
# The performance of Initial Public Offerings on the JSE



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# ABSTRACT

This study examined the performance 60 initial public offerings listing on the JSE main board between 1 January 2000 and 31 December 2011. Significant underpricing of 10.1% and 8.5% was found to exist on the first day and during first week subsequent to the IPO. Underperformance of 14.17% was found using abnormal returns and 12.91% underperformance was found when holding period returns were calculated one year after the IPO. Negative excess returns were also found three years subsequent to the initial offering with the levels of underpricing being more pronounced.

In all calculations, the JSE/FTSE All share index was used as the market benchmark and additionally the market was segmented into a financials and industrials division and a resources division. These divisions were further tested using the SA Financials and Industrials index (FINDI) and the Resource-20 index (RESI20) as the market benchmarks respectively. The evidence indicates that a dichotomy is present on the South African market and that the levels of initial underpricing and long run underperformance are different based on the segment that the IPO company belongs to.

No evidence was found to indicate that first day returns were significantly different between hot and cold issue markets. The first day returns and three year returns were tested in the short and long run in both hot and cold issue periods and no significant difference was found between the two markets.

The industry effect was also examined on the JSE main board using six industry categories for the purposes of this study. IPOs were categorised into the following groupings: (1) Real estate, (2) Consumer goods and services, (3) Financials, (4) Industrial and business goods and services, (5) Natural resources, and (6) Construction. Considerable differences in the level of abnormal returns were found on the first day and in the three year period examined. In both the short and long run, at least two industry means were found to be significantly different from each other indicating that the industry effect is present on the JSE.

Finally, a correlation test was performed to identify whether there is a relationship between the initial and aftermarket performances of IPOs. No significant relationship was found,

implying that the initial abnormal returns cannot be used as a predictor of future performance on the JSE.

**KEY WORDS**

Initial public offering, underpricing, underperformance, short run, long run, aftermarket, first day returns, abnormal returns, holding period returns, JSE Limited, ALSI, FINDI, RESI20, hot issue, industry effect

# DECLARATION

I declare that this dissertation is my own work and is submitted in partial fulfilment of the requirements of the degree of Masters in Financial Management at the University of Cape Town.

I know that plagiarism is wrong. Plagiarism is to use another's work and to pretend that it is one's own. Each significant contribution to, and quotation in, this report from the work or works, of other people has been attributed, and has been cited and referenced. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as their own work.



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# 1. INTRODUCTION

Initial public offerings (IPOs) are the first sale of shares to the public by the company listing on the share exchange. The initial pricing of the share has a significant impact on the share's performance and therefore is an important aspect of the initial offering process.

Companies often use initial public offerings as an opportunity to gain access to more capital to allow for further expansion, growth and development. Companies may also choose to issue shares to the public as it may provide the company with a more cost effective alternative to debt financing. With the increasing costs of debt and stricter requirements that banks are placing on firms as a result of the national credit act in South Africa, debt is becoming more difficult and more expensive to obtain. Additionally, more debt places greater strain on firms in the form of debt covenant requirements. This means that companies are under greater risk of being liquidated if they cannot meet their debt obligations. As an alternative to debt, equity financing is often less taxing on a firm's resources and gives the firm the opportunity to acquire more capital with further issues in the future.

The initial public offering process also provides early private investors with an exit strategy and the chance to monetise their initial investments. Many investors are not looking for long term investments. Thus, when the opportunity to list arises, it provides early investors, who usually advance considerable amounts of monetary resources to growing firms at initiation, with the occasion to move on should they wish to.

Listing additionally provides companies with the opportunity to have their shares publicly traded. This often has the effect of increasing the company's standing in the market and can raise the profile of the company both locally and internationally. This will afford the company easier access to other sources of financing in the future. The better perceived status of the business may also assist in cultivating and maintaining profitable relationships with suppliers, distributors and finance providers. Client and public confidence in the business will also increase due to the listing requirements that improve transparency and good governance. The ability of the company to attract and retain human capital is also enhanced by its increased status as well as the company's ability to offer equity participation to its employees. Overall, listing could have a positive effect on the performance of the firm in the future.

## 1.1 Research purpose

Numerous studies have been conducted to analyse the performance of initial public offerings both in the short run and the long run. Studies have been performed in markets including the United States of America, the United Kingdom, Canada, Australia, Germany, Denmark, Spain, Malaysia, China, Taiwan, Brazil, Mexico and Chile.

Although there have been several studies in South Africa, this study provides research value for a number of reasons. Most importantly, this study will provide more recent information on the performance of initial public offerings in South Africa, both in the short run and the long run, as there has been little published information regarding initial public offerings in South Africa (specifically related to the JSE main board) in recent years. This study will show updated results and compare these results to previous findings both internationally and in South Africa.

Additionally, this study will not only use the FTSE/JSE All share index (J203) as a proxy for the market, but will segment the market into two distinct segments, the resources segment and the financials and industrials segment. The SA Financials and Industrials index (J250) (FINDI) and the Resource-20 index (J210) (RESI20) will be used as proxies for the market. This is in accordance with the findings of van Rensburg (2002) who identified that a dichotomy exists in the South African market and can be divided into the two segments mentioned above. The performance of IPO companies in these two segments will be tested separately using the FINDI and RESI20 as combined proxies for the market. This segmentation applies specifically to the South African market and the performance of IPOs has never been tested this way before. Furthermore, more recent IPO performance information on hot and cold markets and the performance in various industries will be provided. A test to identify the potential relationship between initial and long run returns will additionally be conducted.

This remainder of this study is organised as follows: the next section provides background to the South African market and the JSE whilst section 2 is a review of previous literature regarding IPOs. The research to be performed in this study is defined in section 3 and the data

and methodology are discussed in section 4. The results of the tests performed are examined in section 5 with concluding remarks summarised in section 6.

## 1.2 Background to the South African market and the JSE

South Africa has a single national stock exchange, the JSE Limited ("JSE"; formerly known as the JSE Securities Exchange and the Johannesburg Stock Exchange) which was formed in 1887 in response to the discovery of gold on the Witwatersrand, and the boom in mining and financial companies in the country.[1] The JSE grew considerably over the decades and in 1963 became a member of the World Federation of Exchanges.

In the past few decades, South Africa experienced an extremely volatile political market. The practice of apartheid excluded African, Indian and Coloured South Africans from participation in governmental and financial structures, as well as any meaningful participation in the country's economy (Levy, 1999). In a response to the outrages of apartheid, several countries around the world imposed trade and financial sanctions on South Africa and a significant amount of foreign investment was withdrawn from the country (Levy, 1999). Thus the South African business community was to some extent excluded from international financial markets and South Africa experienced economic difficulty (Levy, 1999).

1994 saw the first democratic election in South Africa, marking the end of apartheid and the start of a movement to embrace transformation. The new government enacted a privatisation programme as well as an affirmative action plan to ensure that designated groups had equal opportunities in the workplace. Post 1995, the JSE opened its doors to foreign membership (prior to this, no direct foreign investment was allowed in JSE firms). Thereafter the level of foreign investment has since increased steadily. New monetary policies such as those aimed at curbing inflation were introduced and these have continued to enhance the financial landscape of South Africa.

The changing political environment in South Africa over the past 20 years has been accompanied by major changes in the economic environment. Stability in the South African market as well as direct exposure to foreign investment have played a significant role in

[1] www.jse.co.za

private and government organisations having undertaken to issue their shares to the public. In the past decade, black economic empowerment initiatives were undertaken to redress the wrongs of the past and attempt to realise the country's full potential. Efforts towards black economic empowerment have resulted in a large number of small to medium black owned enterprises going public.

At present, the JSE is one of the top exchanges in the world based on market capitalisation.[2] Its integral function is to provide facilities for the listing of securities (both domestic and foreign) that give users an orderly market place for trading in these securities. The JSE also functions as a regulatory body over the market.

The JSE consists of both the main board and the Alternative Exchange (AltX) both of which are divisions of the JSE Limited. The AltX was launched in 2003 to create a parallel market focussed on small and medium sized, high growth firms. The listing requirements for the AltX are less taxing on companies, both in terms of administrative requirements and cost, than those for the main board, which is in line with the objectives of the AltX. The AltX strives to provide listing opportunities for various types of companies including fast-growing young businesses, black economic empowerment companies, as well as family-owned businesses. The main objective is to provide smaller companies that are not able to meet the listing requirements for the JSE main board, the opportunity to access capital while not being subject to the more onerous requirements of the main board.



In order to list on the main board of the JSE, the following listing requirements must be met by the company:

1. The company must have subscribed capital of at least R25,000,000;
2. No less than 25,000,000 equity shares must be in issue;
3. The company must have an audited profit history for the preceding three financial years, the last of which should show an audited profit of at least R8,000,000 before taxation;
4. At least 20% of each class of shares must be held by the public;
5. The number of public shareholders must be at least 300 for equity shares, 50 for preference shares and 25 for debentures.

[2] www.jse.co.za

These requirements ensure that the quality of firms listing on the JSE is extremely high. In addition, once listed, the JSE requirements that all listed companies must adhere to, ensure that companies maintain certain financial targets as well as strict corporate governance practices. Although the JSE's listing requirements in conjunction with other regulatory and legislative requirements, are taxing on firms in terms of their disclosure in financial statements, and are financially demanding on firms' resources, these ensure that only companies of a good standing can stay listed on the JSE main board. The stringent requirements of the JSE main board have also played a part in ensuring that only large, relatively stable companies remain listed, which contributes towards the growth and development of the South African market.

Due to the differences in listing and other regulatory and legislative requirements between the AltX and the JSE main board, this study will focus solely on IPOs listing on the JSE main board and therefore does not cover companies listing on the Alternative Exchange.

With the substantial growth in financial markets over recent years, an understanding of the performance of newly listed public enterprises will be of great importance to investors and other stakeholders. The existing published literature on the performance of IPOs on the JSE is limited when compared to the vast amount of IPO related studies conducted abroad, particularly in the United States of America. Some of the more significant contributions to South African studies on IPO performance, analysed IPOs over a period prior to the year 2000. The obvious benefit of using a more recent sample period is that the results are more applicable to the current situation in financial markets. Factors influencing the performance of IPOs may have changed over time and this study will analyse how the current financial climate may affect both the short run and long run performance of initial public offerings on the JSE.

# 2. LITERATURE REVIEW

There has been a significant amount of research related to initial public offerings around the world. The coverage is vast because the results are relevant to investors and management as well as service providers who assist in the IPO process. Investors can use the results of this type of research to enable better investment decisions by understanding market tendencies both in the short term and long term. When taking the expected performance of IPOs on the JSE into account investors are better equipped to make favourable investment decisions. The research on initial public offerings assists managers of companies in better understanding the behaviour of the market, which could provide valuable information that can be used in the complex process of pricing the shares to be offered. In addition, once the pricing structure has been determined, by using the research on IPOs, management can more reliably predict the likely direction of the share price movement as well as the size of the movement based on previous research. Service providers who assist companies in the offering process are also set to benefit from this type of research as it aids them in providing more informed advice to their clients, and could possibly ensure that the offer price is set in a way that creates the greatest potential for the maximum number of shares to be taken up by the market. Bessler and Thies (2007) identified that although there is interest in the initial public offerings market for the value it could provide to employment and economic growth, the primary reason for the large body of information on IPOs is due to investors looking for profit making opportunities in the market.



To obtain a clearer understanding of the historical performance of initial public offerings, studies that have been performed both internationally and in South Africa have been considered. Prior research studies performed on the short run and long run performance of South African IPOs have been addressed separately as these have a strong influence on the work to be performed in this study.

The literature reviewed that relates to the relevant areas of initial public offerings have been sub-divided into the following sections: (1) Short run performance, (2) Long run performance, (3) South African evidence on the short run and long run performance, (4) The hot issue effect, (5) The performance of IPOs in different industries, and (6) Initial returns as an indicator of future performance.

## 2.1 Short run performance

### 2.1.1 North American, Australian and UK markets

Initial public offerings in the USA have the largest amount of literature in comparison to other markets around the world. It was found by McDonald and Fisher (1972) in their study conducted in the United States of America that underpricing of 28.5% occurred in the first week after the initial public offering and underpricing of 34.6% occurred in the first month. In addition, the work done by McDonald and Fisher (1972) indicated that shares which more than doubled in the first week rendered excess returns of 181.5% in the first week.

Aggarwal and Rivoli (1990) compared the performance of the IPOs in their study, to the performance on the NASDAQ. It was found that if the investor purchased an IPO share at the initial offer price and held the share for one day, they would have earned a return of 10.67% more than the return on the NASDAQ index over the same period, supporting the trend of positive abnormal returns in the early aftermarket period. The level of underpricing found by Aggarwal and Rivoli (1990), in a period beginning only seven years after the period tested by McDonald and Fisher (1972), is much lower at 10.67%.

Ibbotson (1975) found that the average initial performance of companies issuing new shares to the public was 11.4%, therefore indicating considerable initial returns up to the end of the first month post the offering in the United States. These results are in line with the work performed by Miller and Reilly (1987). The short run performance of IPOs was investigated by Miller and Reilly (1987) between the years of 1982 and 1983 in the Unites States. It was found that on the first day, mispricing of initial offerings occurs. However, subsequent to this the market will adjust the excess return and the opportunity for underpricing thereafter is eroded.

Tinic (1988) tested the performance of initial public offerings before and after the enactment of the securities act in the United States of America in 1933. Returns on pre-1933 issues were found to be significantly positive, which evidenced underpricing. However, movements after the introduction of the securities act in 1933 showed even greater excess returns in the short term. This work implied that there is a correlation between the degree of regulation and the

level of underpricing in the US market. Also testing IPO performance from a different angle, Carter, Dark and Singh (1998) conducted research on the underwriter effect and the short run initial returns on public offerings between 1979 and 1991 in the US. The results showed that the more renowned the underwriters handling the IPO were, the less severe the underpricing in the short run.

In the UK, Levis (1990) found the mean underpricing to be 8.64% on the London Stock exchange. Smithson and Firer (2007) tested the initial performance of newly listed mining shares on the London and Toronto stock exchanges and it was found that underpricing existed on both exchanges, however the amount of underpricing differed between them as on average the underpricing on the London stock exchange was lower than that of the Toronto exchange.

Over an extremely long period from 1917 to 2007, Chambers and Dimson (2009) conducted their study on the initial performance British IPOs. It was found that pre-world war two IPOs had lower levels of underpricing than IPOs post the war. This is despite the development of the initial public offering arena in Britain with the use of underwriters with high reputations.

In Australia, Finn and Higham (1988) found that in the short-term, an arithmetic mean market-adjusted return of 29.2% occurred on day one of the IPO as evidenced on the Sydney Stock Exchange.

It can be seen that in first world markets, underpricing in the initial stages of IPOs is prevalent. The levels of underpricing in the literature reviewed range from 3.8% to 38.5% in these first world markets.

### 2.1.2 Developing markets

Aggarwal, Leal and Hernandez (1993) examined the short run performance of IPOs in Brazil between 1980 and 1990, Chile from 1982 to 1990 and Mexico from 1987 to 1990, after it was identified that these emerging markets were attracting much interest. It was found that the Brazilian IPOs had a day one benchmark-adjusted return of 78.5%, the Chilean IPOs had an adjusted return of 16.3% and the Mexican IPOs showed an adjusted return of 2.8% on the first day.

In the study performed by Huang (1999), initial public offerings between 1971 and 1995 in Taiwan rendered an initial risk adjusted return of 42.6% from the offering date to the first non-limit trading date. The results from Taiwan show considerably lower underpricing when compared to China. Chi and Padgett's (2005) study on the initial public offerings between 1996 and 1997 found that an extremely high level of underpricing existed on China's two exchanges with an average benchmark-adjusted return of 127.3%.

Figure 1 shows a listing of all previous IPOs researched here, indicating the level of initial benchmark-adjusted returns in the various countries.

**Figure 1: Summary of Prior Results that analysed the short run performance of IPOs**

**Short run performance**

| Study performed by | Country | Period | Benchmark-adjusted initial returns |
|---|---|---|---|
| McDonald and Fisher (1972) | USA | 1969 - 1970 | 28.50% |
| Ibbotson (1975) | USA | 1960 - 1969 | 11.40%* |
| Miller and Reilly (1987) | USA | 1982 - 1983 | 9.80% |
| Tinic (1988) | USA | 1923 - 1930 | 5.17% |
| | | 1966 - 1971 | 11.07% |
| Finn and Higham (1988) | Australia | 1966 - 1978 | 29.20% |
| Levis (1990) | UK | 1985 - 1988 | 8.64% |
| Aggarwal and Rivoli (1990) | USA | 1977 - 1987 | 10.67% |
| Aggarwal, Leal and Hernandez (1993) | Brazil | 1980 - 1990 | 78.50% |
| | Chile | 1982 - 1990 | 16.30% |
| | Mexico | 1987 - 1990 | 2.80% |
| Carter, Dark and Singh (1998) | USA | 1979 - 1991 | 8.08% |
| Huang (1999) | Taiwan | 1971 - 1995 | 42.60% |
| Chi and Padgett (2005) | China | 1996 - 1997 | 127.30% |
| Smithson and Firer (2007) | UK | 1997 - 2006 | 6.30% |
| | Canada | 1997 - 2006 | 38.50% |
| Chambers and Dimson (2009) | UK | 1917 - 1945 | 3.80% |
| | | 1946 - 1986 | 9.15% |

** The study by Ibbotson (1975) did not perform IPO returns testing in comparison to a benchmark, and therefore the initial absolute return has been shown here.*

Therefore, it can be seen that developing markets are consistent with developed markets in that positive abnormal returns are found in the initial period of an IPO. The clear difference is that the level of underpricing in developing markets which ranges from 2.8% to 127.3% is much more extreme than that of the North American, Australian and UK markets (3.8% to 38.5%).

## 2.2 Long run performance

### 2.2.1 North American, Australian and UK markets

McDonald and Fisher (1972) found that one year after the offering, a benchmark-adjusted return of -3.2% was earned indicating underperformance in the long run in the US. Furthermore, the study found that for shares that more than doubled in value in the first week, an abnormal return of -19.5% was rendered in the first year. Aggarwal and Rivoli (1990) also found underperformance in the long term in the US. Investments made at the initial offering price and held for a period of 250 days rendered negative returns in the aftermarket. In addition, investments that were made at the closing price on day one of the offering showed returns on day 250 of 13.73% less than the return earned on the NASDAQ index.

In Ritter's (1991) examination of the long run performance of initial public offerings it was found that during the period of 1975 to 1984 there was substantial underperformance of these issuing firms when compared to a sample of the performance of comparable firms over a three year period. This study was done based on data from the United States on the Amex-NYSE and NASDAQ. The control sample rendered a return of 61.86% over the 3-year period, whereas the initial offerings only returned a total of 34.47% over the same period. This implies that there was an abnormal return of -27.39% in the long run. Ritter concluded that these results were consistent with two factors namely the overoptimistic behaviour of investors regarding the earnings potential of new growth companies as well as the fact that firms do not want to miss these "windows of opportunity".

Loughran and Ritter (1995) examined whether firms that issued stock in terms of an initial offering or a seasoned equity offering (SEO) during the period 1970 to 1990, underperformed in the long run. The results indicated that in the period five years after the offering, the issuing firms underperformed significantly in comparison to non-issuing firms over the same period. The average holding period return for non-issuing firms was 66.4% in the five year period and only 16% for issuing firms which implies an abnormal return of -50.4%, confirming the underperformance during that period. In line with these results are the results from Brav (2000). The research performed by Brav (2000) indicated a negative abnormal return of 65.7% over the five year period post the initial offering to the public. Brav used a

Bayesian approach to overcome the non-normal and non-independent distributions of abnormal returns. This approach uses an asset pricing model and a distribution for firm residual variation to simulate the predictive distribution of average abnormal returns over the long run.

Aftermarket average abnormal returns of -17.17% were found by Schultz (2003) for the five year period following the IPO. The results were found over the period 1973 to 1997 in the United States and show great similarities to other studies to performed internationally.

Underperformance was also found to exist in the study conducted by Gompers and Lerner (2003) on initial public offerings between 1935 and 1972. This was found when using event-time buy-and-hold abnormal returns, however, the results are not consistently statistically significant. When cumulative abnormal returns were calculated, the underperformance no longer existed. In contrast, when a calendar-time analysis was performed the performance of the IPOs matched that of the market and therefore it was found that the results are largely dependent on the methodology used in the testing.

Teoh, Welch and Wong (2004) examined the long run performance of IPOs in the US and found that firms which exhibited aggressive earnings management, experienced on average a 15% to 30% worse performance in the three year period post the offering, in comparison to their less aggressively managed counterparts.

In contrast to the above US findings, Ibbotson (1975) conducted research using multiple regression tests to determine if there would be departures from efficiency in the period subsequent to the initial public offering and found that there were no such significant departures.

Carter, Dark and Singh (1998) found that the long run performance of US IPOs had negative returns, but also found that the market-adjusted returns became less negative the better the underwriter reputation was.

Levis (1993) found that the underperformance of IPOs in the long run was statistically significant in the UK. However, it was also found that the level of underperformance is dependent of the specific benchmark chosen as a proxy for the market.

In the study conducted by Espenlaub, Gregory and Tonks (2000) it was found that initial public offerings in the UK underperform in the long run. This study, using data over the period from 1985 to 1992, found that irrespective of the benchmark used, the IPOs rendered negative abnormal returns over the five year period post the initial offering to the public. However, the level of the underperformance varied significantly depending on the choice of benchmarks.

Finn and Higham (1988) conducted research on the long run performance of initial public offerings in the Sydney Stock Exchange and found that the average market performance was negative, but not statistically significant.

As can be seen from the above information, underperformance in the long run has been found in almost all studies in the USA, UK and Australia. The level of long run underperformance ranges from -4.3% to -65.7% therefore showing a large range of varying degrees of long-run underperformance.



### 2.2.2 Other European markets

The long run performance of IPOs in Germany, during the period 1983 to 1993, was researched by Sapusek (2000). It was found that in the five year period after the initial public offering, there was significant underperformance of the IPO portfolio when compared to various benchmark-indices and matching firms for differing sub-periods, both with and without the inclusion of the underpricing.

Stehle, Ehrhardt and Przyborowsky (2000) also found that German initial public offerings underperform, on average, over a 3-year post-offering period. This study was conducted over the period from 1988 to 1990 and the level of underperformance was found to be an average of 6% using a portfolio of similar shares as the benchmark.

Jakobsen and Sorensen (2001) investigated the long run performance of IPOs on the Danish stock exchange over the period from January 1984 to December 1992. The returns were compared to the Danish Total Stock Index as well as shares of matching firms. The IPOs

underperform in the long run when compared to both benchmarks, however the underperformance was more pronounced when evaluated against the market index.

Alvarez and Gonzalez (2005) found that in line with evidence from other countries, Spanish IPOs between 1987 and 1997 had negative abnormal returns in the long run. Their study used both a 3-year and a 5-year long run time horizon and found underperformance over both periods.

The results found in Germany, Denmark and Spain show similar results to those found in the US and UK. Underperformance of various degrees exists in these markets.

### 2.2.3 Developing markets

Aggarwal, Leal and Hernandez (1993) also examined the long run performance of initial public offerings and found that from day one to the end of one year, Brazilian IPOs had an average benchmark-adjusted return of -9%, and a mean adjusted return of -47% after three years. The Chilean IPOs showed an average abnormal return of 1.1% after one year and -23.7% after three years, while the Mexican IPOs rendered an average adjusted return of -19.6% after one year.

In contrast to studies performed in other countries, Huang (1999) found the average cumulative abnormal return in Taiwan to be a mere -3.9% for the 4-year period following the first non-limit trading day. This indicated that after the initial trading of the IPOs, investors could not earn abnormal returns, therefore providing support for the efficient markets hypothesis in Taiwan.

The study by Chi and Padgett (2005) used two methods to identify the long-run performance of IPOs on the two exchanges in China. In contrast to studies performed in other countries, it was found that after three years the market-adjusted cumulative return was 10.3% and the buy-and-hold return was 10.7%. These findings are in line with the findings of Ahmad-Zaluki, Campbell and Goodacre (2007) who found overperformance of initial public offerings in the long run in Malaysia between 1990 and 2000. It was however also found that the overperformance diminished based on the benchmark and model used to identify the performance.

The results from the developing markets are interesting due to the fact that both China and Malaysia showed overperformance in the long run. Underperformance was found in the other developing countries. Figure 2 shows a summary of all the long run findings.

**Figure 2: Summary of Prior Results that analysed the long run performance of IPOs**

**Long run performance**

| Study performed by | Country | Period | Benchmark-adjusted long run returns |
|---|---|---|---|
| McDonald and Fisher (1972) | USA | 1969 - 1970 | -3.20% |
| Ibbotson (1975) | USA | 1960 - 1969 | 0.01%* |
| Aggarwal & Rivoli (1990) | USA | 1977 - 1987 | -13.73% |
| Ritter (1991) | USA | 1975 - 1984 | -27.39% |
| Aggarwal, Leal and Hernandez (1993) | Brazil | 1980 - 1990 | -47.00% |
| | Chile | 1982 - 1990 | -23.70% |
| | Mexico | 1987 - 1990 | -19.60% |
| Levi (1993) | UK | 1990 - 1998 | -22.96% |
| Loughran and Ritter (1995) | USA | 1970 - 1990 | -50.40% |
| Carter, Dark and Singh (1998) | USA | 1979 - 1991 | -19.92% |
| Huang (1999) | Taiwan | 1971 - 1995 | -3.90% |
| Brav (2000) | USA | 1975 - 1984 | -65.70% |
| Sapusek (2000) | Germany | 1983 - 1993 | 1.78% |
| Stehle, Ehrhardt and Przyborowsky (2000) | Germany | 1988 - 1990 | -6.00% |
| Espenlaub, Gregory and Tonks (2000) | UK | 1985 - 1992 | -4.3% to -42.8% |
| Jakobsen and Sorensen (2001) | Denmark | 1984 - 1992 | -30.00% |
| Schultz (2003) | USA | 1973 - 1997 | -17.17% |
| Gompers and Lerner (2003) | USA | 1935 - 1972 | -16.70% |
| Teoh, Welch and Wong (2004) | USA | 1980 - 1984 | -15% to -30% |
| | USA | 1985 - 1992 | -15% to -30% |
| Chi and Padgett (2005) | China | 1996 - 1997 | 10.30% |
| Alvarez and Gonzalez (2005) | Spain | 1987 - 1997 | -20.98% |
| Ahmad-Zaluki, Campbell and Goodacre (2007) | Malaysia | 1990 - 2000 | 32.63% |

**The research done by Finn and Higham (1988) has not been included here as the aftermarket results were not statistically significant.*

** The study by Ibbotson (1975) did not perform IPO returns testing in comparison to a benchmark, and therefore the long run absolute return has been shown here.*

It is clear from the literature reviewed that the long run performance of IPOs shows underperformance compared to various benchmarks in developed and developing markets. Two developing markets showed long run overperformance. Since the South African market is a developing market, this could be the case on the JSE, although other developing markets found results in keeping with results from the US and UK.

One result that has been consistent throughout the literature, across all markets, is that the benchmark used to identify abnormal returns has a large impact on the level of

undperformance found in the long run. The use of different benchmarks can even result in underperformance in one calculation and no variation from the market in others.

## 2.3 South African evidence on the short run and long run performance of IPOs

A study on the pricing of new equity issues on the JSE was conducted by Barlow and Sparks (1986). The research investigated initial public offerings occurring between 1972 and 1986, which included 105 IPOs during that period. It was found that the average premiums in countries other than South Africa were 16.7%, however, the same statistic as it relates to South African companies over that period was 32%. Therefore, indicating that the average premiums in South Africa are almost double that of other countries. It was concluded that South African firms exhibited significant underpricing in the 15 year period examined.

Bradfield and Hampton (1989) conducted research on the short to medium term performance of initial public offerings in South Africa on the JSE. The study took into account IPOs between 1975 and 1986 which showed the abnormal performance on day one to be 27%. After the first month, this return declined to a mere 3.7%. The results show clear evidence that abnormal returns exist in the South African market in the post-listings period of new issues. Further, a significant correlation between opening premiums and abnormal returns after one year was found to exist on the JSE.

Bhana (1989) investigated the price behaviour of initial public offerings on the JSE between 1985 and 1987. This period of time was identified as being a hot issue period and it was found that significant underpricing occurred in the period up to one month after the offering on the 80 new listings of ordinary shares on the JSE. It was also found that if shares were obtained post the offering, negative returns were earned in the aftermarket after the first year.

Page and Reyneke (1997) examined the long run underperformance of 118 South African initial public offerings listed on the JSE between 1980 and 1991. Even when the listing premium of 32.7% was included in the calculations, the IPOs showed significant underperformance in the 48 month period since the initial offering. The long run underperformance of these IPOs was compounded by the double digit inflation rates that

were present in South Africa during the analysed period. The benchmark adjusted mean returns were significantly negative over the 4 year period for all benchmarks. When compared to a size-matched portfolio of non-issuing companies, the IPO firms underperformed by an average of 13.1%. The extent to which the IPO underperformed was related to both the size and nature of the IPO company. IPO companies which were smaller and listed into sectors which were known to be more volatile, showed greater evidence of underperformance in the period.

Lawson and Ward (1998) analysed the initial returns on new listings from 1986 to 1995 on the JSE. It was found that initial abnormal returns averaged 27.2% during the period. Investors that held their shares for a period of one year from the date of initial offering rendered an average return of 36.2%; however, most of this was as a result of the day one return.

M'kombe and Ward (2002) found that initial public offerings significantly underperformed in the aftermarket compared to the selected benchmarks. It was also found that the listing price was an influencing factor in the aftermarket performance of the IPO.

The study conducted by Correia and Holman (2008) analysed IPO underpricing on the South African Alternative Exchange (AltX) between October 2003 and September 2007. It was found that in the aftermarket, a non-risk adjusted cumulative return of 44% higher than the market benchmark, would have been earned on new listings if investors had purchased IPO shares at the initial offer price. If shares were not purchased at the offer price, the non-risk adjusted cumulative return declined to 6% above the market index. The means that the long run returns would still be positive when the first day movement was not included which is in contrast to long run performance returns found in international studies.

Figure 3 and Figure 4 show summaries of the short and long run performance of IPOs in South Africa.

**Figure 3: Summary of Prior Results that analysed the short run performance of IPOs in South Africa**

**Short run performance**

| Study performed by | Country | Period | Initial returns |
|---|---|---|---|
| Barlow and Sparks (1986) | South Africa | 1972 - 1986 | 32.10% |
| Bradfield and Hampton (1989) | South Africa | 1975 - 1986 | 27.00% |
| Bhana (1989) | South Africa | 1985 - 1987 | 69.70% |
| Page and Reyneke (1997) | South Africa | 1980 - 1991 | 32.70% |
| Lawson and Ward (1998) | South Africa | 1986 - 1995 | 27.20% |
| Correia and Holman (2008)* | South Africa | 2003 - 2007 | 29.00% |

**The study by Correia and Holman (2008) assessed the performance of initial public offerings only on the South African Alternative Exchange (AltX).*

**Figure 4: Summary of Prior Results that analysed the long run performance of IPOs in South Africa**

**Long run performance**

| Study performed by | Country | Period | Aftermarket returns |
|---|---|---|---|
| Bradfield and Hampton (1989) | South Africa | 1975 - 1986 | 29.00% |
| Bhana (1989) | South Africa | 1985 - 1987 | -11.30% |
| Page and Reyneke (1997) | South Africa | 1980 - 1991 | -13.10% |
| Lawson and Ward (1998) | South Africa | 1986 - 1995 | 3.16% |
| M'kombe and Ward (2002) | South Africa | 1980 - 1998 | -3.30% |
| Correia and Holman (2008)* | South Africa | 2003 - 2007 | 6.00% |

**The study by Correia and Holman (2008) assessed the performance of initial public offerings only on the South African Alternative Exchange (AltX).*



From the previous international research on the initial performance IPOs it was shown that the majority of studies find support for the notion that abnormal returns exist in the short run and underperformance exists in the aftermarket. The generally accepted theory to explain short run abnormal returns is underpricing. Studies in developing markets have shown results that in most cases support the numerous studies that have been conducted in the US and other developed markets. The results, which are generally consistent, have shown that positive abnormal returns in the short-run and underperformance in the long run are in most cases not sample or country specific.

The South African evidence has found abnormal returns in the short run based on the previous studies performed on the JSE. The abnormal returns range from 27% to 32% which appear to be higher than abnormal returns found to exist in the USA and UK during comparable time periods. The results are however much lower than the average abnormal returns found in Brazil, Taiwan and China.

There has not been consistent evidence in the aftermarket in South Africa. Although Bhana (1989), Page and Reyneke (1997) and M'kombe and Ward (2002) have found negative abnormal returns in aftermarket, studies by Bradfield and Hampton (1989), Lawson and Ward (1998) and Correia and Holman (2008) have found positive abnormal returns in the long run, therefore not supporting international evidence in this regard.

## 2.4 The hot issue effect

The documented phenomenon of hot issue markets has prompted the significant body of evidence analysing the performance of IPO shares in hot issue periods in comparison to cold issue periods. Derrien (2005) indicated that hot issue markets are characterised by high volumes of initial public offerings and high levels of initial returns.

The study by Ibbotson and Jaffe (1975) was one of the first few studies to identify and test the performance of IPO companies in hot issue markets. The study identified that when compared to the efficient price of the IPO shares, issuers were able to offer their shares at higher prices in cold issue markets and the converse applied to hot issue markets. It was also found that hot and cold issue markets could be identified by issuers based on past history.

It was found by Ritter (1984), during the 15-month period between 1980 and 1981, that new offerings of stock issued during this hot issue period earned investors an average initial return of 48.4%. During the cold issue market, encompassing the remaining period between 1977 to 1982, IPO firms earned an average of only 16.3%. Ritter (1984) put forward the hypothesis that the reason for the hot issue market was explainable by two factors namely; a positive equilibrium relation between risk and expected return, as well as an increase in the riskiness of the average IPO. However, this equilibrium premise was not found to be sufficient to explain the hot issue market. Ritter (1984) did nevertheless find that the hot issue market was present in natural resource issues and all non-natural resources issues had no trace of hot issue periods.

Derrien (2005) found that in the period of 1999 and 2000 only, there were 803 initial public offerings in the United States of America. These IPOs raised approximately $123 billion

leaving an amount of $62 billion on the table, being the difference between the closing price of the shares on the offer date and the offer price. Derrien (2005) identified the fact that during hot issue periods, companies are often aware that their shares are overpriced at the time of offering, and therefore this is a possible reason why companies are not upset at leaving large amounts of money on the table.

In terms of evidence in South Africa, Bradfield and Hampton (1989) tested for differences between the opening premiums of hot and cold issue periods on the JSE between 1975 and 1986. It was found that the mean opening premiums in hot issue periods were 48% compared to cold issue periods which only showed mean opening premiums of 25%. The statistical tests indicated that these differences were statistically significant on the JSE. However, when Bradfield and Hampton (1989) tested the abnormal returns in hot and cold issue periods in the long run, they found that abnormal returns in hot issue markets were not consistently higher than those in cold issue periods in the aftermarket.

In line with the findings of Bradfield and Hampton (1989), during the period 1975 to 1995, Lawson and Ward (1998) found the initial returns in hot periods to be significantly different to those in cold periods. The average initial return during hot issue periods was 34% compared to 12% during the remaining time periods. However, it was also found that significant differences were present between hot and cold periods in the aftermarket on the JSE, with hot period shares outperforming cold period shares. This is in contrast to the findings of Bradfield and Hampton (1989) where no differences were found in the aftermarket on the JSE.

Bhana (1989) analysed the hot issue period between 1985 and 1987 and it was found that in the short run, abnormal returns can be made by investors, however, a short time after the issue of shares, the potential for abnormal returns was eroded supporting the efficient market hypothesis.

In the analysis performed by Page and Reyneke (1997) on the JSE, the evidence found is in line with the numerous amount of international studies performed on hot issue markets as it was found that underperformance in the long run was more prominent when issues took place during high volume periods.

M'kombe and Ward (2002) also found evidence to support the theory that hot and cold periods render differences in results, when they tested the aftermarket performance of shares on the JSE between 1980 and 1998. Furthermore, the analysis indicated that hot issue periods consisted of a higher quantity of poorly performing shares as well as more risky IPO shares when compared to cold issue periods. The presence of a large number of more risky IPO shares during hot issue markets was suggested by M'kombe and Ward (2002) as a possible reason for the high initial premiums in these hot issue periods.

Although the study performed by Correia and Holman (2008) analysed the performance of IPO companies on the JSE AltX only, the positive abnormal returns found in the short term over the total IPO portfolio is consistent with other international and South African studies. However, in contrast to the findings of many studies on hot issue markets, Correia and Holman (2008) identified that the average level of underpricing was 22.8% during the hot issue period and 33.2% during the cold issue period.

Previous studies have found firstly that there are differences in the initial and aftermarket performance of initial public offerings between those that went public during hot issue markets and those that did not. Secondly, there has been a considerable amount of evidence to indicate that hot issue market IPOs will render a superior abnormal performance in the short run and the level of underperformance in the long run will be more prominent when compared to offerings that took place during cold issue periods.



## 2.5 The performance of IPOs in different industries

Companies from a range of industries offer their shares to the public. As such, several studies have tested the effects of IPO performance in certain industries to identify if there are significant differences between some industries on the various exchanges.

Ritter (1984) focused his study on identifying and testing hot issue markets in the United States. His results interestingly found that differences existed between natural resources issues and non-natural resource issues during the period 1977 to 1982. It was identified that hot issue markets were present almost exclusively in companies in the natural resources industry. All companies that did not fall within the natural resources industry did not exhibit

any signs of hot issue markets, therefore indicating the magnitude of valuable information that can be found in testing various industries separately.

Kiymaz (2000) performed extensive analyses on the performance of Turkish IPOs between various industries. The study provided evidence from the Istanbul Stock Exchange during the period of 1990 to 1996. The results showed that all IPOs were underpriced on the initial day of trading by an average of 13.1%. It was also found that initial underpricing for industrial firms was 11.7%, 15% for financial firms and 17.6% for the remaining firms in the sample. When the subsectors were further subcategorised and analysed, it was found that the machinery and equipment group of firms had the lowest initial returns and the tourism and transportation group obtained the highest returns. All sub sectors were found to have statistically significant results for the initial abnormal returns with the exception of the banking sub sector. Furthermore, Kiymaz (2000) found that sectors that experienced higher positive returns in the initial period showed lower returns three months after the IPO.

Ang and Boyer (2009) took a different approach to segmenting the IPO market. The study did not segregate IPO companies by conventional industry groupings, but by new industries as compared to IPOs in established industries. The results showed that there were considerable differences between IPOs from established industries and IPOs from new industries over the analysed period of 1970 to 2002. IPO companies in new industries were found to have greater uncertainty in terms of future earnings, less competition and fewer barriers to entry. The returns results showed that IPOs in new industries were found to provide superior returns over holding periods of one to ten years, when compared to IPOs in established industries. Using the NASDAQ as the benchmark, it was reported in the study by Ang and Boyer (2009) that firms in new industries had positive abnormal returns in the five year period post the offering with an average of 17.46%, whereas companies in established industries showed negative abnormal returns on average of -10.11%. These results were found to be statistically significant.

Instead of analysing the performance of a diverse range of industries, How (2000) examined the initial and long run performance of only mining initial public offerings, in Australia, between 1979 and 1990. The study found substantial average underpricing of 107.18% in the short run. However, mining IPOs were found to not significantly underperform the market in the three year period subsequent to the initial offering.

It is clear that the type of company that lists and the industry or sector it forms part of may influence the way the IPO performs in the initial period and in the long term. Having an understanding of how IPOs perform in different industries can assist managers and investors in better understanding the behaviour of IPOs in the market. From a South African research perspective, this area has not been covered in the published research on the South African markets and therefore this study aims to provide useful information to investors in this regard.

## 2.6 Initial returns as an indicator of future performance

The phenomena of positive abnormal returns in the short run and long run underperformance of IPO shares have received substantial amounts of attention in literature both internationally and in South Africa. Various studies have also investigated the relationship between initial abnormal returns and the performance of shares in the long run. However, the evidence is not consistent as to whether initial underpricing can be used as a signalling and predicting tool for the aftermarket performance of initial public offerings.

Contrary to much available research, Lawson and Ward (1998) did not find any correlation to support the hypothesis that shares with high initial premiums were more likely to underperform in the aftermarket. By contrast, it was found that the long run performance of IPOs with high initial premiums was higher than that of shares with lower initial premiums. These findings support the "loyal clientele" theory which states that shares which initially render a high performance for the investor are continually supported by the investors and maintain high market performance over the long run.

McDonald and Fisher (1972) found positive abnormal returns in the short run and negative underperformance in the aftermarket, however, no link was found between the initial performances of IPO companies and their aftermarket returns. Similar results were found by Ibbotson and Jaffe (1975), although the aftermarket period tested in their study only covered up to the second month post the initial offering.

Bhana (1989) tested the predictive value of the underpricing on the JSE to determine underperformance in the long run and the initial underpricing was not found to be predictive of long run performance, thus, supporting the efficient markets theory of rapid price adjustment to the available information in the market. This is consistent with the results of M'kombe and Ward (2002) who found that the initial level of underpricing on the JSE did not have an impact on the IPO share's aftermarket performance.

The study by Levis (1993) showed that companies with high initial returns rendered poor performance in the aftermarket. These findings are in line with the overreaction hypothesis which states that investors are irrational and overoptimistic about the future performance of IPO shares. Investors therefore overreact on the offer date resulting in large positive abnormal returns in the short run and underperformance in the long run once the market has corrected for the initial overreaction.

The study by Alvarez and Gonzalez (2005) also tested underpricing as a signalling method in the aftermarket performance of IPOs. It was found that initial underpricing was positively correlated to the long run abnormal performance over a 5-year time horizon therefore confirming the signalling hypothesis in Spanish IPOs over the period from 1987 to 1997.

Bradfield and Hampton (1989) found that the correlation between initial underpricing and the returns, one year after the listing, was positive and significant on the JSE. This correlation is interesting considering that other international studies have found a negative relationship between initial and aftermarket abnormal returns (Levis (1993) and Alvarez and Gonzalez (2005)).

It is clear from the above research, that the prior evidence on initial returns as an indicator of the performance in the long run, is mixed. The testing in this study will aim to provide clarity on this matter with regards to South African initial public offerings on the JSE main board.

# 3. RESEARCH QUESTIONS

Initial public offerings present investors with the opportunity to earn superior returns, however, these returns can only be made with a clear understanding of how IPOs perform in South Africa.

This study aims to examine the performance of initial public offerings on the JSE main board over the period 1 January 2000 to 31 December 2011. The performance will be investigated in both the short run and the long run. Prior studies both internationally and in South Africa have examined the initial and aftermarket performance of IPOs and these studies have been reviewed and analysed for the purpose of this study. Reference is made to these prior studies where appropriate. The following research questions have been identified and will be dealt with in the course of this study.

- Can positive abnormal returns be found in the initial period post the offering and if so, what level of abnormal returns can be identified on the JSE main board?

- Does underperformance of IPOs exist in the long run on the JSE main board in relation to index benchmarks?

- Is there a significant variation in the performance of IPOs between hot and cold issue markets both in the short run and long run?

- Are there significant differences in performance results of initial public offerings in the short and long run between the different industry groupings in South Africa?

- Can the initial performance of IPOs on the JSE main board be used as an indicator of the long run performance of IPOs?

# 4. DATA AND METHODOLOGY

## 4.1 Data

This study reviews initial public offerings on the JSE between 1 January 2000 and 31 December 2011, for the purpose of identifying both the initial and aftermarket performance of these IPOs. This period has been chosen in order to provide more updated research to supplement the previous research that has been completed on IPOs listed on the JSE. In addition, the 12 year period, although being relatively short, compares favourably to those periods used in other international studies.[3]

The list of initial public offerings and offer prices between the period 1 January 2000 and 31 December 2008 was complied based on the set of data used by Muller (2009).[4] A total of 224 firms had new listings on the JSE during the period 1 January 2000 and 31 December 2011. This is in accordance with the JSE handbook, although some of these companies listed more than one type of share. Of the 224 firms with new listings, 76 firms listed on the JSE Alternative Exchange (AltX). This study focuses only on listings on the JSE main board and therefore specifically excludes all listings on the AltX due to the differences between the AltX and the JSE main board mentioned previously. In addition, the new listings included rights issues and follow-on offerings which are also not included in the scope of this study. After removing all the companies that do not meet the definition of an initial public offering on the JSE main board, 77 companies remained in the sample.

Obtaining initial offer price information proved to be difficult as there were numerous inconsistencies between the various independent sources used. Therefore all offer prices were verified against data from the JSE handbook, Bloomberg and Reuters. Data was only used where at least two of these sources could provide data that agreed. In addition, JSE Securities Exchange News Service (SENS) announcements on the Standard Bank online share trading website[5] were reviewed to confirm offer prices and other information about the initial public offerings. Where there was data that could not be confirmed by at least two of the

[3] Only 8 of the 26 articles that analysed the long run performance of initial public offerings had a sample period greater than or equal to 12 years.
[4] I gratefully acknowledge the contribution made by Mike Muller for the initial public offerings dataset provided to me for the period 1 January 2000 to 31 December 2008 as was used in his research.
[5] securities.standardbank.co.za

independent data providing services, the IPO was removed from the sample. The verification of data across the different sources would maintain the integrity of the data to ensure that the output was reliable, even though the sample of IPO firms tested may be smaller.

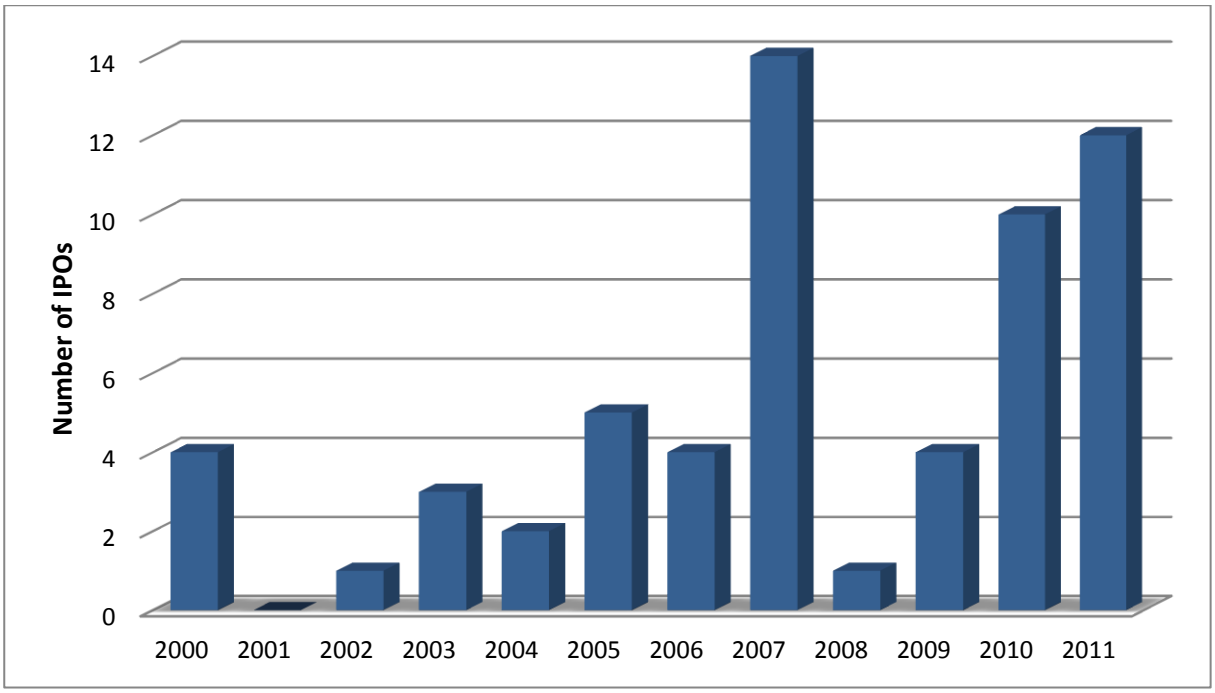
Once all companies with inconsistent or unavailable data were removed from the sample, the remaining sample contained 63 companies. Daily and monthly closing prices for all the remaining companies were obtained from I-Net Bridge, Bloomberg and DataStream. These prices were also cross-checked to ensure that there were no errors in the data used. In addition, where it was necessary, prices were further confirmed using data from McGregorBFA and the Standard Bank online share trading website.[6] Three IPO companies were further excluded from the sample due to timing difficulties, dual listings complexities and lack of relevant data.

The final sample that was used for testing contained 60 initial public offering companies over the 12 year period from 1 January 2000 to 31 December 2011. Refer to Appendix 1 for a full listing of the initial public offerings tested for the purposes of this study. As can be seen from Figure 5, 2007, 2010 and 2011 were the years with the largest number of IPOs with 14, 10 and 12 IPOs taking place in each of the years respectively. It is also clear that the number of IPOs varied significantly across the 12 year period of this study.



[6] securities.standardbank.co.za

**Figure 5: Distribution of IPO sample to be examined on the JSE main board during the period 2000 - 2011**




By contrast to previous studies performed in South Africa, the number of IPOs over the 12 year period covered in this study, are relatively low. Bhana (1989) identified 205 listings on the JSE main board between 1985 and 1987 with a significantly higher number of offerings taking place during 1987 (133 IPOs). This gives an annual average of 68 initial public offerings between 1985 and 1987. In addition, during the same three year period, there were 103 listings on the Development Capital Market. Page and Reyneke (1997) studied IPOs over the period 1980 to 1991 and found 118 initial public offerings during that time, with the highest being 77 in 1987 resulting in an average of 10 IPOs per year. Lawson and Ward (1998) showed an annual average of 25 listings and a total of 535 listings over the 21 year period from 1975 to 1995.

In contrast to the previous work done on the JSE, this study finds only 60 companies with initial public offerings over the 12 year period from 2000 to 2011. Over this time period there is an average of 5 IPOs per annum. This shows a significant decrease in the IPO volumes listing on the JSE in the last few decades.[7] It is not clear what the reason for the apparent decrease in listings is, however, a possible reason for this phenomenon may be the

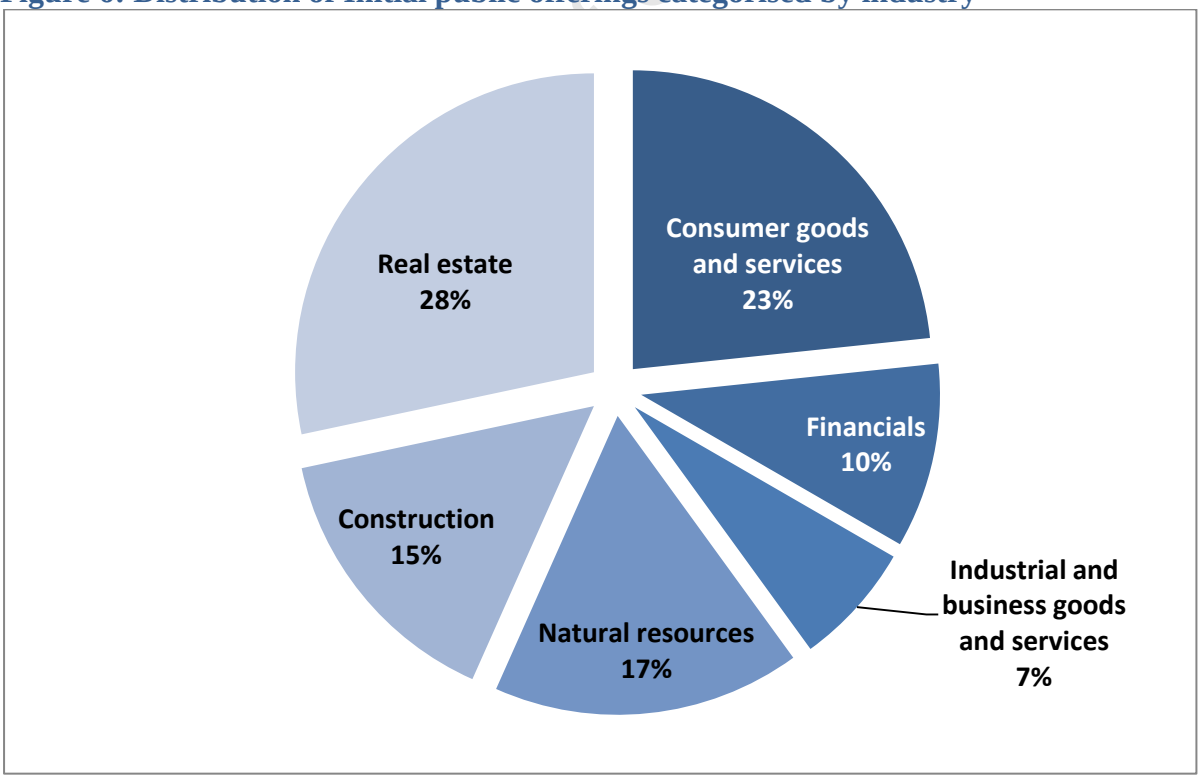
[7] A number of listings were removed from the sample used in this study due to inconsistencies in the data or unavailable data. If these IPOs were included in the sample, the number of IPOs between 2000 and 2011 would still be significantly lower than the number found in previous studies performed on the JSE.

introduction of the South African Alternative Exchange in 2003. Since its inception, more companies may have chosen to list on the AltX as opposed to the JSE main board as the listing and other legislative and regulatory requirements are less onerous on these firms. However, prior to the formation of the AltX, many companies may have chosen to form part of the Development Capital Market (DCM) instead of the JSE main board, and the AltX may simply have replaced this segment in the market as the JSE DCM has been discontinued.

The 60 initial public offering companies included in the sample to be tested includes companies from various industries. These firms have been segmented into the following broad industry classifications for the purposes of this study: (1) Real estate, (2) Consumer goods and services, (3) Financials, (4) Industrial and business goods and services, (5) Natural resources, and (6) Construction. The JSE industry classifications were obtained for each IPO company and those companies where the official sectors were considered to be similar, these IPOs were grouped together to arrive at six industry groupings. The percentage of IPOs represented by each industry have been shown in Figure 6.



**Figure 6: Distribution of Initial public offerings categorised by industry**




It is evident from the above figure, that companies going public between January 2000 and December 2011 were not evenly distributed across industries. Companies in the Real estate (28%) and Consumer goods and service (23%) industries are heavily represented in the IPO

sample from 2000 to 2011, with more than half of the total number of IPOs during that period being from these two industries. The Natural resources industry represented 17% of the total IPOs with the Construction industry closely matched at 15%. In addition to analysing the performance of initial public offerings on the JSE main board, this study will use the six industries categorised above to identify if there are performance differences between the industries.

The benchmark used from which to identify abnormal returns plays a vital role in this study and therefore it is imperative to identify the most appropriate benchmark in order to correctly calculate these abnormal returns. It was found by Ahmad-Zaluki, Campbell and Goodacre (2007) that the measurement of abnormal performance is extremely sensitive to the benchmark used in the calculations. Espenlaub, Gregory and Tonks (2000) and Jakobsen and Sorensen (2001) found that irrespective of the benchmark used, underperformance was found in the long run, however, the use of different benchmarks rendered notably different levels of underperformance in the long run.

The benchmark to be used in calculating both initial and aftermarket abnormal returns is the FTSE/JSE All share index (J203). The All share index (ALSI) represents 99% of the full market capitalisation value of all ordinary shares listed on the main board of the JSE which qualify under the rules of eligibility.[8] Therefore, in a South African context, the use of the ALSI is assumed to be the most representative benchmark of the South African market and therefore will be used as the primary point of reference in this study.

Although the ALSI is considered to be the most apt representation of the South African market, it was found by van Rensburg (2002) that a dichotomy exists in the market. van Rensburg (2002) found that the Financial-Industrial and Resources indices may be used as observable proxies for the South African market. Although his study is focussed on applying the appropriate market proxy in beta estimation when calculating the fair price of securities, the same logic will be applied here when identifying benchmarks that most closely represent the South African market.

By splitting the IPO companies into those most closely represented by the SA Financials and Industrials index (J250) (FINDI) and those represented by the SA Resources index (J258), and comparing the IPO returns to their respective benchmark indices, this may provide

[8] www.jse.co.za

superior information regarding abnormal returns as these indices may more accurately represent the market. Bradfield and Munro (2009) also indicated that the JSE is unique in the sense that it is composed of two distinctly different types of shares being resources shares and financial and industrial shares. It is also stated that investors may prefer to measure the performance of their shares to one of these two indices instead of the FTSE/JSE All share index.

Data for the SA Resources index (J258) was not available for the full period of the study and the Resource-20 index (J210) (RESI20) has been used as a proxy for this index. Those shares that have been delisted, have been allocated to the index that represented that share prior to the delisting. Not all shares on the JSE main board are represented by these two indices, however, due to the two indices representing a large portion of the market, they nevertheless provide an adequate benchmark against which to measure the performance of IPOs. The IPO companies have been allocated to the relevant benchmarks according to the following industry categories: Financials, Industrial and business goods and services, Consumer goods and services, Construction, and Real estate companies have been matched to the SA Financials and Industrials index (J250) and IPO companies in the Natural resources industry have been matched to the Resource-20 index (J210).



## 4.2 Methodology

This study calculates abnormal returns over various time periods including day one, week one and month one to show the returns in the short run. Additionally, the long run returns over periods of one year (12 months) and three years (36 months) are calculated.

The methodology used in this study is in line with that applied by Page and Reyneke (1997) as well as Ritter (1991) in their respective studies on the performance of IPOs. In order to assess the performance of IPOs on the JSE in both the short run and long run, the abnormal returns (ARs) for each IPO firm are calculated. For the various periods, the benchmark-adjusted return for each IPO firm *i* in event day, month or year *t* is defined as:

$$AR_{it} = R_{it} - R_{bmt}, \quad (1)$$

where; $R_{it}$ is the return for company *i* in trading period *t* and $R_{bmt}$ is the return over the specified period for the benchmark index over the same period of time. Where a company has

delisted prior to the end of event month *t*, the return is calculated based on the final closing price available prior to the delisting. The abnormal returns formula above calculates the return of the IPO company that is in excess of the market return and therefore will indicate if there is under or overperformance of the IPO firm. Where a firm has delisted prior to the period of time being tested, the ALSI, FINDI and RESI returns have been matched to the unique period of the company's existence until the date of delisting. The mean abnormal return across all IPO companies is then calculated as follows:

$$\mathrm{AR}_t = \frac{1}{n}\sum_{i=1}^{n} \mathrm{AR}_{it}. \tag{2}$$

Although this is the most straightforward approach to calculating the average abnormal returns over all the IPOs in the sample, Page and Reyneke (1997) indicate that a potential bias can result from summing average abnormal returns over extended periods of time. Therefore, as an alternative method, holding period returns (HPRs) are also calculated for each IPO company. The HPR is the percentage by which the value of the share has grown over a pre-specified period. Holding period returns will be calculated using monthly share prices for both one year and three years post the IPO. HPRs are computed up to the end of month *T*. For each IPO company, the HPR for company *i* over period *T* is defined as:

$$\mathrm{HPR}_{iT} = \prod_{t=1}^{T}(1 + \mathrm{R}_{it}) - 1, \tag{3}$$

where; $\mathrm{R}_{it}$ is the monthly return for company *i* in trading month *t*. This measures the total return from a buy and hold strategy where the share is purchased at the closing market price on the day of the initial public offering and held until the end of the period being tested (either one year or three years for the purposes of this study). If a company has been delisted prior to the end of the testing period (either one year or three years), the HPR is calculated until the date of delisting.

The IPO portfolio holding period return is calculated as:

$$\mathrm{HPR}_T = \frac{1}{n}\sum_{i=1}^{n} \mathrm{HPR}_{iT}. \tag{4}$$

To interpret the total IPO portfolio holding period returns, wealth relatives are computed as performance measures over the various periods. The wealth relatives can be interpreted as the end-of-period wealth from holding the IPO portfolio of companies compared to the end-of-

period wealth from holding the benchmark portfolio. The wealth relatives are calculated as follows:

$$\mathrm{WR}_T \sum_{i=1}^{n}(1+\mathrm{HPR}_{iT})/\sum_{i=1}^{n}(1+\mathrm{HPR}_{bmT}). \quad (5)$$

A wealth relative greater than 1.00 indicates that the IPO portfolio outperformed the benchmark index and a wealth relative below 1.00 evidences underperformance of the IPO portfolio over the specified period.

For each IPO company the daily and monthly closing prices have been obtained over the three year post-issue period. In order to calculate the abnormal returns as per formula (1), the IPO offer price and the closing price on the issue date has been used. The same calculation has been performed for one week and one month periods subsequent to the issue using the offer price of the IPO and the closing price of the share at the end of the respective period.

The abnormal returns calculations showing the short run performance one week and one month following the issue were also calculated using the closing price of the share on the issue date and the closing price at the end of the respective period. The initial offer price is excluded as it is not reflective of the price at which the average investor can acquire shares. Page and Reyneke (1997) identified that over the period 1980 to 1991, of the 113 IPOs listing on the JSE for which data on subscription could be obtained, 94.7% were fully subscribed and 60.0% were oversubscribed in excess of ten times. Thus it is clear that IPOs listing on the JSE are often oversubscribed and therefore not available at the offer price to all investors. The treatment of excluding the initial offer price and using the closing price on the IPO date as a fair price at which investors can obtain shares, has been applied by Page and Reyneke (1997) and Loughran and Ritter (1995). This has been applied to the first week, first month, one year and three year calculations with the first week and first month abnormal returns being calculated including and excluding the first day return.

In determining the long run performance of initial public offerings, abnormal returns and holding period returns are calculated for both a one year and three year period subsequent to the offering. In all long run performance calculations, the offer price of the IPOs has been excluded and the performance is based on the closing price of the IPO share on the issue date and the closing price at the end of the respective period.

Daily closing prices were obtained for the FTSE/JSE All share index (J203), SA Financials and Industrials index (J250) and the Resource-20 index (J210). These closing prices were individually matched to each IPO company based on the company's unique one year and three year post-issue periods. This allows for the benchmark returns to be matched against each IPO company's returns to facilitate the calculation of abnormal returns.

Additionally, monthly closing prices for the ALSI were obtained in order to calculate an ALSI holding period return for the one year and three year periods. These holding period returns were matched to the holding period returns of the IPO portfolio over the particular periods to allow for the calculation of wealth relatives.

The resultant dataset comprises of abnormal returns for each IPO company over the various different holding periods (i.e. one day, one week, one month, one year, and three years) as well as holding period returns for the IPO portfolio and the ALSI over the one year and three year holding periods. T-tests for difference of means are used to test whether the mean abnormal returns over the different holding periods are significantly different from zero. This will enable the process of making inferences on the performance of IPOs on the JSE in the short run and long run.

The effect of hot and cold issue periods will be tested both in the initial period and in the aftermarket. IPOs will be categorised into IPOs that took place in hot issue markets and those that took place in cold issue markets based on the volumes of initial public offerings in the various periods. Data from the original performance tests will be segmented into the two categories and t-tests will be performed to identify if the initial and long run performance of IPOs between the two markets are significantly different. Where data is non normal, Kruskal-Wallis tests will be performed to test for differences between the hot and cold issue markets.

By categorising the IPO companies according to the six broad industries identified (i.e. (1) Real estate, (2) Consumer goods and services, (3) Financials, (4) Industrial and business goods and services, (5) Natural resources, and (6) Construction) tests for differences in the abnormal returns amongst the different sectors can be performed. Where differences are found to exist either in the short run (proxied by the one day abnormal return) or long run (proxied by the three year abnormal return), the industry effect hypothesis is supported. Analysis of Variance tests (ANOVA) will be performed to identify if there are differences

between the industry groups. Where the data in the samples are non normal or have unequal variances, Kruskal-Wallis tests will be performed to test these differences.

A correlation test will be performed to identify a relationship between the returns in the long run (proxied by the three year abnormal returns) and first day returns. To assess whether long run abnormal returns are linearly related to initial abnormal returns, a regression analysis is performed. The required conditions for the regression analysis are tested. This involves testing the assumption of normality, constant variance and autocorrelation of residuals.

# 5. RESULTS

The results below are subdivided into five sections, each detailing the five hypotheses investigated in this study. The first section analyses the short run performance of IPOs on the JSE main board over three time periods (first day, first week and first month after the IPO). This is followed by the results of the long run performance of IPOs over two separate time periods (one year and three years). The results of the analyses between IPO performance in hot and cold issue markets is dealt with in section three. Following this, section 4 deals with whether there are differences in the performance of IPOs between six industry categories. The final section tests to determine if a relationship exists between the size of the initial abnormal returns and the long run abnormal returns of the IPOs on the JSE main board.

## 5.1 Short run performance

In order to make inferences regarding the initial underpricing of initial public offerings, the returns on the first day, first week and first month are analysed. The hypothesis used to test whether the mean abnormal returns are significantly different from zero is as follows:

$H_o$: $\mu_{\text{Abnormal Return}} = 0$
$H_1$: $\mu_{\text{Abnormal Return}} \neq 0$

### 5.1.1 Results for first day returns

In obtaining the results for the first day returns, all IPOs were compared to the FTSE/JSE All share index (ALSI) as the benchmark of the movement in the South African market. Additionally, all companies were also evaluated against either the SA Financials and Industrials index (FINDI) or the Resource-20 index (RESI20) based on the general grouping that matched the type of firm listing on the JSE main board. Interestingly, 50 of the 60 companies listing on the JSE during the period 1 January 2000 to 31 December 2011 fell into the category related to financial and industrial companies and only ten companies were included in the group of resource firms. In the study performed by van Rensburg (2002), it was indicated that there exists a dichotomy on the South African market, and therefore IPO companies were split into the two categories identified by van Rensburg as being the driving

forces behind movements in the market. This being the case, one would expect the type of companies listing on the JSE to be more equally distributed in volumes of the two groupings, however this does not appear to be the case.

**Figure 7: First day abnormal returns**

| Benchmark | Number of IPOs | Mean abnormal returns | p-value | Significant at the 5% level |
|---|---|---|---|---|
| ALSI | 60 | 10.1% | 0.0005 | YES |
| FINDI | 50 | 13.0% | 0.0000 | YES |
| RESI20 | 10 | -4.4% | 0.2903 | NO |

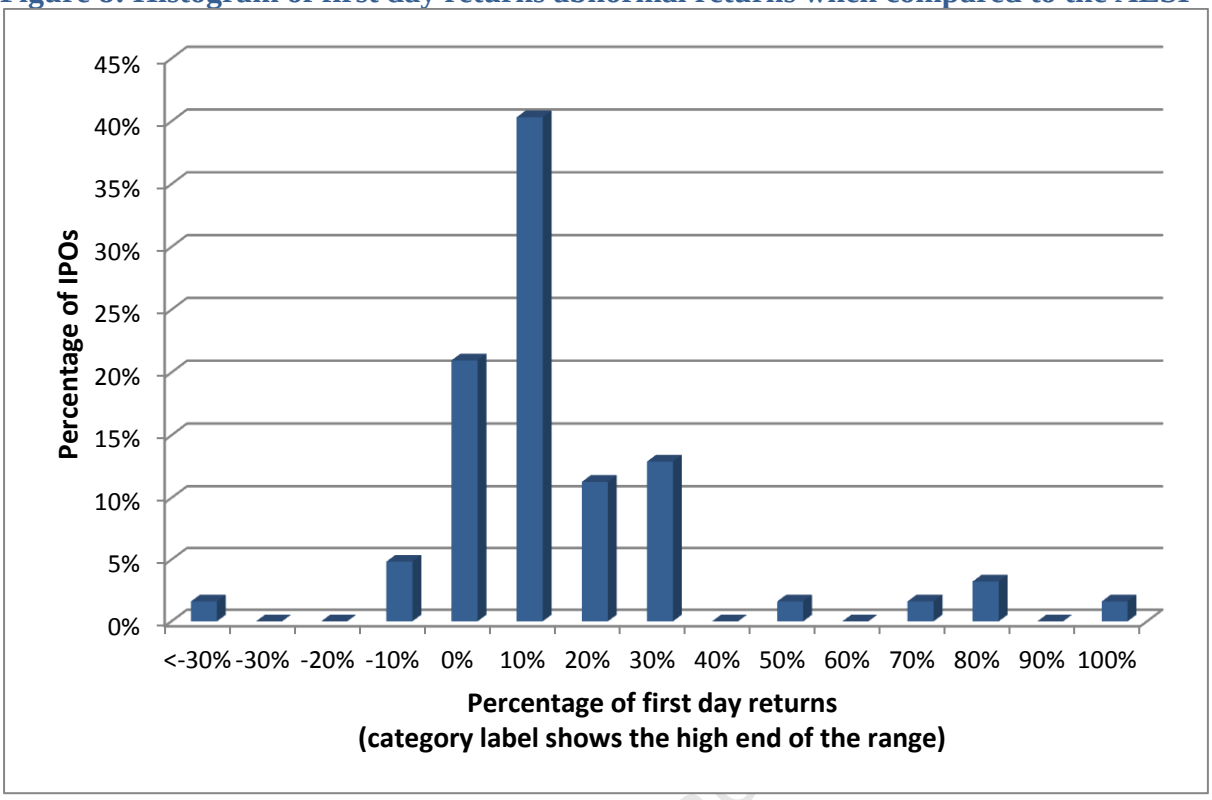
The abnormal returns in Figure 7 reveal that on average IPO companies outperform the market as proxied by the ALSI by 10.1%. This statistic shows an extremely small p-value and therefore is significant at the 5% significance level. The abnormal performance found on the first day using the ALSI as the benchmark is in line with the vast amount of research that has found positive abnormal performance on the first day of the IPO. The amount of underpricing of 10.1%, however, appears to be lower than the levels of underpricing found in previous studies performed on the JSE. In the South African studies referred to in this paper, the range of IPO underpricing on the JSE has been between 27% and 69.7%.

Furthermore, the mean underpricing on the JSE main board of 10.1% is considerably less than the average first day underpricing of 29% found by Correia and Holman (2008) on the South African Alternative Exchange. Tinic (1988) tested the performance of initial public offerings before and after the enactment of the securities act in the United States of America in 1933. While short run returns on pre-1933 issues were found to be significantly positive, even greater excess returns were found after the enactment securities act in 1933. This would imply that there is a positive relationship between the level of regulation on companies on an exchange and the amount of underpricing found on the shares listing on that exchange. Since the listing requirements are less onerous on firms listing on the AltX, it would be expected that the positive abnormal returns on the JSE main board are greater than those found on the AltX. This is however not the case. In fact, it is mentioned by Correia and Holman (2008) that the focus on high quality listings and the increased listing and corporate governance requirements on the AltX may be a contributing factor to the underpricing on the AltX being less than that of the JSE Development Capital Market (DCM). Therefore, the increased

listing and regulatory requirements on the JSE main board may contribute to the reason for the positive abnormal returns on the JSE main board being lower than that on the AltX.

When individual companies were matched up to the FINDI, the mean first day abnormal return was 13.0%, which is greater than that of the overall group of initial public offering shares. The positive abnormal returns in this division have a zero p-value and are statistically significant at the 5% level. The sample size of the companies matched to the RESI20 is small with only ten firms being included in this grouping. An average abnormal return of -4.4% was found, however, the abnormal returns are not found to be significantly different from zero. The results are nevertheless still useful in interpreting the first day results. The results show that investors who acquired IPO shares at the offer price would earn positive abnormal returns of an average of 10.1%. Greater abnormal returns can be made if investors invest in only financial and industrial shares. Additionally, although a mean abnormal negative return is found on the resources shares, it could not be inferred that the abnormal returns are significantly different from zero. This implies that when determining the offer price of these IPOs, resource companies are generally more closely priced to the value the market places on the shares. This may be as a result of the fact that commodity prices are known by the market allowing issuers as well as investors to more accurately value the shares being listed, leading to a lower abnormal return on listing due to the common critical inputs of commodity prices.

**Figure 8: Histogram of first day returns abnormal returns when compared to the ALSI**




The histogram in Figure 8 shows that 40% of all the initial public offerings during the period tested had underpricing of between 0% and 10% and just over 20% of IPOs showed underpricing of between 10% and 30%. There were several companies that showed negative abnormal returns, however, these were outweighed by the larger portion of companies showing positive abnormal returns on the first day. The histogram additionally shows that very few anomalies were present and that close to 90% of IPOs had initial abnormal returns in the range of -20% to 30%.

### 5.1.2 Results for first week and first month returns

To identify the initial abnormal returns on IPOs, in addition to analysing the first day performance, which is the most frequently used method in which to identify initial returns, this study has examined the first week and first month performance. As mentioned previously, the offer price of IPOs is not a price that is available to all investors in order for them to acquire IPO shares. Therefore both the first week and first month abnormal returns have been calculated including and excluding the initial offer price. Where the offer price has

been excluded, the closing price at the end of the first day has been used as an indicator of the price at which the average investor would have been able to purchase the share.

**Figure 9: First week and first month abnormal returns**

| | | Including offer price | | | Excluding offer price | | |
|---|---|---|---|---|---|---|---|
| **Time period** | **Benchmark** | **Mean abnormal returns** | **p-value** | **Significant at the 5% level** | **Mean abnormal returns** | **p-value** | **Significant at the 5% level** |
| **First week** | ALSI | 8.5% | 0.0136 | YES | -2.3% | 0.1022 | NO |
| | FINDI | 11.5% | 0.0027 | YES | -1.7% | 0.1956 | NO |
| | RESI20 | -6.9% | 0.2458 | NO | -5.7% | 0.1212 | NO |
| **First month** | ALSI | 6.9% | 0.0661 | NO | -4.9% | 0.0306 | YES |
| | FINDI | 11.2% | 0.0109 | YES | -2.6% | 0.1344 | NO |
| | RESI20 | -12.8% | 0.1640 | NO | -14.9% | 0.0827 | NO |

The results from the first week and first month tests provide some interesting insights into the initial performance of IPOs. Both the first week and first month results have been calculated including and excluding the first day returns. The results show that in the first week subsequent to the initial offering a mean abnormal return of 8.5% can be earned. Using the ALSI as the benchmark the results indicate that the positive abnormal returns in the first week are statistically different from zero when the offer price is included.

In contrast to this, when the offer price is excluded and the calculation of returns is based on the closing price on day one, the first week results compared to the ALSI, show a mean negative abnormal return of -2.3%. Although this result is not significant at the 5% level it does show that most of the value in the IPO share is the positive abnormal return earned on the first day of the offering. If the IPO share is not obtained at the offer price, the potential for positive abnormal returns diminishes rapidly and by the end of the first week it seems that abnormal returns can no longer be made.

When the first week returns are compared to the FINDI as the benchmark the abnormal returns that can be made increase to 11.5% which again indicates that the underpricing in financial and industrial companies is greater the total average of all IPOs. When the first day return is excluded from the first week return, the mean abnormal return falls to -1.7% once again implying that even in financial and industrials companies the greatest opportunity for investors to earn positive abnormal returns is on the first day. The first week results for

financial and industrial companies when the offer price is excluded is not significant and therefore, no abnormal returns can be made if the share is purchased at the closing price on day one and held for one week.

By contrast, the resources shares show negative abnormal returns in the first week when the offer price has been included and when it has been removed from the calculation. The mean abnormal return in the first week is -6.9% when the share is purchased at the offer price. This statistic is not significant at the 5% level and therefore it cannot be inferred that the performance of resource IPOs is significantly different from the benchmark (RESI20). What is remarkable to note here is that when the first day performance is removed from the first week calculation, the mean abnormal return increases which is in contrast to the expected direction of the movement. This is a clear indication that the dichotomy of the South African market as expressed by van Rensburg (2002) often shows financial and industrial shares moving a different direction to resources shares on the JSE.

Overall, when the first day returns are not included in the first week abnormal returns calculations, none of the IPO groupings of companies show statistically significant differences from the various benchmarks used. Therefore it indicates that abnormal returns cannot be earned by investors in this time period if shares are acquired at the closing price on the offer date, regardless of whether the company forms part of the financials and industrials segment or the resources segement.

When the first month returns are investigated, it can be seen that as with the first week results, when the offer price is included in the calculations, the overall return is a positive abnormal return in comparison to the ALSI. The first month mean abnormal return is 6.9%, however this return is not significant. When sector benchmarks are used, the financial and industrial companies show greater positive abnormal returns of 11.2% when compared to the 6.9% that can be earned over all IPOs. The resources firms show negative abnormal returns in the first month with an average of -13.0%, though the t-test performed shows that the average abnormal return is not statistically different from zero.

When the first day return is removed from the first month calculations, all abnormal returns calculated show that only negative abnormal returns can be made one month subsequent to the initial public offer. Although the results using the FINDI and RESI20 are not significant

at the 5% significance level, the abnormal returns using the ALSI as the benchmark show a statistically significant mean abnormal return of -4.9% after the first month.

It is clear from the above short run performance analysis that, in accordance with international and previous South African studies, that underpricing exists on the first day of initial public offerings on the JSE. Although underpricing of an average of 10.1% was found when the IPO returns were compared to the ALSI returns on the first day, the underpricing is less than the amounts that have been found in previous studies on the JSE. Additionally, there are slight departures in this phenomenon when the first day returns are split into financial and industrial companies and resources companies. The first day returns on these groupings of shares were further analysed and compared to the SA Financials and Industrials index (FINDI) and resource companies were compared to the Resource-20 index (RESI20). The findings indicate that financial and industrial companies show greater first day underpricing than that total IPO portfolio whereas resource companies show negative abnormal returns on the first day, although these negative abnormal returns are not statistically significant.

The first week and first month results when the offer price is included in the calculation show similar results with the total IPO portfolio rendering positive abnormal returns. Financial and industrial companies showed that their movements were in line with that of the total IPO portfolio, whereas resources companies showed negative abnormal returns in the first week and first month. This provides evidence to support the theory that the South African market can be segmented into two distinct groupings and that the two divisions may frequently show movements in opposite directions. Furthermore, although it may be expected that resource companies are the largest driving force behind movements in the FTSE/JSE All share index, as the JSE has been noted to be dominated by mining and resources companies, this has not been the case in the results found.[9] This may be as a result of the largest resource companies already being listed on the JSE and IPO companies not being representative of the current landscape of the JSE main board as new industries are entered into as the market changes.

Finally, the short run performance shows that when the closing price at the end of the first day is used as a measure of the fair price at which the average investor can acquire shares, all

[9] The JSE Limited website indicates that the JSE is primarily a resources exchange. Due to the volume and size of resource companies listed on the exchange, the JSE has six separate mining sub-sectors all of which have separate indices being calculated (www.jse.co.za).

mean abnormal returns in the first week and first month are negative. These negative abnormal returns are not all statistically significant, but are an indication of the fact that regardless of the subdivision that the company falls into, when IPO shares are purchased at the closing price on the offer date, positive abnormal returns cannot be made in the first week or first month subsequent to the offer.

### 5.1.3 Reasons for positive abnormal performance in the short run

The analysis of initial public offerings in the short run has shown that abnormal positive returns exist on the JSE main board. There is abundant documentation regarding the phenomenon of initial public offerings showing some level of positive abnormal performance in the initial period post the IPO. The reasons for this trend are however not consistent among studies and numerous studies have indicated that no clear reasons can be identified.

A possible reason for the large abnormal returns in the short run, is that underwriters may deliberately underprice initial public offerings of shares in an attempt to ensure high share subscriptions. This may have the effect of making the underwriting firm appear to have conducted a successful public offer which will work in their favour in terms of relationship building with the IPO firm. It is likely that the firm will then use the same underwriters to assist with issues in the future. In addition, underwriters may prefer low offer prices as a tool to encourage greater performance in the aftermarket.

Bhana (1989) identifies the ‘naive hypothesis’ as the most straightforward reason for the underpricing occurrence. Bhana (1989) explains that new companies listing on an exchange have no public financial and operating performance history and therefore, investors have no way of identifying how the firm might perform subsequent to the share issue. As compensation for the additional risk that investors have taken on they demand a premium in the form an underpriced offer price. As the initial public offering company becomes seasoned and a performance history becomes available to the public, the risk premium is no longer evident. This theory however does not adhere to the efficient market hypothesis as investors are able to methodically earn abnormal returns in the short run.

The research conducted by Tinic (1988) tested the hypothesis that underpricing serves as a form of insurance against legal liability and the associated damages to the reputations of

investment bankers. The performance of IPOs was tested before and after the enactment of the Securities Act in 1933. It was found that post 1933 underpricing of initial public offerings increased significantly in magnitude when compared to the underpricing found pre-1933. The findings showed support for the initial hypothesis, as due to the additional constraints placed on issuers and their agents, agents would ensure that offers were underpriced as a protection mechanism against legal liability and related damages to their firm's reputation.

Levi (1990) explained the positive first day returns in the UK IPO market by the winner's curse problem. The winner's curse problem is the case where uninformed investors receive only a portion of undervalued shares and a full allocation of overvalued shares. Undervalued shares are usually oversubscribed and portions are allocated to all investors on a pro-rata basis. Additionally, uninformed investors receive a full allocation of overvalued shares as informed investors do not apply for these shares. With this in mind, issuers intentionally underprice shares to convince uninformed investors to participate in the purchase of the shares (Levi, 1990).

Although How (2000) only investigated the performance of initial public offerings of mining companies in Australia, underpricing was found to be substantial in this industry. The reason for this underpricing was found to be the time delay between the prospectus registration date and IPO listing date. The time taken from the date of the company's registration of its prospectus to the time taken for the IPO company to be listed on the stock exchange in calendar days was used as a proxy for the level of informed investor demand for an IPO share. Therefore, offerings that filled quicker had a higher demand from informed investors and therefore were expected to be more underpriced.

There are various theories to explain the phenomenon of initial positive abnormal returns on IPOs, however, based on previous research, it is likely that a combination of factors including the deliberate underpricing of IPOs by underwriters, the naive hypothesis and the winner's curse problem have contributed to the first day underpricing on the JSE main board.

## 5.2 Long run performance

To further investigate the long run performance of IPOs, the returns one year and three years subsequent to the offering have been analysed. Both abnormal returns and holding period returns have been calculated to obtain a clear understanding of the performance of the IPO companies. In addition, wealth relatives have been calculated to enable the appropriate interpretation of the holding period returns. The hypothesis used to test whether the mean abnormal returns are significantly different from zero is as follows:

$H_o$: $\mu_{\text{Abnormal Return}} = 0$

$H_1$: $\mu_{\text{Abnormal Return}} \neq 0$

### 5.2.1 Results for the one year and three year returns

In obtaining the results for the one year and three year returns, abnormal returns were calculated for both the long run periods tested in this study. The closing price of each IPO share at the end of the period tested was used together with the closing price on the offer date, in order to calculate the return for the various periods. All IPOs were compared to the FTSE/JSE All share index (ALSI) as the benchmark for the movement in the South African market, to facilitate the calculation of abnormal returns. Additionally, all companies were also evaluated against either the SA Financials and Industrials index (FINDI) or the Resource-20 index (RESI20) based on which general grouping more closely matched the type of firm listing on the JSE main board.

Additionally, holding period returns were calculated to compensate for the potential bias that can result from summing returns over long periods of time. The holding period returns for each IPO company were evaluated against ALSI holding period returns. In order to further interpret the holding period returns, wealth relatives have been calculated to operate as performance measures.

In all long run performance calculations, the offer price of the IPO has been excluded and the closing price on the date of the offer has been used as the fair price at which the average investor would be able to acquire shares.

**Figure 10: One year and three year abnormal returns**

| Time period | Benchmark | Mean abnormal returns | p-value | Significant at the 5% level |
|---|---|---|---|---|
| One year | ALSI | -14.17% | 0.0138 | YES |
| | FINDI | -7.47% | 0.121 | NO |
| | RESI20 | -35.35% | 0.0447 | YES |
| Three years | ALSI | -43.36% | 0.0023 | YES |
| | FINDI | -29.29% | 0.0162 | YES |
| | RESI20 | -129.49% | 0.0595 | NO |

Figure 10 shows that when compared to the ALSI, the IPO portfolio underperformed by 14.17% one year after the offering. Significant underperformance of 43.36% was found after three years. What is also clear from Figure 10 is that the initial public offerings studied consistently underperform when compared to the two other selected benchmarks (FINDI and RESI20), providing evidence to support the fact that regardless of the benchmark chosen, the IPO will underperform the market in the long run. Even with the South African market split into what may be considered the two most significant components of the market being the resources segment and the financials and industrials segment, there is still clear underperformance in both cases. This provides evidence against the fact that the two separate segments of the market generally move in different directions, as was found to be the case in the short run.

As was seen in the short run section, when returns were compared to the ALSI in the initial IPO period, the first day and first week showed significant positive abnormal returns. In the first month, the abnormal returns were not found to be significantly different from zero. Here it can be seen that significant negative abnormal returns are present in the long run. A clear trend is visible. The reasons for this phenomenon of initial overperformance and subsequent underperformance will be investigated in the next section.

It is also evident from Figure 10 that in each of the three groupings the level of underperformance increased from the one year period to the three year period. This shows support for the fact that by the end of year three, the market may still be correcting for the possible overreaction in the initial stages of the IPO which saw large levels of positive abnormal returns. This provides support for the efficient market hypothesis. However, after three years, the market appears to still be correcting for the initial overvaluations of the IPO shares and therefore it appears that the market may not be efficient. Considering the large

increase in underperformance from the first year to the end of the third year, it raises questions regarding the point at which the level of underperformance will start reducing and if there will be such a point in time. The results could also show signs of investors overreacting in the long run and being excessively pessimistic.

It is also interesting to note that as with the short run returns, resources IPOs are the weakest performers when compared to financial and industrial companies as well as the entire portfolio of IPOs. This fact may be surprising considering that various studies including the study by Levis (1993) found that where there is large underpricing in the short run, there is great underperformance in the long run. We would then expect that since in the short run the resource companies showed negative abnormal returns, that the long run performance would show less underperformance or even no variances from the market, but the opposite seems to apply here.

In addition to calculating abnormal returns, holding period returns (HPRs) were calculated also using the FTSE/JSE All share index (ALSI) as the market benchmark. The results of these HPRs are shown in Figure 11.

**Figure 11: One year and three year holding period returns and wealth relatives**

| Time period | Benchmark | Mean HPRs | p-value | Significant at the 5% level | Wealth relative |
|---|---|---|---|---|---|
| **One year** | ALSI | -12.91% | 0.0163 | YES | -0.1 |
| **Three years** | ALSI | -41.59% | 0.0041 | YES | -0.04 |

The results for the holding period returns are very similar to the results found when using abnormal returns calculations. The HPRs are slightly lower than the abnormal returns for both periods, however the results here are still statistically significant and provide confirmation that even though a different calculation method was used, long run underperformance is present. Using the holding period returns, wealth relatives were calculated, where a wealth relative less than 1.00 indicates underperformance in relation to the market proxy. The wealth relative for the period one year after the offering is -0.1 which indicates that the IPO portfolio underperformed when compared to the ALSI. Not only is the wealth relative an indication of underperformance in the fact that the value is much less than 1.00, but the wealth relative is also negative which shows that whilst the ALSI HPR was positive, the IPO portfolio had an absolute holding period return that was negative. The three

year wealth relative shows the same picture as the one year amount except to a more extreme degree with a wealth relative of -0.04 showing massive underperformance.

Many international studies have found underperformance in the long run of varying ranges as documented in the literature review. The results found here are in keeping with the vast amount of prior research that has been performed on the performance of IPOs in the long run. Although the international results have been relatively consistent in the finding of underperformance in the aftermarket, the prior South African evidence provides conflicting conclusions.

The results found here are in accordance with the findings of Bhana (1989), Page and Reyneke (1997) and M'kombe and Ward (2002) who all found long run underperformance on the JSE. Studies by Bradfield and Hampton (1989) and Lawson and Ward (1998) found positive abnormal returns in the long run, therefore not supporting the international evidence in this regard.

Bhana (1989) found a mean abnormal return of -11.3% one year after the listing and -3.3% was found by M'kombe and Ward (2002). The results found here of an abnormal return of -12.91% and an average HPR of -14.17% are slightly higher than the first year results found previously. Further, Page and Reyneke (1997) found abnormal returns of -13.1% per annum in the four year period subsequent to the offer. This can be compared to the three year findings in this study, however, the underperformance found here of -41.59% (HPR) and -43.36% (AR) are extremely high in comparison to the previous studies conducted in South Africa.



### 5.2.2 Reasons for underperformance in the long run

The underperformance of IPO shares in the long run has been documented in many previous studies and underperformance had been identified in the IPOs listing on the JSE main board. There are several possible reasons why this phenomenon has held true in so many countries around the world including South Africa.

Ritter (1991) identified three possible reasons to explain the underperformance of IPO shares in the aftermarket including: the incorrect measurement of risk related to these companies,

bad luck, and fads and overoptimism. Ritter (1991) found that the underperformance was concentrated among young growth firms who went public during times of high initial public offering volumes. In times of high volumes of IPOs, Ritter (1991) states that investors behave irrationally and are often overoptimistic about the growth opportunities presented in the IPO companies. While bad luck could not be entirely ruled out as an explanation, it was found that since IPO companies underperformed in numerous industries relative to other firms in those same industry categories, the best explanation for underperformance in the aftermarket was that firms generally went public at the peak of industry "fads" and therefore, investors were irrationally positive regarding the IPO firms' future performances.

In line with the results found by Ritter (1991), Schultz (2003) found that significant long run underperformance exists. The study sites "market highs" as a possible reason for the underperformance as many initial public offerings take place during periods of markets highs and as a result of numerous issuances, subsequent performance is poor.

Loughran and Ritter (1995) found that initial public offerings are often incorrectly valued by investors. Investors may justify high valuations by believing they have identified the next top company that will show significant growth and sizable profits in the long run. This is found to be the case even though there have been numerous cases of IPOs underperforming as well as considerable amounts of documented instances in recent literature that show underperformance of IPOs. Loughran and Ritter (1995) find that investors will persist with investing and overvaluing IPOs at the initial stages as they may use hope as a guiding factor instead of experience.

Several reasons may have contributed to the trend of underperformance on the JSE main board in the long run. In the South African market, there does seem to be some indication that long run underperformance is a market mechanism to correct for the overreaction by investors in the initial period of the offering. This was seen as there was underperformance one year and three years after the IPO. Markets may take some time to uncover the true value of each IPO company and the respective share prices will drop as markets return to being efficient. This is in line with the above findings of Ritter (1991), Loughran and Ritter (1995) and Schultz (2003). Additionally, investors may have fallen prey to hoping they have found the "next big thing" instead taking historical IPO performances into account when making IPO share acquisition decisions.

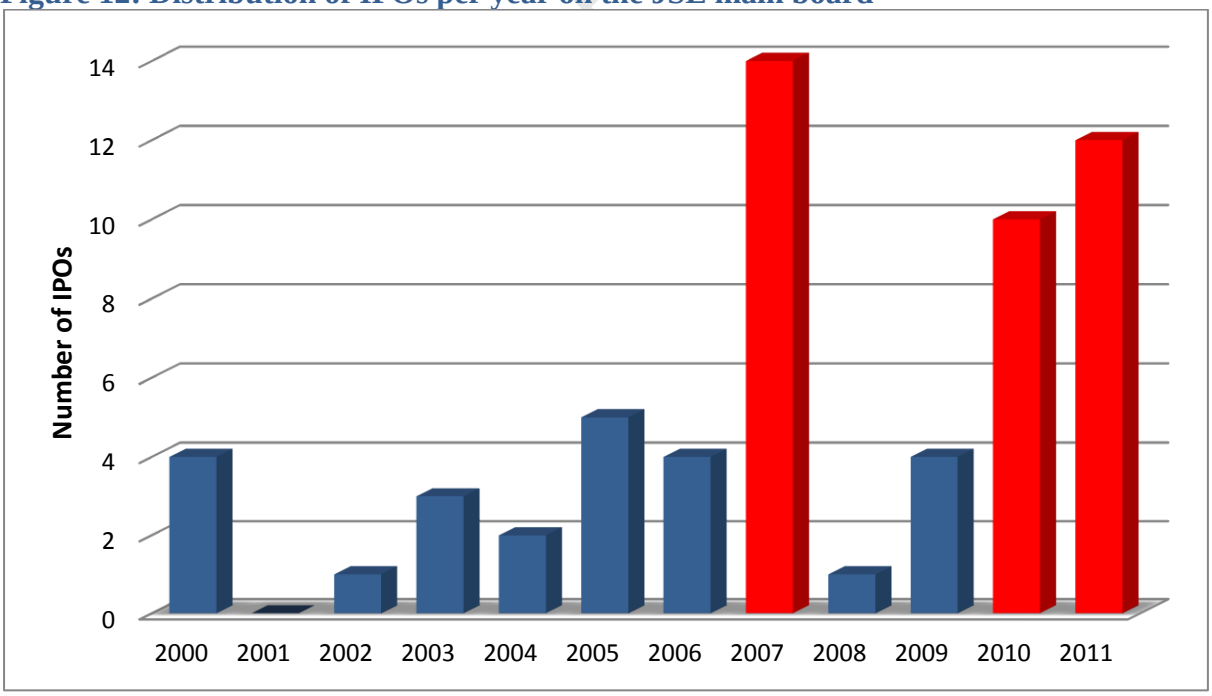
## 5.3 The hot issue effect

In order to make inferences about the performance of IPOs on the JSE, an understanding must be gained of how IPOs perform in hot and cold issue markets. Hot issue markets are characterised by high volumes of initial public offerings and high levels of initial returns (Derrien, 2005).

To identify potential hot issue periods on the JSE main board, the number of listings per year between 1 January 2000 and 31 December 2011 were analysed. The information in Figure 12 shows three calendar years (2007, 2010 and 2011) where the number of IPOs is considerably larger than all the other years. Therefore, when they are grouped together, we arrive at two distinct hot issue periods being from 1 January 2007 to 31 December 2007 and 1 January 2010 to 31 December 2011. IPOs in these two groups will be analysed against the cold issue period which covers the periods from 1 January 2000 to 31 December 2006 and 1 January 2008 to 31 December 2009.



**Figure 12: Distribution of IPOs per year on the JSE main board**



This method of identifying hot and cold issue periods is not without flaws. Firstly, by identifying hot and cold issue periods based on the number of IPOs in a particular calendar year there is the obvious weakness in the method whereby IPOs in the year preceding or following a predetermined hot issue period based on this method may technically have fallen into the hot issue period, but due to there not being a large number of IPOs in that year, the entire year's IPOs will have been allocated to the cold issue period. Additionally, since the period analysed in this study is a cross section of IPOs over a much longer period, the initial period covered in this study (ie the IPOs in the year 2000) may form part of a hot issue period from the preceding years and as a result could be incorrectly allocated. Despite the shortcomings in the method of identifying hot and cold issue periods, however, there is still merit in the tests to be performed. The periods identified as hot issues periods have clearly been correctly allocated and therefore in analysing the performance of hot issue IPOs against cold issue IPOs, valuable insights will be obtained.

To identify the performance of the IPOs in hot and cold issue periods, both the short run and long run will be analysed. The first day performance will be examined for the short run period and the three year performance (excluding the returns on the first day) will be considered in the long run analysis. In all abnormal performance calculations, the FTSE/JSE All share index (ALSI) will be used as the benchmark against which to measure the abnormal returns over the short and long run. The hypothesis used to test whether the mean abnormal returns are significantly different between hot and cold issue periods is as follows:

$H_0$: $\mu_{\text{Hot issue periods}} = \mu_{\text{Cold issue periods}}$
$H_1$: The two means differ.

### 5.3.1 First day performance in hot and cold issue periods

**Figure 13: First day abnormal returns and summary statistics in hot and cold issue periods**

| | Cold issue period | First hot issue period | Second hot issue period | Total |
|---|---|---|---|---|
| | Jan 00 - Dec 06 & Jan 08 - Dec 09 | Jan 07 - Dec 07 | Jan 10 - Dec 11 | Jan 00 - Dec 11 |
| Number of companies | 24 | 14 | 22 | 60 |
| Mean | 10.3% | 27.6% | -0.7% | 10.1% |
| Median | 7.7% | 19.8% | -0.1% | 3.8% |
| Maximum | 63.7% | 93.1% | 46.6% | 93.1% |
| Minimum | -19.8% | -3.1% | -66.1% | -66.1% |
| Standard Deviation | 15.1% | 31.7% | 18.0% | 23.1% |

As can be seen in Figure 13 above, the results show a somewhat atypical picture of hot and cold issue markets on the JSE main board. The average first day abnormal return for the entire sample of IPOs is 10.1%. When this is compared to the cold issue period, there is a very slight increase in the mean abnormal return to 10.3%. However, when the 10.3% mean abnormal return in the cold issue period is compared to the same statistic of 27.6% in the first hot issue period the results are in line with what would be expected, where underpricing in hot issue markets is considerably higher than the level of underpricing in cold issue markets (Derrien, 2005). In stark contracts to the first hot issue market, however, the second hot issue period shows an abnormal return of -0.7%. Not only is this statistic negative, it is lower than the first hot issue market, the overall IPO portfolio and the cold issue period. This then completely opposes the IPO share movements in the first hot issue market leading to inconsistent results between the two hot issue periods.

Additionally, the first hot issue period shows a maximum abnormal return of 93.1% which is the maximum abnormal return of the total IPO portfolio. Contrastingly, the lowest abnormal return of the entire IPO portfolio of -66.1% was found to have occurred during the second hot issue period. The first hot issue period has a large standard deviation which would be expected in a hot issue period as M'kombe and Ward (2002) found that hot issue periods contained the most risky IPO companies. It was found that the riskiness inherent in these companies could be a contributing factor for the larger amounts of underpricing found in hot issue IPOs on the JSE (M'kombe and Ward, 2002). The findings in the second hot issue

period where the mean abnormal return is less than that of the cold issue period is supported by the findings of Correia and Holman (2008) in their study based on IPO listing on the AltX.

Although there are seen to be large differences in the short run performance of IPOs in the two hot issue periods, in order to test the performance of hot issue periods compared to cold periods, the two hot issue periods will be viewed as a single period.

**Figure 14: First day abnormal returns and summary statistics in hot and cold issue periods**

| | Cold issue period | Hot issue period | Total |
|---|---|---|---|
| | Jan 2000 - Dec 2006 & Jan 2008 - Dec 2009 | Jan 2007 - Dec 2007 & Jan 2010 - Dec 2011 | Jan 2000 - Dec 2011 |
| Number of companies | 24 | 36 | 60 |
| Mean | 10.3% | 10.0% | 10.1% |
| Median | 7.7% | 1.3% | 3.8% |
| Maximum | 63.7% | 93.1% | 93.1% |
| Minimum | -19.8% | -66.1% | -66.1% |
| Standard Deviation | 15.1% | 27.4% | 23.1% |
| P-value | | | 0.9646 |

As can be seen from the above statistics, the mean abnormal returns in both the hot and cold issue periods are fairly similar at 10%. To determine if the differences between the hot and cold issue periods are statistically significant, a t-test was performed. The p-value of 0.9646 indicates that the short run performance of IPOs in hot issue periods is not significantly different to the short run performance in cold issue periods.

These results are consistent with the findings of Bradfield and Hampton (1989) who tested the abnormal returns in hot and cold issue periods in the short run on the JSE. It was found that abnormal returns in hot issue markets were not consistently higher than those in cold issue periods in the aftermarket.

### 5.3.2 Three year performance in hot and cold issue periods

To examine the long run performance of IPOs in hot and cold issue periods the abnormal returns have been analysed over the three year period subsequent to the date of the offer to the public. This has however meant that all IPOs that took place from October 2009 onwards have not been included in this sample as the end of the three year period for these IPO companies has not yet been reached. This also means that the second hot issue period as described above has not been tested here as all the IPOs in that hot issue period listed in 2010 and 2011.

**Figure 15: Three year abnormal returns and summary statistics in hot and cold issue periods**

| | Cold issue period | First hot issue period | Total |
|---|---|---|---|
| | Jan 2000 - Dec 2006 & Jan 2008 - May 2009 | Jan 2007 - Dec 2007 | Jan 2000 – May 2009 |
| Number of companies | 23 | 14 | 37 |
| Mean | -41.9% | -45.7% | -43.4% |
| Median | -51.4% | -46.9% | -49.0% |
| Maximum | 325.1% | 23.2% | 325.1% |
| Minimum | -235.9% | -99.0% | -235.9% |
| Standard Deviation | 108.1% | 36.5% | 87.3% |
| P-value | | | 0.975 |



The summary statistics in Figure 15 indicate that the level of underperformance is only marginally greater in the hot issue period when compared to the cold issue period. Yet, although the means are similar between the two periods, the minimum and maximum abnormal returns in the cold issue period are far more extreme than that of the hot issue periods. This results in the cold issue period having a much larger standard deviation than the hot issue period and the overall IPO sample. This opposes the information seen in the short term where the greatest level of standard deviation was found in the first hot issue period.

In determining the statistical significance of the difference between the long run abnormal returns of hot and cold issue periods it was found that the abnormal returns in the first issue period were not normally distributed in accordance with the chi-squared test of normality performed. Therefore, the calculation of a t-test was precluded from be used here. A Kruskal-Wallis test was therefore performed to identify if the differences between the two groups were statistically significant at the 5% level. The p-value of 0.975 indicates that there is

insufficient evidence to reject the null hypothesis at the 5% level and therefore it reveals that the long run abnormal performance between hot issue markets and cold issue markets is not significantly different.

These results are consistent with the findings of Bhana (1989) who found that in the aftermarket, markets become efficient and therefore the potential for abnormal returns in hot issue periods are eroded on the JSE. The results found by Bradfield and Hampton (1989) also on the JSE, indicated that there is no specific price behaviour present in the aftermarket between hot and cold issue markets which is in accordance with the results of this study.

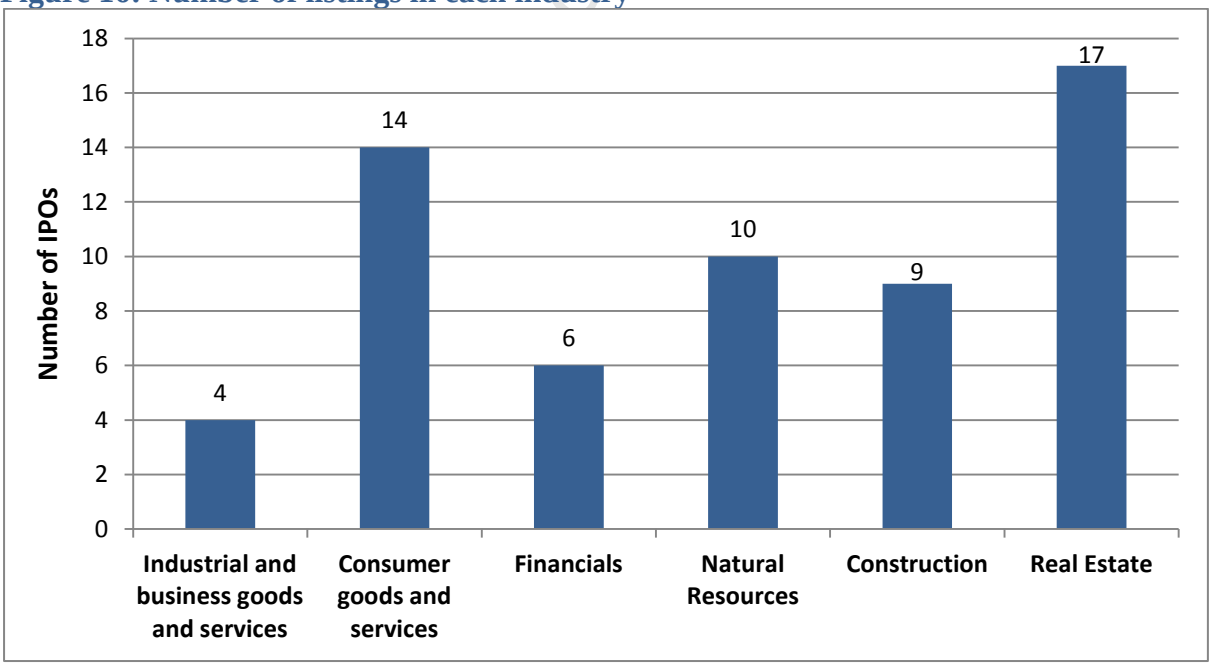
## 5.4 IPOs in different industries on the JSE

The fourth hypothesis examines whether an industry effect exists and whether each IPO's performance is affected by the particular sector into which it lists. It has already been noted in the previous tests that there are major differences between resources companies listing on the JSE main board and financial and industrial companies. This section will delve deeper into this phenomenon and analyse the six identified sectors into which companies listed during the period covered in this study.

The initial public offering firms have been segmented into the following broad industry classifications: (1) Real estate, (2) Consumer goods and services, (3) Financials, (4) Industrial and business goods and services, (5) Natural resources, and (6) Construction. As can be seen from Figure 16, the largest represented sector in the IPOs between 1 January 2000 and 31 December 2011 is the real estate sector (17 IPOs) followed by the consumer goods and services sector (14 IPOs), however, there appears to be a fair representation in terms of the number of IPOs across all sectors.



**Figure 16: Number of listings in each industry**




Both the short and long run periods will be examined to identify if there is a relationship between the first day excess returns as well as the three year abnormal returns and the industry to which the company belongs. All returns will be compared to the FTSE/JSE All

share index (ALSI) as the benchmark to indicate movements in the South African market. This will facilitate the calculation of abnormal returns in the short and long run in each industry. These tests will provide insights into whether the industry effect exists on the JSE main board. The hypothesis to test whether the mean abnormal returns differ by industry is as follows:

$H_0$: $\mu_{\text{Industrial and business goods and services}} = \mu_{\text{Consumer goods and services}} = \mu_{\text{Financials}} = \mu_{\text{Natural resources}} = \mu_{\text{Construction}} = \mu_{\text{Real estate}}$

$H_1$: At least two means differ.

**Figure 17: First day and three year abnormal returns per industry**

| | Number of IPOs in short run | First day abnormal returns | Number of IPOs in long run | Three year abnormal returns |
|---|---|---|---|---|
| Industrial and business goods and services | 4 | -2.2% | 3 | -43.8% |
| Consumer goods and services | 14 | 10.4% | 9 | 7.7% |
| Financials | 6 | -0.1% | 4 | -119.9% |
| Natural resources | 10 | -4.5% | 3 | -140.9% |
| Construction | 9 | 46.0% | 9 | -51.0% |
| Real estate | 17 | 6.4% | 9 | -20.0% |
| Total | 60 | 10.1% | 37 | -43.4% |
| P-value | | 0.0002 | | 0.0346 |



The above results indicate that there are vast differences between the first day abnormal returns in the various industries. The construction industry has shown the highest mean positive abnormal return of 46% in the short run followed by the consumer goods and services industry with an average abnormal return of 10.4%. The abnormal return in the consumer goods and services industry is comparable to the overall IPO portfolio abnormal return of 10.1%. This being the case, the only mean abnormal return on the first day that is considerably greater than that of the IPO portfolio comes from the construction industry. All other industries are seen to have lower levels of underpricing than the portfolio. Three industries had average levels of negative abnormal returns on day one which is unexpected considering that various studies have found significant positive first day abnormal returns, including this study. Of course, finding significant positive abnormal returns on the first day does not mean that no companies underperformed in comparison to the benchmark, however it is interesting to note that in this case there are three industries that provide a mean abnormal return that has underperformed the benchmark. Thus providing support for the

hypothesis that some industries may show different IPO performance results to others. Additionally, the natural resources industry has shown the weakest performance on the first day with a mean abnormal return of -4.5%. The natural resources industry was identified previously in this study as performing particularly poorly when the RESI20 was used as the market benchmark and the performance was compared to financial and industrial companies. Even when the industries are segmented further into the six industries identified here, the resources industry is identified as a highly poor performer.

When identifying the performance of IPOs in the long run, the three year results have been analysed per industry. Due to the fact that some issues took place in the later months of 2009 onwards, these IPOs have as yet not reached their three year anniversaries. Therefore these IPOs have not been included in the sample of long run IPOs resulting in 37 IPOs being included in the long run tests.

In contrast to the short run returns, the long run abnormal performance figures, as calculated by reference to the ALSI as the market benchmark, paint a different picture. In this case, the natural resources and financials industries showed the largest underperformance over the three year period, in both cases showing underperformance of over 100%. Interestingly, with a long run mean abnormal return of -140.9% the largest underperformer has been identified as the natural resources industry which was also found to be the case in the short run. When the performance of the shares in the long run were further investigated, it was identified that all the shares tested in the natural resources industry showed large levels of underperformance. This is an indication that the hypothesis of efficient pricing does not hold, but rather that resources shares were overpriced on the issue date. The overpricing of these shares may be as a result of a resource price boom at the time of listing that will correct in the period subsequent to the initial public offering.

Also noteworthy is that fact that over the three year period tested, only the consumer goods and services industry showed outperformance in the long run. When the details of the IPO shares that comprise the consumer goods and services industry were investigated further, it was found that of the nine IPOs examined in the long run, six of those shares showed various levels of underperformance.

In order to identify if there is a statistical difference between the performances of the six industries, statistical tests were performed. The required conditions for performing an analysis of variance (ANOVA) test were not met as the data in both the short and long run is non-normally distributed based on the chi-squared tests of normality performed. Although the Barlett's tests performed indicated that the variances in the performance of the various industries were not unequal, the ANOVA tests could not be performed. As a result of this, Kruskal-Wallis tests were performed.

Both the short run and long run p-values are very small therefore indicating that there are significant differences between at least two of the industries tested in the two time periods. Therefore it is clear that the industry effect is present in the first day performance of IPOs as well as the three year performance. Knowing that not all the IPOs in different industries on the JSE perform in the same way is an indication to investors that the industry into which an IPO lists, should be taken into account when analysing the potential performance of a particular IPO share.

## 5.5 Initial returns as an indicator of future performance

Thus far, this study has confirmed that on the JSE main board, it is possible for investors to earn positive abnormal returns in the short run when IPO first day returns are compared to the FTSE/JSE All share index (ALSI) which serves as a proxy for the movements in the South African market. Positive average abnormal returns were found to be statistically significant and therefore different from zero on the first day and in the first week after the offering when the offer price was included in the first week calculation. When the offer price was removed from the first week calculation, the results indicated a negative abnormal return, however the first week results were found not to be significantly different from zero. The first month results indicated that with the offer price included the IPO portfolio returns were not significantly different from the benchmark and when the offer price was excluded the average abnormal results were found to be significant and underperforming the benchmark.

Therefore, when the short run results are considered together, a clear trend can be identified. On average, the returns start off by overperforming in comparison to the market on the first day, it then appears that share prices tend to decrease on the IPO portfolio and after a few days are no longer significantly different from the market. At the end of the first month the IPO portfolio is underperforming the market.

When the long run abnormal returns are considered, it is found that after the first year, the IPO portfolio is significantly underperforming the ALSI. After three years, the IPO portfolio shows even larger negative average abnormal returns which are significantly different from the market benchmark.

This trend has been depicted in Figure 18 showing the movements in average abnormal returns over the five periods tested in this study of the portfolio of initial public offerings. These abnormal returns have been calculated based on the ALSI as the market benchmark. In the first week, first month, first year and three year average abnormal returns, the closing price on the offer date has been used as the initial price of both the IPO and the ALSI when calculating the abnormal returns shown in Figure 18.

**Figure 18: Abnormal returns on the portfolio of IPO companies over time**

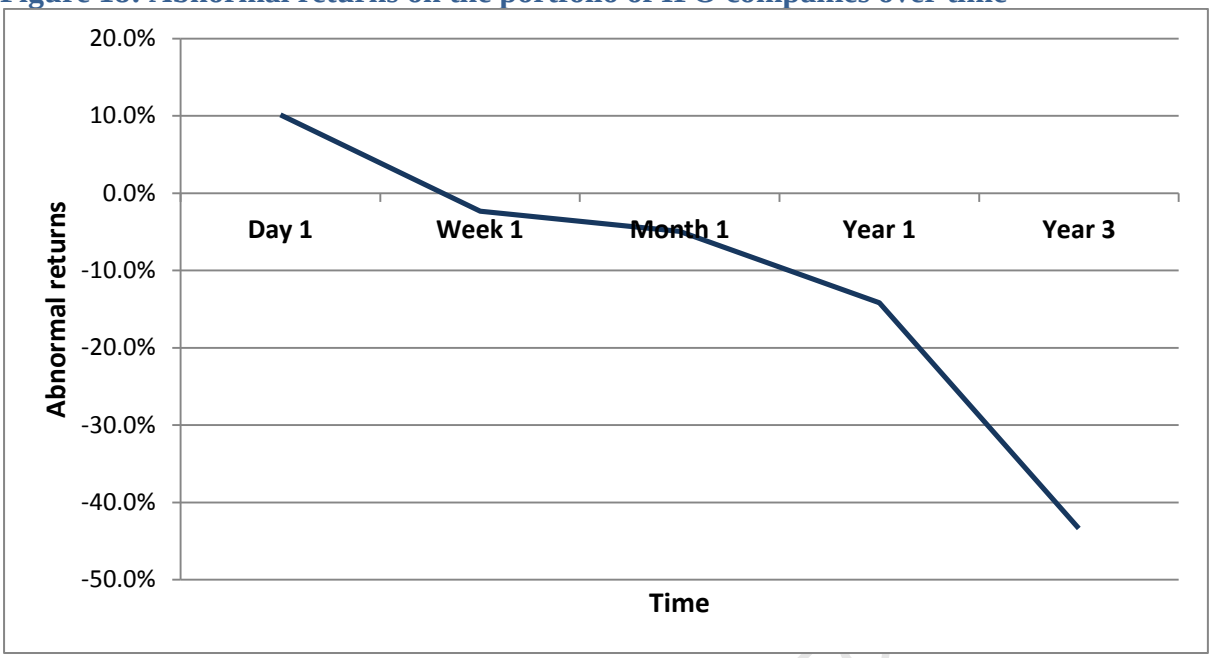



Figure 18 illustrates that in general initial public offerings on the JSE main board follow the trend of showing positive abnormal returns on the first day and large negative abnormal returns after three years. Therefore, in this section, the relationship between the size of the first day abnormal return and the three year abnormal return will be tested to identify if some correlation between the two values is present. Thus it can be identified if there is a link between the short run performance and the long run performance of initial public offerings on the JSE Limited. A pearson correlation test will be performed to identify this potential relationship. Additionally, a regression test will be performed to assess whether the first day abnormal returns are linearly related to the three year abnormal returns. The first day return will be used as the independent variable and the three year return will be the independent variable. The hypotheses for both tests are as follows:

Correlation test:

$H_0$: $\rho = 0$

$H_1$: $\rho \neq 0$

Regression test:

$H_0$: $\beta_1 = 0$

$H_1$: $\beta_1 \neq 0$

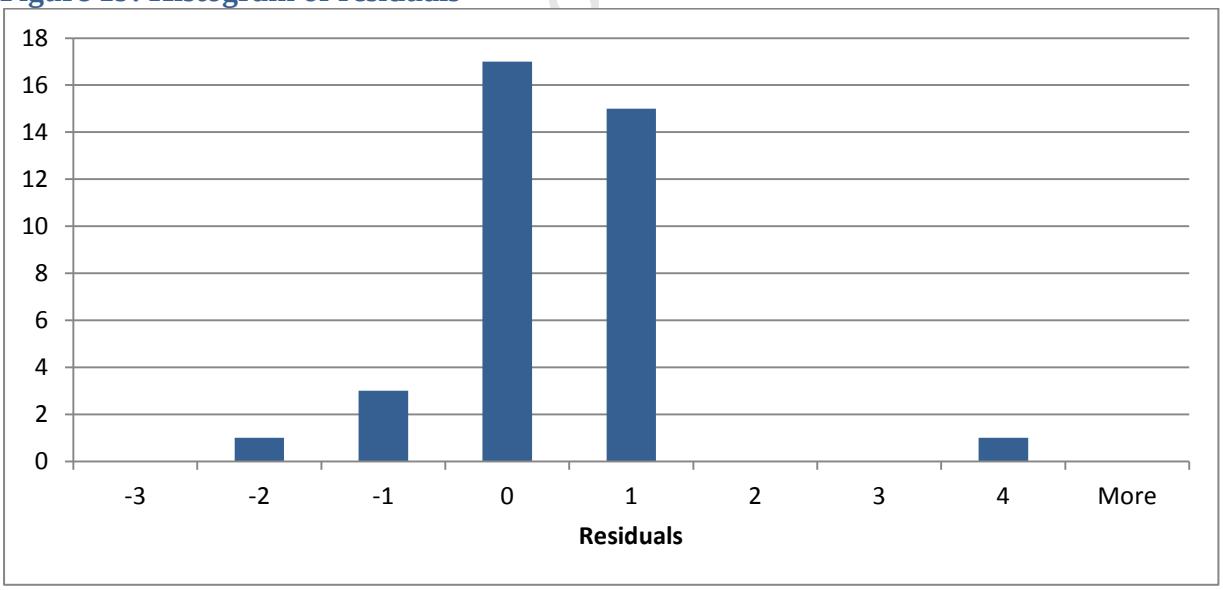
Of the 60 IPOs that took place between 1 January 2000 and 31 December 2011, only 37 can be included in these tests as the three year anniversary has not yet been reached for several of the IPO firms.

The results of the correlation analysis between the first day returns and the three year returns of the IPO companies show a correlation of statistic of -0.0805. The correlation coefficient is extremely small therefore indicating that the relationship between the first day abnormal returns and three year abnormal returns is minimal and even negligible. Even with such a small value, it is important to note that the correlation statistic points to the presence of a very faint negative relationship between the two abnormal returns. This negative relationship is what would be expected considering that several studies have hypothesised that IPO shares that overperform more in the initial stages are the shares that underperform the greatest in the long run. This was found to be the case by Levis (1993) in the United Kingdom.

Prior to the interpretation of the regression statistics, an analysis of the requirements that need to be met to be able to perform a regression test must be completed. The error variable was examined to ensure that the data was normally distributed and a chi-squared test of normality was performed. The chi-squared test indicates that the data is not normally distributed. This can be seen in Figure 19 below. However, Keller (2005) indicates that if the data shows some form of bell shape, the statistical tests are still relevant.

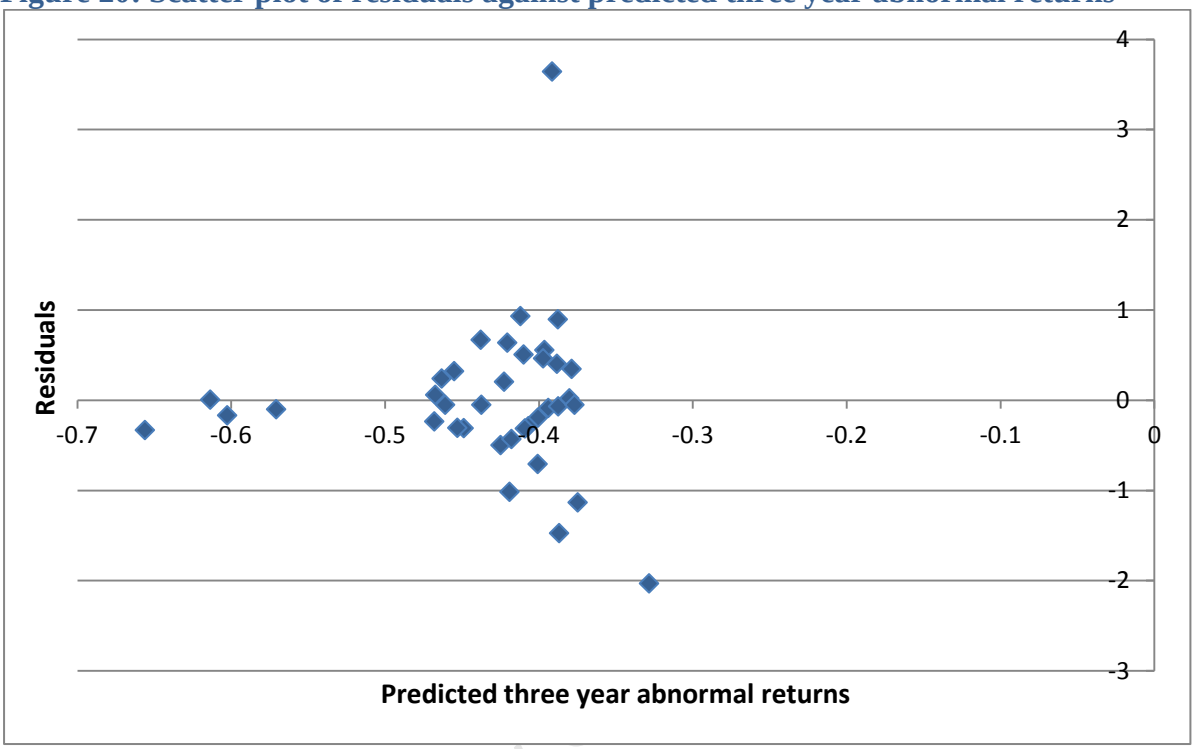


**Figure 19: Histogram of residuals**



Additionally, the requirement to ensure that residuals have a constant variance must be met. A scatter plot of the residuals plotted against the predicted three year abnormal returns was examined to test for a constant variance.

**Figure 20: Scatter plot of residuals against predicted three year abnormal returns**




The residuals appear to have a greater variance as the predicted three year abnormal returns values increase. Therefore the assumption of constant variance may be violated. Since two of the requirements needed to perform the regression tests appear to be violated, this test will not be performed and interpreted here.

Although no regression test could be performed, the outcome of the pearson test is sufficient information to conclude that there is a relationship between the first day abnormal returns of the IPOs tested and their three year returns, however, this relationship is weak and possibly negligible.

Positive abnormal returns were found by McDonald and Fisher (1972) in the short run and negative underperformance was found in the aftermarket, however, no link was found between the initial performances of the IPO companies and the aftermarket returns as is the

case here. Ibbotson and Jaffe (1975) found similar results, although the aftermarket period tested in their study only covered up to the second month post the initial offering.

It can therefore be concluded that on the JSE main board, no link can be made between the initial and aftermarket performance of IPOs which is consistent with the results of previous testing perfromed on the JSE by Bhana (1989), Lawson and Ward (1998) and M'kombe and Ward (2002).

# 6. CONCLUSIONS

This study examined the performance 60 initial public offerings listing on the JSE main board between 1 January 2000 and 31 December 2011. Significant underpricing of 10.1% and 8.5% was found to exist on the first day and during first week subsequent to the IPO. No significant underpricing was found one month after the offering, however, when the first day return was removed, significant underperformance was seen one month after the initial public offering.

When the long run performance was examined, underperformance of 14.17% was found using abnormal returns and 12.91% underperformance was found when holding period returns were calculated one year after the IPO. Negative excess returns were also found three years subsequent to the initial offering with the levels of underpricing being more pronounced.

In all calculations, the JSE/FTSE All share index was used as the market benchmark and additionally the market was segmented into a financials and industrials division and a resources division. These divisions were further tested using the SA Financials and Industrials index (FINDI) and the Resource-20 index (RESI20) as the market benchmarks respectively. The first day results showed a significant positive abnormal return in the financials and industrials segment and a negative abnormal return in the resources segment which was not found to be significant. This evidence indicates to investors that a dichotomy is present on the South African market and that levels of underpricing can be different based on the segment the IPO company belongs to. The long run performance showed both segments underperforming the market with the resources segment showing greater levels of underperformance in both the one year and three year periods subsequent to the offering.

Periods that evidenced considerably larger volumes of IPOs were identified as hot issue periods and the performance of IPOs was tested to identify significant differences between hot and cold issue markets. Two separate hot issue periods emerged from the data, however, these hot issue periods showed conflicting results based on the first day performance. The first hot issue period showed mean abnormal returns of 27.6% with the second period showing -0.7%. When the periods were combined, no evidence was found to indicate that first day returns were significantly different between hot and cold issue markets. The three

year returns were tested in the long run in both hot and cold issue periods and as with the first day returns, no significant difference was found between the two markets. This is not consistent with previous studies that have found significantly higher underpricing in the short run and greater underperformance in the long run in hot issue markets.

The industry effect was also examined on the JSE main board using six industry categories for the purposes of this study. IPOs were categorised into the following groupings: (1) Real estate, (2) Consumer goods and services, (3) Financials, (4) Industrial and business goods and services, (5) Natural resources, and (6) Construction. Considerable differences in the level of abnormal returns were found on the first day and in the three year period examined. In both the short and long run, at least two industry means were found to be significantly different from each other indicating that the industry effect is present on the JSE.

Finally, since positive abnormal returns were found in the short run and negative abnormal returns were found in the long run, a correlation test was performed to identify whether there is a relationship between the initial and aftermarket performances of IPOs. No significant relationship was found implying that the initial abnormal returns cannot be used as a predictor of future performance on the JSE.

With regards to the South African market, future research can be performed to identify how abnormal returns on IPO shares change over time and what this means for investors. Additional research can be performed to identify specific industries that are likely to outperform others over a longer period of time and the reasons for the differences in the industries can be examined.

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# 8. APPENDICES

## Appendix 1: List of all IPO companies with first trading date

| Ticker | Company Name | First Trading Date |
|---|---|---|
| CMA | Command Holdings Ltd | 09 February 2000 |
| RDF | Redefine Income Fund | 23 February 2000 |
| SQE | Square One Solutions Group Ltd | 13 April 2000 |
| MSM | Massmart Holding Ltd | 04 July 2000 |
| ACP | Acucap Properties Ltd | 27 March 2002 |
| TKG | Telkom SA Ltd | 04 March 2003 |
| EXO | Exxoteq Limited | 05 November 2003 |
| EMI | Emira Property Fund | 28 November 2003 |
| ABT | Ambit Properties Ltd | 04 February 2004 |
| LEW | Lewis Group Limited | 04 October 2004 |
| MKL | Makalani Holdings Ltd | 18 May 2005 |
| NCA | New Corpcapital Ltd | 27 June 2005 |
| SYA | Siyathenga Propery Fund Ltd | 05 August 2005 |
| DIV | Diversified Property Fund Ltd | 06 October 2005 |
| CBS | CBS Property Portfolio | 02 November 2005 |
| HPA | Hospitality Property Fund Ltd | 16 February 2006 |
| MDN | Madison Property Fund Managers Holdings Ltd | 07 June 2006 |
| AFT | Afrimat Ltd | 07 November 2006 |
| PZG | Pamodzi Gold Ltd | 11 December 2006 |
| ASO | Austro Group Ltd | 01 February 2007 |
| SOH | South Ocean Holdings Ltd | 28 February 2007 |
| RBX | Raubex Group Ltd | 20 March 2007 |
| KEL | Kelly Group Ltd | 03 April 2007 |
| CBH | Country Bird Holdings Ltd | 03 May 2007 |
| SSK | Stefanutti and Bressan Holdings Ltd | 03 August 2007 |
| PKH | Protech Khuthele Holdings Ltd | 07 August 2007 |
| SKY | Sea Kay Holdings Ltd | 16 August 2007 |
| KWS | Kwikspace Modular Buildings (Pty) Ltd | 08 November 2007 |
| BLU | Blue Label Telecoms Ltd | 14 November 2007 |
| KDV | Kaydav Group Ltd | 15 November 2007 |
| ARH | ARB Holdings Ltd | 20 November 2007 |
| TWP | TWP Holdings Ltd | 26 November 2007 |
| UNI | Universal Industries Corporation Ltd | 29 November 2007 |
| KEH | Keaton Energy Holdings Ltd | 22 April 2008 |
| TTO | Trustco Group Holdings Ltd | 19 February 2009 |
| EFF | Efficient Fin Hldgs Ltd | 20 April 2009 |
| VOD | Vodacom Group Limited | 18 May 2009 |
| FFA | Fortress Income Fd Ltd A | 22 October 2009 |
| FFB | Fortress Income Fd Ltd B | 22 October 2009 |
| OPT | Optimum Coal Holdings Limited | 29 March 2010 |
| WIL | Wilderness Holdings Limited | 08 April 2010 |

| Ticker | Company Name | First Trading Date |
|---|---|---|
| RACP | RECM and Calibre Limited | 08 June 2010 |
| LHC | Life Healthcare Group Holdings Ltd | 10 June 2010 |
| RSG | Resource Generation Limited | 14 July 2010 |
| RIN | Redefine Prop International Ltd | 07 September 2010 |
| RBP | Royal Bafokeng Platinum Limited | 08 November 2010 |
| VIF | Vividend Income Fund Limited | 18 November 2010 |
| PLL | PLATFIELDS LIMITED | 14 December 2010 |
| CLR | CLOVER INDUSTRIES LIMITED | 14 December 2010 |
| RMI | Rand Merchant Insurance Holdings | 07 March 2011 |
| IPF | Investec Property Fund Limited | 14 April 2011 |
| REB | Rebosis Property Fund Limited | 17 May 2011 |
| COH | Curro Holdings Ltd | 02 June 2011 |
| MPT | Mpact limited | 11 July 2011 |
| MWNT | Mine waste sol pty ltd | 15 July 2011 |
| HSP | Holdsport limited | 18 July 2011 |
| FMC | Forbes & manhattan coal | 28 July 2011 |
| VPF | Vunani Property Investment Fund Ltd | 11 August 2011 |
| DIA | Dipula Income Fund Ltd | 17 August 2011 |
| DIB | Dipula Income Fund Ltd | 17 August 2011 |
| FCR | Ferrum Crescent Limited | 11 November 2011 |
| SGA | Synergy Income Fund Ltd-A | 14 December 2011 |