exploration | Platinum & Precious Metals |
| A-Medical Supplies | Farming & Fishing | Platinum Mining |
| A-Mining Finance | Financial Services | Private Equity Funds |
| Apparel Retailers | Fixed Line Telecommunication Services | Property |
| Asset Managers | Food | Property Loan Stock |
| Banks | Food and Drug Retailers | Publishing and Printing |
| Banks & Fin Services | Furn. & Household | Rail, Road and Freight |
| Banks & Other Fin. Ser. | Gambling | Real Estate Holding and Development |
| Bev, Hotel & Leisure | General Mining | Redevelopment |
| Build & Construction | Gold Mining | Retail |
| Building Materials & Fixtures | Hotel & Leisure | Retailers Hardlines |
| Building, Construction & Engineering | Hotels | Service |
| Business Support Services | Information Technology | Short-Term Insurance |
| Cash Companies | Insurance | Speciality Finance |
| Chem & Oil | Investment Banks | Stores |
| Cloth., Footwear & Textile | Investment Services | Telecommunication |
| Coal | Investment Trust | Transport |
| Computer Hardware | Life Assurance | Transportation |
| Computer Services | Media | Travel & Tourism |
| DCM | Metal & Minerals | V- Medical Equipment |
| Development | Mining Exploration | VCM |
| Development Capital | Mining Holding | V-Consumer Finance |
| Development Stage | Nonferrous Metals | Venture Capital |
| V-Other Financial | V-Other Financial | |

Table A-2: New sector classification showing original sector

| New Sector | Original Sector |
|---|---|
| Agriculture and Fishing | Farming & Fishing |
| | Redevelopment |
| Construction | A-Heavy Construction |
| | Build & Construction |
| | Building Materials & Fixtures |
| | Building, Construction & Engineering |
| Education & Training | Education & Staff |
| Elect | Development Capital |
| | Electron & Elect |
| Energy, Chem & Oil | Chem & Oil |
| | Exploration |
| | OIL INTEGRATED |
| Engineering | Diversified Industrial |
| | Engineering |
| Financial | INVESTMENT COMPANIES ELIGIBLE |
| | Asset Managers |
| | Banks |
| | Banks & Fin Services |
| | Banks & Other Fin. Ser. |
| | Financial Services |
| | Insurance |
| | Investment Banks |
| | Investment Services |
| | Investment Trust |
| | Life Assurance |
| | Private Equity Funds |
| | Short-Term Insurance |
| | Speciality Finance |
| | V-Consumer Finance |
| | Venture Capital |
| | V-Other Financial |
| Food | A-Business Support Services |
| | Food |
| | Food and Drug Retailers |
| Hotel & Leisure | Bev, Hotel & Leisure |
| | Development |
| | Gambling |
| | Hotel & Leisure |
| | Hotels |
| | Travel & Tourism |
| Information Technology | Cash Companies |
| | Computer Hardware |
| | Computer Services |
| | DCM |
| | Development Capital |
| | Development Stage |

| | |
|---|---|
| | Information Technology |
| Investment | Business Support Services |
| | Development Stage |
| | Redevelopment |
| Media | Development Capital |
| | Media |
| | Redevelopment |
| Mining | A-COAL |
| | A-Mining Finance |
| | Coal |
| | Diamonds |
| | General Mining |
| | Gold Mining |
| | Metal & Minerals |
| | Mining Exploration |
| | Mining Holding |
| | Nonferrous Metals |
| | Other Mineral Extractors and Mines |
| | Platinum |
| | Platinum & Precious Metals |
| | Platinum Mining |
| Packaging, Printing & Textiles | Cloth., Footwear & Textile |
| | Packaging & Printing |
| | Publishing and Printing |
| Pharm & Medical | A-PHARMACEUTICALS |
| | A-Medical Supplies |
| | Pharm & Medical |
| | V- Medical Equipment |
| Property | Property |
| | Property Loan Stock |
| | Real Estate Holding and Development |
| Retail | RETAILERS MULTI DEPARTMENT |
| | Apparel Retailers |
| | Furn. & Household |
| | Retail |
| | Retailers Hardlines |
| | Stores |
| Service | Service |
| Telecommunication | Fixed Line Telecommunication Services |
| | Telecommunication |
| | VCM |
| Transport | Development Capital |
| | Rail, Road and Freight |
| | Transport |
| | Transportation |

# Appendix B – GDP Growth Rate



# Appendix C – Sample of IPOs and year of issue

| Name | Year listed |
|---|---|
| Hoechst South Africa Limited | 1995 |
| Polifin Limited | 1995 |
| MTN | 1995 |
| Plessey Corporation Ltd. | 1995 |
| Admiral Leisure Wold Ltd | 1996 |
| Energy Africa Ltd | 1996 |
| New Clicks Holdings Ltd | 1996 |
| Mathomo Group Ltd | 1996 |
| National Chick Ltd | 1996 |
| Masterfridge Ltd | 1996 |
| Howden Africa Holdings Ltd | 1996 |
| Enviroserv Holdings Ltd | 1996 |
| Sweets from Heaven Hldgs Ltd | 1996 |
| King Food Holdings Ltd | 1996 |
| Alliance Pharmaceuticals Ltd | 1996 |
| Chillers Group Ltd | 1996 |
| Carson Holdings Ltd | 1996 |
| Buildmax Ltd | 1996 |
| Homechoice Holdings Ltd | 1996 |
| Rebhold Ltd | 1996 |
| Forbes Group Ltd | 1996 |
| Abacus Technology Hldgs. Ltd | 1996 |
| Terexko Ltd | 1996 |
| Network Healthcare Hldgs. ltd | 1996 |
| Stocks Hotels & Resorts Limited | 1997 |
| Avis Holdings Limited | 1997 |
| Tourism Investment Corporation | 1997 |
| Nando's Group Holdings Ltd | 1997 |
| Amalgamated Appliance Holdings Ltd | 1997 |
| Prospur Packaging and Plastics Limited | 1997 |
| Billiton PLC | 1997 |
| Afribrand Holdings Ltd | 1997 |
| Computer Configuration Holdings Ltd | 1997 |
| OTR Mining Limited | 1997 |
| African Harvest Ltd | 1997 |
| Southern Mining Corporation Limited | 1997 |
| Paradigm Interactive Media Ltd | 1997 |
| A. M. Moolla Group Limited | 1997 |

| Name | Year listed |
|---|---|
| Maxiprest Ltd | 1997 |
| Woolworths Holdings Limited | 1997 |
| MMW Technology Holdings Limited | 1997 |
| Bonatla Property Holdings Limited | 1997 |
| Moulded Medical Suppliers Limited | 1997 |
| Paragon Business Forms Ltd | 1997 |
| O'Hagan's Investment Holdings limited | 1997 |
| Retail Apparel Group Limited | 1997 |
| Molope Foods Limited | 1997 |
| Astrapak Ltd | 1997 |
| Beige Holdings Ltd | 1997 |
| Awethu Breweries Ltd | 1997 |
| Advetch Education Holdings Limited | 1997 |
| Thabex Exporation Limited | 1997 |
| Trematon Capital Investment Limited | 1997 |
| AMB Holdings Ltd | 1997 |
| Ref Finance and Investment Corporation | 1997 |
| Whetherleys Investment Holdings Ltd | 1997 |
| Aquila Growth Ltd | 1997 |
| Net1 Applied Technology Holdings Limited | 1997 |
| ITI Technonlogy Holdings Limited | 1997 |
| Tridelta Magnet Technology Ltd | 1998 |
| Barnard Jacobs Mellet Holdings Ltd | 1998 |
| Infiniti Technologies Ltd | 1998 |
| Renaissance Retail Group Ltd | 1998 |
| Top Info Technology Holdings Ltd | 1998 |
| Elexir Technology Holdings Ltd | 1998 |
| Truworths International Ltd | 1998 |
| Metboard Properties Ltd | 1998 |
| Zaptronix Ltd | 1998 |
| Iliad Africa Ltd | 1998 |
| Peregrine Holdings Ltd | 1998 |
| Real Africa Durolink Holdings Ltd | 1998 |
| Glenrand M.I.B. Ltd | 1998 |
| Accord Technologies Ltd | 1998 |
| Bryant Technology Ltd | 1998 |
| Corpcorm Ltd | 1998 |
| JCI Gold Ltd | 1998 |
| Brimstone Investment Corp. Ltd | 1998 |
| Nimbus Holdings Ltd | 1998 |
| Comair Ltd | 1998 |

| Name | Year listed |
|---|---|
| Core Holdings Ltd | 1998 |
| Global Village Holdings Ltd | 1998 |
| Valuecom Holdings Ltd | 1998 |
| Billboard Communication Ltd | 1998 |
| Intertrading Ltd | 1998 |
| E-Data Holdings Ltd | 1998 |
| Idion Technology Holdings Ltd | 1998 |
| Mercantile Lisbon Bank Holdings Ltd | 1998 |
| Viking Investments & Asset Management Ltd | 1998 |
| Enterprise Outsourcing Holdings Ltd | 1998 |
| Good Cape Ltd | 1998 |
| Crux Technologies Ltd | 1998 |
| World Educational Technologies Ltd | 1998 |
| IST Group Ltd | 1998 |
| UCS Group Ltd | 1998 |
| Casey Investment Holdings Ltd | 1998 |
| MB Technologies Ltd | 1998 |
| Terrafin Holdings (Pty) Ltd | 1998 |
| Datacentrin Holdings Ltd | 1998 |
| Steinhoff International Holdings Ltd | 1998 |
| CS Computer Services Holdings Ltd | 1998 |
| Gold Edge Holdings Ltd | 1998 |
| Value Group Ltd | 1998 |
| Compu Clearing Outsourcing Ltd | 1998 |
| Indequity Group Ltd | 1998 |
| Rectron Holdings Ltd | 1998 |
| African Partnership Ltd | 1998 |
| Whetstone Industrial Holdings Ltd | 1998 |
| EC-Hold Ltd | 1998 |
| Maxtec Ltd | 1998 |
| OSI Holdings Ltd | 1998 |
| Global Technology Ltd | 1998 |
| Cape Empowerment Trust Ltd | 1998 |
| Equinox Holdings | 1998 |
| Faritec Holdings Ltd | 1998 |
| Sotta Sercuritisation International Ltd | 1998 |
| Sanlam Ltd | 1998 |
| Digicore Holdings Ltd | 1998 |
| JEM Technology Holdings Ltd | 1998 |
| Micro Logix Ltd | 1998 |
| Metropolis Transactive Holdings Ltd | 1998 |

| Name | Year listed |
|---|---|
| Exploration Corporation Holdings Ltd | 1999 |
| Regal Treasury Bank | 1999 |
| Tile Afrika Holding Ltd | 1999 |
| Decillion Ltd | 1999 |
| Hix Technologies Ltd | 1999 |
| Cycad Financial Holding Ltd | 1999 |
| Womens Investment Portfolio Holding Ltd | 1999 |
| Hertage Collection Holdings Ltd | 1999 |
| Millionair Charter Ltd | 1999 |
| Cadiz Holdings Ltd | 1999 |
| Silverbridge Holdings Ltd | 1999 |
| Union Alliance Media Ltd | 1999 |
| Netactive Ltd | 1999 |
| Foneworx Ltd | 1999 |
| APS Technologies Ltd | 1999 |
| Paracon Holdings Ltd | 1999 |
| Sekunjalo Investments Ltd | 1999 |
| AMB Equity Partners Ltd | 1999 |
| Acuity Group Holdings Ltd | 1999 |
| Stella Vista Technologies Ltd | 1999 |
| Forza Group Ltd | 1999 |
| Money Web Holdings Ltd | 1999 |
| Aveng Ltd | 1999 |
| Shawcell Telecommunications Ltd | 1999 |
| Old Mutual plc | 1999 |
| Africa Glass Industries Ltd | 1999 |
| PSG Investment Bank Holdings Ltd | 1999 |
| MIH Holdings Limted | 1999 |
| Intervid Limited | 1999 |
| Nedcor Investment Bank Holdings Limited | 1999 |
| Spearhead Property Holdings Limited | 1999 |
| Incentive Holdings Limited | 1999 |
| Securedata Holdings Limited | 1999 |
| Investment Solutions Holdings Lmited | 1999 |
| Prism Holdings Limited | 1999 |
| Insurance Outsourcing Management HDGS | 1999 |
| Discovery Holdings Limited | 1999 |
| Spur Corporation Limited | 1999 |
| Primegro Properties Limited | 1999 |
| Century Carbon Mining Limited | 1999 |
| Command Holdings Limited | 2000 |

| Name | Year listed |
|---|---|
| Redefine Income Fund Limited | 2000 |
| Square One Solutions Group Limited | 2000 |
| Massmart Holdings Limited | 2000 |
| African Gem Resources Limited | 2000 |
| Remgro Limited | 2000 |
| Tradehold Limited | 2000 |
| Proper Group Limited | 2000 |
| Astral Foods Limited | 2001 |
| Ingenuity Property Investments | 2001 |
| Apexi B Properties Limited | 2001 |
| Creditvision Holdings Ltd | 2001 |
| SA Retail Properties limited | 2001 |
| Exxaro Resources Limited | 2001 |
| Stratcorp Limited | 2001 |
| Fairvest Property Holdings | 2001 |
| Capitec Bank Holdings Limited | 2002 |
| Acupac Properties Limited | 2002 |
| Santova Logistics Ltd | 2002 |
| Ifour Properties Limited | 2002 |
| Phumelela Gaming and Leisure Limited | 2002 |
| Investec PLC | 2002 |
| Resilient Propert Income Fund Limited | 2002 |
| Beget Holdings Limted | 2002 |
| John Daniel Holdings Limited | 2003 |
| Telkom SA Limited | 2003 |
| Coronation Fund Managers Limited | 2003 |
| Orion Real Estate Ltd | 2003 |
| MICC Property Income Fund Limited | 2003 |
| Emira Property Fund | 2003 |
| Ambit Properties Limited | 2004 |
| Monyetla Property Fund Limited | 2004 |
| Industrial Credit Company Africa Holdings Limited | 2004 |
| Business Connexion Group Limited | 2004 |
| Vukile Property Fund Limited | 2004 |
| Milkworx Limited | 2004 |
| Lewis Group Limited | 2004 |
| The Spar Group Limited | 2004 |
| South African Coal Mining Holdings | 2004 |
| Mvelaphanda Group Limited | 2004 |
| Aquarius Platinum Limited | 2004 |
| Makalani Holdings Limited | 2005 |

| Name | Year listed |
|---|---|
| CIPLA Medpro SA | 2005 |
| New Corpcapital Limited | 2005 |
| Verimark Holdings Limited | 2005 |
| Wescoal Holdings Limited | 2005 |
| Amalgamated Electronics Corporation Limited | 2005 |
| Oando plc | 2005 |
| Tawana Resources NL | 2005 |
| CBS Property Portfolio Limited | 2005 |
| Miranda Mineral Holdings Limited | 2005 |
| Wesizwe Platinum Limited | 2005 |
| Hospitality Property Fund Limited | 2006 |
| IFA Hotels and Resorts Limited | 2006 |
| Esorfranki | 2006 |
| Witwatersrand Consolidated Gold Mines | 2006 |
| Afrocentric Investment Corporation Limited | 2006 |
| Metmar Limited | 2006 |
| Sanyati Holdings Limited | 2006 |
| JSE Limited | 2006 |
| Madison Property Fund Managers | 2006 |
| Litha Healthcare Group | 2006 |
| Great Basin Gold Limited | 2006 |
| Afrimat Limited | 2006 |
| Kumba Iron Ore Limited | 2006 |
| Coal of Africa Ltd | 2006 |
| Zeder Investments Limited | 2006 |
| Jubilee Platinum PLC | 2006 |
| Anooraq Resources Corporation | 2006 |