

**AN ANALYSIS OF PUBLIC EQUITY OFFERINGS LISTED ON
THE JOHANNESBURG STOCK EXCHANGE (JSE)**

Gillian van Heerden

609v0536

Department of Economics and Economic History
Rhodes University

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Supervisors: Prof. AP Faure & Prof. GR Keeton

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ABSTRACT

The underpricing of initial public offerings (IPOs) and their subsequent low long-run performance represents one of the anomalies observed in primary markets worldwide. However, the depth and breadth of it varies from country to country, and sector to sector. Literature has documented that the phenomenon surrounding the long-run post issue performance of IPOs is not unique and that quite similar patterns can be found regarding firms making seasoned equity offerings (SEOs). This study is an empirical analysis of public equity offerings listed on the Johannesburg Stock Exchange (JSE). Using data for 141 South African IPOs that were listed on the JSE Mainboard from 2001 to 2010, significant short-run underpricing is found. A sector wise analysis of three broad sectors indicated that the ‘other’ sector had the largest IPO underpricing after the first few days of trading. The year-wise analysis is also documented. In the long-run this study showed that IPOs in South Africa underperformed two out of three benchmarks in 36 full months post listing. In contrast, using data for 50 South African SEOs during 2003 to 2010, superior SEO performance is found over a 36-month period when assessed using a size and industry adjusted benchmark. Various cross-sectional and time-series patterns in the aftermarket performance of IPO and SEO firms are also documented.

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CHAPTER 1: INTRODUCTION, PROBLEM STATEMENT AND METHOD OF INVESTIGATION

1.1. INTRODUCTION: RATIONALE AND CONTEXT

One of the most popular aspects of IPOs is the phenomena of underpricing, that is the initial high returns of these IPOs after their first day of trading, and their subsequent low long-run performance. A number of academic papers around the world have found evidence to support these phenomena (Ritter, 1991; Aggarwal, 1993; Ibbotson *et al.*, 1995; Loughran and Ritter, 2002). However, in Sub-Saharan Africa in general, and South Africa in particular, research on IPOs, their role in the economy and the underpricing issue has been relatively underexplored (Page and Reneke, 1997; Alli *et al.*, 2010).

In the IPO literature when the offer price of a new issue is lower than the price of the first trade, the stock is considered to be underpriced (Ritter, 1991; Levis, 1993). Underpricing is often calculated as the percentage difference between the closing price on the listing date from the offer price of the issue. The underpricing of IPOs is a stylized fact in stock markets worldwide. However, the depth and breadth of IPO underpricing varies from country to country, and sector to sector.

In one seminal study, Ritter (1984) examined over 5 000 U.S. IPOs occurring from 1960 to 1982 and reported initial returns to be 18.8% higher than the offering price shortly after public trading started. In the U.K., Dimson (1979), Buckland *et al.* (1981), and Levis (1993) indicated average first day returns ranging from 8.5% to 17.0%. Internationally, Loughran *et al.* (1994) showed significant underpricing for 28 countries.

Although the phenomenon of IPO underpricing has received much attention in stock markets worldwide, research on IPOs in Africa seems to lag behind. The relative paucity of company data on listing and trading, the small size and the low liquidity of stock markets, coupled with the undeveloped states of capital markets accounts for the lack of research on African IPOs (see Alli *et al.*, 2010 and Alagidede, 2010).

However, in recent times African countries have witnessed considerable changes in their political and economic systems (Alli *et al.*, 2010). These changes have resulted in the liberalization of their economies, the privatization of state-owned enterprises and a boost to capital markets (Alli *et al.*, 2010). Attention has thus been turning gradually to the role of the stock markets in capital accumulation and corporate financing in Africa. Consequently a few

studies have emerged examining underpricing of IPOs in African markets (Omran, 2005; Adjasi *et al.*, 2011; Agathee *et al.*, 2012; van Heerden and Alagidede, 2012).

Numerous theories have been proposed for the IPO underpricing phenomenon, from asymmetric information, to signalling and winners' curse, but none are mutually exclusive. One of the most documented theories is asymmetric information, advanced by Rock (1986). Rock (1986: 187) posits that: "the argument depends upon the existence of a group of investors whose information is superior to that of the firm as well as of all other investors. If new shares are priced at their expected value, these privileged investors crowd out the others when good issues are offered and they withdraw from the market when bad issues are offered. The offering firm must price the shares at a discount in order to guarantee that the uninformed investors purchase the issue". Beatty and Ritter (1986) agree with Rock (1986) and describe the phenomenon as the 'winner's curse' that uninformed investors face. Informed investors have the advantage to bid for shares that are underpriced, while uninformed investors do not. This means that informed investors have a larger probability of buying shares that are underpriced than do uninformed investors, and hence see larger returns on their investments.

Coupled with the well-known phenomenon of short-run IPO underpricing, is their long-run underperformance. Ritter, 1991; Loughran and Ritter, 1995; and Levis, 1993 provide evidence that issuing firms show high returns prior to an offering, but then shortly afterwards deteriorate and show surprisingly low stock returns in the subsequent years. These authors attribute this behaviour of underperformance to the effects of investor sentiment on returns. Market participants purchasing shares in IPO and seasoned equity offering (SEO)¹ firms systematically over-value the shares at the time of equity issue (Brav *et al.*, 2000: 210). Another interpretation of this phenomenon is that capital markets do not efficiently capture the information conveyed by many important corporate announcements (Jegadeesh, 2000). Contrary to concluding that IPO and SEO stocks are mispriced at the time of equity issues, Jegadeesh (2000) proposed that these stocks only appear to be underpriced because the benchmark against which their performance is judged is misspecified.

IPOs and SEOs contain a number of similarities, including the transfer of a portion of ownership rights from the company to new shareholders. Therefore it is argued that if

¹ A seasoned equity offering, also known as a secondary equity offering, occurs when an already publicly traded company issues new equity to the public.

managers are able to exploit over valued shares during an IPO, the same can be said for a SEO (Spiess and Affleck-Graves, 1995).

Spiess and Affleck-Graves (1995) document that the phenomenon surrounding the long-run post issue underperformance of IPOs is not unique and that quite similar patterns can be found regarding firms making primary SEOs. They found identical underperformance for IPOs and SEOs when they evaluated these returns against a benchmark of firms based on their book-to-market ratio and size. This pattern of deterioration of returns following an issue was persistent over a number of years and cannot be labelled an isolated event. They concluded (Spiess and Affleck-Graves, 1995) that long-term underperformance is a phenomenon of all common stock offerings and not unique to IPOs as suggested by Ritter (1991). Each matched firm was selected from the same industry group and was of similar size to the issuing firm; therefore it is unlikely that such a large difference in the risk premium could be explained by traditional risk measures.

South Africa did not escape the phenomenon of IPO long-run underperformance. M'kombe and Ward (2002) conducted their research for the period 1980 to 1998 and found that IPOs significantly underperformed their selected benchmarks. They also concluded that medium and long-term investors witnessed negative returns on their investments. They observed that the listing price of IPOs significantly influenced their long-run performance (M'kombe and Ward, 2002; van Heerden and Alagidede, 2012). However, limited research exists on the long-run performance of SEOs in South Africa.

1.2. GOALS OF RESEARCH

There is little evidence of research on South African IPOs after 2004 and therefore little evidence of how the global financial crash in 2008 affected IPOs in South Africa. Furthermore there is little evidence of any research on SEOs in South Africa. The main goals of the research are therefore the following:

- to assess the short-run and long-run performance of IPOs in South Africa during the period 2001 to 2010.
- to assess the long-run performance of seasoned equity offerings and compare their performance to those of IPOs over the long-run.

Therefore the following hypotheses are proposed:

H1: IPOs listed on the JSE between 2001-2010 are underpriced in the short-run

H2: IPOs of a listing volume greater than 200 000 000 display larger underpricing

H3: IPOs less than 500 cents show a greater level of underpricing

H4: IPO underpricing can be more prevalent within a certain industry

H5: IPOs on the JSE underperformed over a 3-year period during 2001-2010

H6: SEOs listed on the JSE between 2001-2010 underperformed over a 3-year period

H7: The long-run performance of IPOs can be compared to that of SEOs during the same period.

Due to the difficulties encountered in trying to obtain the listing price of SEOs from the JSE, it was decided to omit the analysis from the research, and be consistent with the literature and focus on the long-run comparison between IPOs and SEOs, which excludes the first day of trading.

1.3. METHODS, PROCEDURES AND TECHNIQUES

Two methods will be used to determine the short-run performance of South African IPOs, namely the mean market-adjusted short-run performance method and the wealth relative model (Ritter, 1991).

Some economists believe that using the first day initial return is not significant as the market may have been irregular on that particular day and may have distorted the results (Agathee *et al.*, 2012; Sadaqat *et al.*, 2011). Therefore a number of days are used to examine whether IPOs were underpriced. Sadaqat *et al.* (2011) used days 1, 5, 10, 15, 20 in their study. To be consistent with the literature these same days have been selected to conduct the analysis on the South African data.

There are two different methods to calculating the long-run returns on IPOs and SEOs, namely: cumulative market-adjusted long-run performance (CAR) method and the buy-and-hold (BHAR) method. These methods have been seen in research by Chi and Padgett (2005) on Chinese IPOs, Keloharju (1993) on Finnish IPOs and Ritter (1991) on American IPOs.

A characteristics based approach, rather than a regression-based approach, will be used to assess the long run performance of IPOs and SEOS. Using the values calculated from the

CAR and BHAR methods, this approach enables the researcher to form a benchmark and to place the results within context and draw valuable conclusions.

Since only public information sourced from the JSE, McGregor BFA and Thomson Datastream will be used; it is unlikely that ethical considerations will be encountered.

1.4. OUTLINE OF STUDY

This study is split into five chapters and proceeds as follows: Chapter 2 reviews the literature on IPOs, by looking at evidence specific to African countries, and analyses the various arguments for the anomalous underpricing of stocks in the first few days of trading. Literature regarding the long-run performance of IPOs and SEOs is also reviewed. Chapter 3 presents the methodology for calculating returns and adjusted abnormal returns following a company going public. The process of the benchmark selection is also explained. Chapter 4 gives a background to the data construction and their sources and the main empirical evidence, looking particularly at sector and market wide results. Chapter 5 concludes by highlighting the main empirical findings.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

An initial public offering (IPO) is the first sale of stock by a formally private company to the public (Ibbotson and Ritter, 1995). It is quite prestigious for a company to trade on a major stock exchange. In the past only private companies with strong fundamentals were able to qualify for an IPO; however since the internet boom this has all changed. The standards for a company to go public are not as high and firms no longer need strong financials and a solid history to go public (JSE, 2012).

Public offerings are important for countries in respect of economic growth. Weild *et al.* (2013) found that stock markets that provide incentives for small companies to list their shares on a registered exchange and associated infrastructure in the aftermarket, will create an increase in capital formation, ultimately leading to an increase in job creation, economic growth and tax receipts. Historically small IPOs have made up the majority of all IPOs listed on an exchange. Statistics published by the OECD showed that there were over 2 000 IPOs listed per year globally in the early 1990s, but that this number has subsequently decreased to about 750 per year. Weild *et al.* (2013) found that this decrease in the number of offerings has put downward pressure on the world's rate of innovation, economic growth and job formation.

One of the most popular aspects of IPOs is the phenomena of underpricing, that is the initial high returns of these IPOs after their first day of trading, and their subsequent low long-run performance. A number of academic papers have found evidence to support these phenomena around the world (Ritter, 1991; Aggarwal, 1993; Ibbotson *et al.*, 1994; Loughran and Ritter, 2002). However, research on public offerings in sub-Saharan Africa and South Africa, and in particular, their role in the economy and the underpricing issue has been relatively underexplored (Alli *et al.*, 2010; Page and Reyneke, 1997).

2.2. MOTIVATION TO GO PUBLIC

A company can decide to raise money in one of three ways: borrowing, use of retained earnings or issuing equity. Retained earnings are simply the percentage of net income not distributed as dividends. A company may decide to plough back these earnings for corporate expansion, or rely on debt and/or equity.

Pagano *et al.* (1998) focused their study on the motivation for companies to go public. They found the probability of an IPO to be positively affected by the stock market valuation of firms in the same industry. This clustering of IPOs is a phenomenon known as the hot-issue effect (Ritter, 1991). This phenomenon exists in the U.S. and other countries; however, its extent differs from country to country. The possible reasons could be that some developing sectors are in need of higher investment or that the owners are simply attempting to exploit sector mispricing. Pagano *et al.* (1998) found the mispricing explanation to be the most appropriate. They found, in the case of Italy, that investment and profitability decrease after an IPO. Secondly, they found that a company's size is another factor affecting the probability of an IPO. In their study they found a company's size to be significantly positively correlated with the probability of an IPO, i.e. the larger a company is, the more likely it is to go public.

A number of economists have documented the long-run underperformance of IPO firms three years after being listed (Ritter, 1991 and Levis, 1993). This underperformance in the long-run would indicate that companies do not go public to finance future growth, but rather to take advantage of buoyant markets. Auret and Britten (2008) found this to be true in South Africa. Pagano *et al.* (1998: 60) found that in Italy "companies do not go public to finance subsequent investment and growth, but rather to rebalance their accounts after a period of high investment and growth." This was found to be true in Spain (Planell, 1995, cited in Pagano *et al.*, 1998), and in Sweden (Rydqvist and Hogholm, 1995, cited in Pagano *et al.*, 1998). However, this was not the case in the U.S. Mikkelson *et al.* (1995, cited in Pagano *et al.*, 1998) found that newly listed companies in the U.S. showed high growth.

There are many advantages for a company to go public. Firstly a public company is more likely to be able to borrow money at a cheaper rate. Generally, a company's debt-to-equity ratio improves after an initial public offering, which means that the company may be able to obtain more favourable loan terms from lenders (Lewis and Kappes, 2012). Pagano *et al.* (1998) found that around the date of the IPO, short-term credit interest rates offered become more favourable and that more banks are prepared to provide credit to the company. This is because after listing the company will be better exposed and will pose less of a financial risk to potential lenders. It may also be due to the new outside funds that are acquired during the issuing of the shares.

The second advantage of being a public company is that it is easier for a public company to merge or make an acquisition. This is because shares can be issued as part of the deal. Another

advantage is that the company becomes more liquid. In addition, going public will generally result in the ability to better promote the company. Publicly traded businesses are usually better known than non-publicly traded businesses. The company can gain publicity and an image of stability by trading publicly (Lewis and Kappes, 2012). Along with prestige and the ability to better promote the company, going public may allow the company to attract better personnel, including high-level executives and officers (Lewis and Kappes, 2012). Bruton *et al.* (2003) found that in the U.K. the main reason for listing a company was to improve its visibility and therefore improve its competitive position.

Although the number of advantages associated with being a public company is high, there are also potential disadvantages. The biggest disadvantage of going public is the loss of decision-making control and ownership (Brau and Fawcett, 2006). There are also a number of direct and indirect costs associated with listing a company. These costs are easier for a larger company to absorb than smaller companies, resulting in smaller companies being more likely to remain private. Another disadvantage is that once a company is public it will have to become more transparent and reveal more information to the public. The company's competitors could use this information to their advantage (Auret and Britten, 2008).

2.3. SHORT-RUN UNDERPRICING

In the IPO literature a stock is considered to be underpriced when the offer price of a new issue is lower than the price of the first trade. Underpricing is usually calculated as the percentage difference between the closing price on the listing date from the offer price of the issue. From the point of view of market efficiency, significant and persistent variations in the returns of new issues over different days, and weeks and months contravenes the basic tenets of an efficient market. The subject has therefore attracted considerable attention in the academic and professional literature over the last three decades.

2.3.1. International evidence

The underpricing of IPOs is a stylized fact in stock markets worldwide. However, the depth and breadth of the phenomenon varies from country to country, and sector to sector. In one seminal study, Ritter (1984) examined over 5 000 IPOs occurring from 1960 to 1982 and reported initial returns to be 18.8% higher than the offering price shortly after public trading started. Furthermore, during a 15-month period, the mean return on IPOs of common stock purchased at the offering price and sold at the closing bid price on the first day of public trading was 48.4%. This is in contrast to a mean return on IPOs of 16.3% during the remainder of

the 6-year period from 1977 to 1982. In the U.K., Dimson (1979), Buckland *et al.* (1981), and Levis (1993) indicate average first day returns ranging from 8.5% to 17%. Internationally, Loughran *et al.* (1994) showed significant underpricing for 28 countries.

Coakley *et al.* (2009) found a 10.5% initial average one day return when they studied 591 IPOs in the U.K. during the period 1985 to 2000. This is rather low when one compares this figure to others in Europe during this time period, as it also incorporates the 1990's boom. For example, in Germany, Elston and Yang (2010) found the initial one day returns on IPOs to be 52.15%, on average, during 1996 and 2001. This figure is almost five times that of the U.K.

McGuinness (1992) examined 80 Hong Kong IPOs during the period 1980 to 1990. He found high initial market returns of 18%, on average, after the first day of trading, which disappeared over time. Wai-Yah *et al.* (2004) also studied IPOs on the Hong Kong Stock market but during the period 1995 to 1999. They found that the Hong Kong market was efficient when it came to adjusting for IPO underpricing. They observed that there is only a profit to be made if the shares are bought directly from IPOs, and there is no opportunity for day-traders to buy and sell shares during the first day of trading.

Jog and Riding (1987) examined 100 Canadian IPOs during the period 1971 and 1983. They found, on average, a 9.33% initial one day return. They found this figure to be lower than what has been reported in previous research, meaning that the Canadian markets are more efficient than had been previously implied. They also found this figure to be consistent with what had been reported in U.S. studies. They concluded that the government need not intervene to improve efficiency in the Canadian markets.

Loughran and Ritter (2002) studied U.S. IPOs between the period 1980 and 2000. They then split this period into three sub-periods, namely: 1980-1989, 1990-1998 and 1999-2000. They classified the 1999-2000 sub-period as the internet bubble. They found that the average raw initial returns were 7.4%, 14.8% and 65% respectively. They found that the large underpricing during the bubble period was mainly due to the changing issuer objective function and that part of the increase in the underpricing over the years was due to the change in risk composition of companies (Loughran and Ritter, 2002).

Lee *et al.* (1996) found the raw return on Australian IPOs to be 16.4% between the period 1976 and 1989. This is lower than the 19.2% return that was found by Finn and Higham (1988) in

their study of Australian IPOs. Lee *et al.* (1996) found that a large number of IPOs were in fact overpriced, which contributed to the distribution being quite highly skewed. They found their results to be consistent with the theory of the winners' curse, but felt that having a benchmark of zero is inappropriate as a comparison as it overstates the abnormal returns to IPO investors.

Aggarwal *et al.* (1993) examined three Latin American countries, namely: Brazil, Chile and Mexico. They were analysed over roughly the same time period: 1980-1990, 1982-1990 and 1987-1990, respectively. The results were however vastly different, with Brazil showing the highest initial average day returns of 78.5%, compared with 16.7% for Chile and just 2.8% for Mexico.

Kenourgios *et al.* (2007) studied 169 IPOs listed on the Athens stock exchange during the period 1997 to 2002. They found average raw returns of 52.7% after the first day, 44.78% after the fifth day and 41.84% after the 21st day of trading. This shows that investors who bought IPOs and sold them at the end of the 1st, 5th and 21st days made large returns on their investments. Kenourgios *et al.* (2007) did not mention a 'bubble period' in their study, but looking at the number of IPOs there is a definite increase in the number of IPOs in 1999 and 2000. This is the time period Loughran and Ritter (2002) defined as their bubble period in the US, which could account for the very high returns in Greece compared to other developed economies.

Sullivan and Unite (1999) examined the initial returns earned by IPO investors in the Philippines. Their results were consistent with what had been observed in other countries, with an initial average one day return of 22.69%, on average. Their study confirms the view that smaller countries with less developed capital markets are subject to greater risks. Although the 22.69% return in the Philippines seems high initially, it should be noted that the underpricing of these IPOs was less than what has been seen in other emerging market countries such as Pakistan, Nigeria and Brazil, and less than other Pacific-Rim countries. Sullivan and Unite (1999) listed possible reasons for this occurrence: (1) the stage of market liberalization in the country, (2) the development of the country's stock market, (3) country's stock market regulations, (4) accuracy and information disclosure, and (5) specific firm characteristics.

2.3.2. African evidence

Although the phenomenon of IPO underpricing has received a lot of attention worldwide, studies of Africa IPOs seems to lag behind. The relative paucity of company data on listing and trading, the small size and the low liquidity of stock markets, coupled with the undeveloped states of capital markets typically accounts for the low volume of research on African IPOs (see Alli *et al.*, 2010 and Alagidede, 2010). However, in recent times African countries have witnessed a considerable amount of change in their political and economic systems. These changes have resulted in the liberalization of their economies, the privatization of state-owned enterprises and a boost to capital markets. Attention has thus been turning gradually to the role of the stock markets in capital accumulation and corporate financing. Consequently a few recent studies have examined underpricing of IPOs in African markets.

Agathee *et al.* (2012) studied 44 IPOs listed on the Mauritian stock exchange between 1989 and 2005. They found the initial first day return to be 14.29% on average. The average returns are highest if the investors buy and hold every IPO issue until the end of their first month. Two recent studies found significant underpricing in Nigeria and Egypt. Adjasi *et al.* (2011) examined the first day returns of 125 IPOs in Nigeria between 1990 and 2006. They found very high initial returns of 43.1%, on average, during that period. Relating underpricing to the quality of audit report the authors found firm size and audit quality to be important factors in IPO underpricing in Nigeria. Omran (2005) researched 53 IPOs listed in Egypt between 1994 and 1998. He found the average raw return on these IPOs to be 8%. This is lower than the raw returns found in Mauritius and Nigeria. However, the time period for the Egyptian study was considerably smaller.

In South Africa, Barlow and Sparks (1986) studied 105 unseasoned² equity issues on the JSE during 1972 to 1986 and found a simple weighted mean initial return of 32.1%. Bradfield and Hampton (1989) found average opening premia of 48% in hot issue markets and 25% in cold (i.e. non-clustered) issue periods from May 1975 to August 1986. Page and Reyneke (1997) examined South African IPOs during the period 1980 to 1991, before the end of Apartheid. Alli *et al.* (2010) studied South African IPOs during the period 1995 to 2004, after the end of Apartheid. They found the initial returns on IPOs to be 5.45%, considerably lower than the 32.7% found in the study during Apartheid. There is, however, limited evidence of research on South African IPOs after 2004. Therefore the impact of the recent global financial crisis

² A security that has only recently been made available to the public for trading

on IPOs in South Africa has not been examined. Also, these South African studies do not relate underpricing to sectors in the economy. This indicates definite gaps in South African IPO literature with potential for further useful research.

Table 1. Summary of average initial returns of IPOs in various countries

<i>Country</i>	<i>Time period</i>	<i>Sample size</i>	<i>Average initial return (%)</i>	<i>Study</i>
Australia	1976-1989	266	16.4	Lee <i>et al.</i>
Brazil	1980-1990	62	78.5	Aggarwal <i>et al.</i>
Canada	1971-1983	100	9.33	Jog and Riding
Chile	1982-1990	36	16.7	Aggarwal <i>et al.</i>
China	1987-1995	308	948.6	Su and Fleisher
Egypt	1994-1998	53	8.0	Omran
Finland	1984-1989	80	8.7	Keloharju
Germany	1996-2001	267	52.15	Elston and Yang
Greece	1997-2002	169	52.7	Kenourgios <i>et al.</i>
Italy	1985-2001	182	21.87	Cassia <i>et al.</i>
Mexico	1987-1990	44	2.8	Aggarwal
Mauritius	1989-2005	44	14.29	Agathee <i>et al.</i>
Nigeria	1990-2006	125	43.1	Adjasi <i>et al.</i>
Pakistan	2000-2009	73	42.17	Sadaqat <i>et al.</i>
Philippines	1987-1997	104	22.69	Sullivan and Unite
South Africa	1995-2004	141	5.45	Alli <i>et al.</i>
South Africa	1980-1991	118	32.7	Page and Reyneke
Switzerland	1983-1989	42	35.8	Kunz and Aggarwal
Turkey	1990-1996	163	13.1	Kiyamaz
United Kingdom	1980-1988	712	14.3	Levis
United Kingdom	1985-2000	591	10.5	Coakley <i>et al.</i>
US	1980-1989	1982	7.4	Loughran and Ritter
	1990-1998	3384	14.8	Loughran and Ritter
	1999-2000	803	65	Loughran and Ritter

2.3.3. Theories and explanations

Numerous theories have been proposed for the IPO underpricing phenomenon, but no agreed explanation has been reached. These different theories focus on the relations between issuers, investors, and the investment bankers that take the firms public. One must note that the proposed theoretical explanations are not mutually exclusive. Some of the most common

theories that exist are: asymmetric information, signalling model, moral hazard, marketing theory, and regulation.

One of the most commonly documented theories to explain IPO underpricing is Rock's (1986) asymmetric information theory. Rock (1986: 187) stated that: "the argument depends upon the existence of a group of investors whose information is superior to that of the firm as well as of all other investors. If new shares are priced at their expected value, these privileged investors crowd out the others when good issues are offered and they withdraw from the market when bad issues are offered. The offering firm must price the shares at a discount in order to guarantee that the uninformed investors purchase the issue".

Beatty and Ritter (1986) agree with Rock (1986) and describe the phenomenon of underpricing as the 'winners' curse' that uninformed investors face. Informed investors have the advantage to bid for shares that are underpriced, while uninformed investors do not. This means that informed investors have a larger probability of buying shares that are underpriced than uninformed investors do, and hence see larger returns on their investments. This type of asymmetric information is also known as adverse selection. Adverse selection occurs when one side of the market is more informed than the other side (Varian, 2010). Therefore according to Rock (1986) and Beatty and Ritter (1986), IPOs need to be sufficiently underpriced in order to compensate uninformed investors for the adverse selection bias. Beatty and Ritter (1986) developed a cross-section of the asymmetric model and concluded that riskier issues should, on average, see greater underpricing. Koh and Walter (1989) also found this to be consistent with their data for Singapore (cited in Ibbotson and Ritter, 1995).

However, not all economists accept the asymmetric information theory. Ritter and Welch (2002) felt that too much emphasis has been placed on asymmetric models and found that empirical evidence in favour of these models is rather mixed. They argue that the model is unable to explain extremely high returns and that more research needs to be done on agency conflicts and allocation of share issues.

Signalling games is an alternative theory developed to explain the underpricing phenomenon. Signalling occurs when the managers or owners know the true value of the firm, while outsiders (potential investors) do not. Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welsh (1989) are examples of economists who have modelled this theory (cited in Alli *et al.*, 2010). The idea, they argue, behind underpricing a firm's IPO is that the firm hopes to achieve

better prices in subsequent seasoned equity offerings (SEOs). The underpricing of an IPO is therefore done deliberately in the hope that investors will see the high initial returns and that these will lure them into buying shares when the firm releases its next equity issue into the market.

Su and Fleisher (1999) found their data on Chinese IPOs to be consistent with the signalling model. Su (2004) found with later research done on Chinese IPOs, that the empirical results generated from the data are consistent with both the signalling model as well as the adverse selection theory. However some studies have found no evidence to prove that signalling exists. Jegadeesh *et al.* (1993) studied U.S. IPOs and found only weak evidence of signalling. Elston and Yang (2010) cast even further doubt on this theory. Using data from German IPOs, they found no evidence to suggest that the signalling model exists. However, they did find that insiders are still the majority shareholders after an IPO.

Some governments regulate the offering prices of shares. This is sometimes viewed as the reason why some countries see abnormally large returns on IPOs. The U.S. Securities and Exchange Commission is more concerned about companies' full disclosure than their 'fairness', so they do not set a regulatory price. An example of a country that uses regulation is Japan. Before 1989, Japanese firms were required to have offer prices based upon the multiples of three comparable companies. In practice this does not work, as it does not account for a company's potential growth, and companies with low multiples may have been chosen as the comparison (Ibbotson and Ritter, 1995).

Loughran and Ritter (2002) are of the opinion that IPO underpricing depends on the environment in which the listing takes place. They posit that the "winner's curse" was the best explanation for U.S. IPOs in the 1980s, but that during the internet bubble in the 1990s, this was not the main reason. Instead they found that other alternatives such as analyst coverage, side payments to CEO's and venture capitalists are better explanations of IPO underpricing during that period. Levis (1993) believes that IPOs are intentionally underpriced, but that the long-run underperformance of IPOs is due to some form of market overreaction.

2.4. LONG-RUN UNDERPERFORMANCE

Prior to 1990 most IPO literature focused on the initial trading days following an issue and failed to take into account the long-run behaviour of IPOs (Aggarwal and Rivoli, 1990). A large amount of literature exists providing evidence that issuing firms show high returns prior

to an offering, but then shortly after listing deteriorate and show very low stock returns in the subsequent years (Ritter, 1991; Loughran and Ritter, 1995, Spiess and Affleck-Graves, 1995). These authors attribute this longer-term underperformance to the effects of investor sentiment on returns. Brous *et al.* (2001) posit the optimistic expectations hypothesis to explain the long-run underperformance of IPO stock returns. This hypothesis suggests that investors are overly optimistic about the expected future long-run performance of issuing firms, or alternatively that market participants purchasing shares in IPO and SEO firms systematically over value the shares at the time of equity issue (Brav *et al.*, 2000). Literature evaluating the long-run performance of firms for three to five years following an offering, suggests that it may take up to five years for the market to correct for its initially over-optimistic expectations. However, the idea of a persistent IPO long-run underperformance is puzzling to academics as this behaviour is inconsistent with the doctrine of the Efficient Markets Hypothesis (EMH) which suggests that there should be no abnormal risk-adjusted returns (Brous *et al.*, 2001). The apparent contradiction of this hypothesis has prompted some academics to argue that the underperformance is in fact due to the selection of benchmarks employed (Auret & Briten, 2008).

The first paper to introduce the idea of the long-run underperformance of IPOs was Aggarwal and Rivoli (1990), who examined U.S. IPOs during 1977-1987. They found investors who purchased IPOs at the end of the first trading day and held onto them for 250 trading days experienced negative returns of -13.73%.

In a seminal paper Ritter (1991) investigated the long-run performance of IPOs in the US between 1975 and 1984, and showed that IPOs could underperform for up to three years following their issue when compared to firms of similar size and industry. Ritter calculated that the returns of IPOs after their first three years of trading were 34.5% on average, compared to the 61.9% average return for non-issuing firms over the period. Therefore companies that issued an IPO underperformed when compared to non-issuing companies. Ritter (1991) suggested that the IPO market may be subject to fads. A fad is defined as a temporary overvaluation caused by over-optimism on the part of the investors (Aggarwal and Rivoli, 1990).

Aggarwal and Rivoli (1990) list a number of factors that might explain fads in the IPO market. Firstly they note that fads are more likely to occur if there is greater uncertainty surrounding the true intrinsic value. Higher levels of noise trading and more speculative investors, which

are typically found in the IPO market, lead to higher levels of price volatility. Lastly they mention that IPOs will conform to their well-documented patterns because the buyer is overly optimistic. However, support around the issue of fads in the IPO market is mixed as empirical limitations have prevented conclusions either for or against the presence of fads in securities in general (Shiller, 1981; Summers, 1986; West, 1988; Kleidon, 1986; Marsh and Merton, 1986).

Similar results have been found in research for other countries. Lee *et al.* (1996) found a long-run underperformance in their research of Australian IPOs, and noted that their results reflected a greater underperformance than that reported on U.S. data by Ritter (1991). Using the CAR method, for the first three years following the IPOs in Australia, produced a result of -51.259%. This means that the value of the IPO had more than halved in a three year period.

The same long-run underperformance was also seen on 80 IPOs issued between 1984 and 1989 in Finland (Keloharju, 1993). Keloharju (1993) noted that if an investor had acquired an IPO and held onto it for three years, they would be left with only 79% of the value they had originally paid. Further analysis showed that the underperformance of IPOs on the Helsinki Stock Exchange was not industry-specific, but was concentrated in small companies. Keloharju (1993) believes that Rock's 'winners' curse' is rational when explaining short-run returns, but that the theory is challenged when looking at the long-run underperformance.

Stehle *et al.* (2000) calculated that 187 German IPOs between 1960 and 1992 underperformed the market by 6%, in the first three years following their issue, when compared to other companies of similar size and industry. They found the underperformance to be substantially less than what had been reported in other countries, as well as what had been reported by Ljungqvist (1997) in his study of German IPOs between 1988 and 1990.

Chi and Padgett (2005) found that Chinese IPOs contradicted what had been observed in other countries. They observed 409 IPOs listed between 1996 and 1997 on the Shanghai and Shenzhen Stock Exchanges. Using both the CAR and BHAR methods to calculate the long-run performance during the first three years, they found the returns to be 10.3% and 10.7% respectively. These results were both significant at the 5% level. They concluded that Chinese companies performed well during the first three years after listing. They noted (Chi and Padgett, 2005: 468) that companies that performed better were ones with "less government ownership, smaller offer sizes, high-tech features and lower initial returns".

Levis (1993) examined U.K. IPOs during the period 1980 to 1988 and found a significant long-run underperformance of IPOs during their first three years and beyond. However, the underperformance was less severe than that seen in the U.S. He observed that one of the important determinants of the long-run performance of an IPO is the size of the issue, i.e. the larger the size of the issue, the better the aftermarket performance.

Loughran and Ritter (1995) discovered that during hot-issue periods the underperformance of IPOs in the long-run seems to be greater. They found that companies that listed in cold-issue periods did not underperform. Judging from these results, they concluded that companies use 'windows of opportunity' when their firms stock appears to be over priced when issuing subsequent equity. Their reason for doing so is to take advantage of a lower cost of equity capital in buoyant markets.

Carter *et al.* (1998) found similar results to Ritter (1991) when they studied U.S. IPOs during the period 1979 to 1991. However, instead of relating the results to hot-issue periods, they related them to underwriters. Their findings revealed that IPOs underperformed less in the long-run when taken public by more prestigious investment bankers. Michaely and Shaw (1995) also found this to be true in their U.S. study. They found that companies taken public by prestige underwriters have lower initial returns and better long-run performances than those IPOs associated with lower prestigious investment bankers.

Another interpretation of this phenomenon is that capital markets do not efficiently capture the information conveyed by many important corporate announcements (Jegadeesh, 2000). Jegadeesh (2000) suggests that numerous previous studies have been carried out over short windows around the events and, as a result, only capture a fraction of the impact of corporate actions on firms. Contrary to the conclusion that IPO and SEO stocks are mispriced at the time of equity issues, Jegadeesh (2000) suggests that these stocks appear to be underpriced because the benchmark is misspecified. Fama (1998) likewise suggests that long-run stock return underperformance is sensitive to reasonable changes in methodology. It is argued that issuing firms are generally high-growth firms, but have been found to have lower stock returns when compared to non-issuing firms with the same growth rate (Loughran and Ritter, 1997).

South Africa does not escape the phenomenon of IPO long-run underperformance. M'kombe and Ward (2002) found that during 1980 to 1998 IPOs significantly underperformed their selected benchmarks and that medium and long-term investors witnessed negative returns on

their investments. They observed that the listing price of IPOs significantly influenced their long-run performance.

2.5. HOT-ISSUE EFFECT

Ritter (1984) describes a hot-issue period as one during which the return on the first day of trading of a new listing is high and a cold-issue period as one during which the initial returns on new listings are low. Ritter (1984) noted that during 1960 to 1982 in the U.S. there were 3 or 4 periods in which monthly average initial returns on IPOs were exceptionally high. These are examples of hot-issue periods. He observed that each of these periods was followed by an increase in the number of initial public offerings.

Chalk and Peavy (1987) agreed with Ritter's (1984) findings as they also found an increase in the volume of IPOs and initial returns during these hot-issue periods. They found that smaller companies tend to take advantage of these periods to go public. Their proposed explanation was that investment bankers are uncertain of how to price small companies, and set a smaller company offer price in relation to larger firm offers. This then creates a size effect, and large initial returns are then seen on these small companies.

Helwege and Liang (2004) suggest that large underpricing signals that the market is in a hot-issue period and that the hot-issue period occurs when high quality firms want to go public. This is because these high quality firms feel that they will receive higher (true) valuations for their IPOs. They suggest also that a hot-issue market is characterized by a cluster of companies in a specific industry wanting to go public. This is particularly true for technology companies.

M'kombe and Ward (2002) looked at the long-run performance of IPOs that were listed during a hot-issue period in South Africa. They found that IPOs listed during a hot period showed lower long-run performance compared to IPOs listed during a cold period. Ritter (1991) and Loughran and Ritter (1995) also found this to be true with their research on US IPOs. M'kombe and Ward (2002) suggest that a reason for this was that during hot-issue periods, lower priced risky IPOs were listed. The low priced IPOs showed good initial returns in the short-run, but had a low long-run performance. They found that the number of IPOs listed during a hot-issue period did not affect the long run performance, but that the amount of capital raised did. They found that IPOs that raised amounts between R25 million and R75 million, compared to smaller and larger listings, had better long-run performances.

2.6. SIZE OF IPOs

Chalk and Peavy (1987) and Ibbotson *et al.* (1994) reported that in the short-run underpricing is found to occur more often on smaller offerings in the U.S. than larger offerings, on average. They found that the underpricing phenomenon is overstated in the U.S. as the average initial returns use equal weights on all IPOs, irrespective of their size. Ibbotson *et al.* (1994) studied 2 439 IPOs from 1975 to 1984. They found the average initial return on IPOs with an offering price of \$3.00 or more to be 8.6%, and the average initial return on IPOs with an offering price of less than \$3.00 to be 42.8%. This illustrates that the underpricing is considerably larger on smaller offerings.

M'kombe and Ward (2002) found a similar result in their research on South African IPOs. They found that IPOs with an offering price below 99 cents showed the highest initial returns, but did not perform well in the long-run. These low priced shares are viewed as high risk, so one would expect them to offer high returns to compensate investors for the additional risk. They found that shares listed between 200 and 400 cents showed moderate initial returns but performed the best in the long-run. Shares that were priced at 500 cents or more showed the lowest long-run returns. Therefore, in the short-run these results agree with that seen in the U.S. that underpricing is greater on lower priced IPOs.

2.7. IPOs DURING THE 1987 US MARKET CRASH

The U.S. market experienced a crash in 1987, before which the annual number of IPOs peaked at 708 (Ang and Boyer, 2009). The number of IPOs decreased following the crash, falling to below 300 per year for the following three years. The numbers of IPOs were therefore directly affected by the crash. Ang and Boyer (2009) offered a possible explanation for this decline: that investment bankers were trying to protect their own reputation during troubled times. Ang and Boyer (2009) found that the average principal amount of an IPO increased after 1987, even though the total principal amount had decreased. This suggests that potential investors were seeking quality companies and so were only accepting IPOs of larger more established companies.

2.8. SECTORS

Kiyamaz (2000) studied IPOs on the Istanbul Stock Exchange for the period 1990 to 1996. He investigated the differences in initial returns and after market returns for three different sectors of the economy, namely: industrial, financial and 'other'. He found the 'other' sector to show the highest initial return of 16.6%. The financial sector showed an initial return of 16% and the industrial sector showed an initial return of 11.7%. Kiyamaz (2000) then further categorised the sectors and found the subsector with the highest initial return was tourism/transportation and the subsector with the lowest initial return was machinery/equipment.

Ritter (1984) found a distinct industry effect for natural resource IPOs in the 1980s in the U.S. He found initial returns for this sector to be 48.7%.

Ang and Boyer (2009) looked at economic segmentation differently. Instead of looking at different sectors in the economy, they decided to separate the IPOs into new industries and established industries. Their reason was that new industries have more room for growth and would attract investors due to their potential high returns. Their study was conducted during the Internet bubble, where Internet based companies were showing extremely high returns. Ang and Boyer (2009) found that, contrary to what they had expected, newer industries showed more underpricing than more established industries.

Some theories state that during 'hot' issue periods, clusters of companies within the same industry decide to list due to similar companies having successful listings. However, Helwege and Liang (2004) found little evidence to support this theory, and described the results as being more consistent with a change in overall demand for IPOs.

2.9. SEASONED EQUITY OFFERINGS (SEOs)

Initial public offerings and seasoned equity offerings contain a number of similarities, including the transfer of a portion of ownership rights from the company to new shareholders. Therefore it is argued that if managers are able to exploit over valued shares during an initial public offering, the same should be true for a seasoned equity offering (Spiess and Affleck-Graves, 1995)

Spiess and Affleck-Graves (1995) document that the phenomenon surrounding the long-run post issue performance of IPOs is not unique and that quite similar patterns can be found

regarding firms making primary seasoned equity offerings. Their research was conducted on 1 247 U.S. firms during 1975-1989. They report a median return of 10% in the five-year period following the seasoned issue, compared to a median five-year holding period return of 42.3% for non-issuing firms with similar size in similar industries. They found identical underperformance for IPOs and SEOs when they evaluated their returns against a benchmark of firms based on their book-to-market ratio and size. The pattern of deterioration of returns following an issue was persistent over a number of years and cannot be labeled an isolated event. They concluded that long-term underperformance is a phenomenon of all common stock offerings and is not unique of IPOs as was suggested by Ritter (1991). Each matched firm was selected from the same industry group and was of similar size to the issuing firm, therefore it is unlikely that such a large difference in the risk premium could be explained by traditional risk measures. In agreement to the signaling games theory, Spiess and Affleck-Graves (1995) also conclude that managers take advantage of when their stock is overvalued to issue further equity.

Loughran and Ritter (1995) also found that long-run underperformance in the U.S. is not an exclusively IPO phenomenon. They found that firms conducting regular rights issues also significantly underperformed relative to non-issuing firms over a five year period. They found this underperformance to be economically significant. They concluded that investors would have to invest 44% more in issuing companies in order to have the same level of wealth as those who invested in non-issuing companies. They found this result to be the same for IPOs and for SEOs. They investigated the possible underlying reasons for this low long-run performance and discovered that issuing firms had larger betas compared to non-issuing firms. This implies that issuing firms should have higher returns in the long-run. Loughran and Ritter (1995) agreed with Fama and French's (1992) findings that a proportion of underperformance could be attributed to low book-to-market ratios and high past returns.

Mola and Loughran (2004) examined U.S. SEOs from 1986-1999. They found the average offering to be priced 3% below the closing price of the day before the issue. They report a dramatic increase in the discounting of SEOs over time and note that this has an indirect cost on firms issuing secondary offerings. Alternatively stated, the clients of investment bankers are benefiting from the discounting of SEOs, while the issuing firms have less money on the table. Their investigation into the reasoning behind the increase in discounting supports the changing composition and the investment banking power hypothesis.

Loughran and Ritter (1997) found a link between the stock price performance of SEO issuing firms and their operating performance. Using a sample of 1 338 SEOs from 1979-1989 they compared issuing firms to non-issuing firms with the same market capitalization. They found the average raw return of issuing firms to be 7% compared to 15% for non-issuing firms. They reported that these low returns followed extremely high returns of 72% on average in the year preceding the offering. They also showed that the profit margin for issuing firms decreased from 5.4% in the fiscal year of the offering, to 2.5% four years later. They noted that the post-issue deterioration patterns are more severe for smaller issuers than larger issuers. IPO and SEO literature often comments that investors are over optimistic about issuing firms. However, Loughran and Ritter (1997) suggest that this is also true of managers. They found that managers continue to invest heavily in the firm even while its performance deteriorates.

Brous *et al.* (2001) assessed the performance of their U.S. SEO sample during 1977-1990 against 3 benchmarks, namely: size matched, size and market-to-book (M/B) ratio matched and a size-SIC³-and M/B matched sample of non-issuing firms. They found their raw returns to be similar to those reported in Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995). They reported a mean size adjusted return of -29.14%, which was significant at the 1% level. Similar to the results reported in Spiess and Affleck-Graves (1995) and Eckbo *et al.* (2000), they found the magnitude of underperformance to be smaller when using a size and M/B ratio benchmark. They concluded that negative benchmark adjusted returns suggest that firms issuing SEOs underperform benchmark firms over a long-term period subsequent to their equity offering (Brous *et al.*, 2001).

Jegadeesh (2000) also found SEO underperformance on his study of U.S. stocks from 1970-1993. SEOs underperformed their benchmark for 21 of these 23 years. After considering several different benchmarks to evaluate their long-run performance, he found that the lowest level of underperformance occurred when the issuing firms were matched on size and market-to-book ratio. He posited two alternative explanations for this long-run behavior. The first is that the announcement of further equity issuance signals overvaluation, and the alternative explanation is based on firm-specific characteristics.

In contradiction to the above, Brav *et al.* (2000), Eckbo *et al.* (2000), and Mitchell and Stafford (2000) find either little or no evidence of SEO underperformance. However, their matched

³ SIC is the abbreviation for Schwarz Information Criterion and is a statistical tool used in model selection.

firms do not exclude IPOs. Since they included issuing firms in their benchmark firms, this significantly understates the level of underperformance because this benchmark partly uses the new issue anomaly to explain itself.

The literature suggests that IPOs are significantly underpriced in the short-run and then subsequently report low performance in the long-run. This analysis will investigate the IPO short-run underpricing phenomenon for new listings on the JSE Mainboard between 2001-2010. The long-run performance of these IPOs over a three-year horizon will be investigated and compared to the long-run performance of SEOs listed on the JSE during the same time period. Further cross-sectional and time-sectional analysis is done for IPOs in both the short run and long run, and for SEOs in the long run. The methodology for calculating and measuring this performance is outlined in the following Chapter

CHAPTER 3: METHODOLOGY

3.1. SHORT-RUN PERFORMANCE

In this study the standard method for calculating underpricing of new issues is adopted, namely: mean market-adjusted short-run performance and the wealth relative method (Ritter, 1991; Sadaqat *et al.*, 2011; Aggarwal *et al.*, 1993).

3.1.1 Mean market-adjusted short-run performance method

The raw return on IPOs is calculated as follows:

$$R_{x,d} = \frac{P_{x,d} - P_{x,0}}{P_{x,0}} \quad [1]$$

Where $R_{x,d}$ is the return on stock 'x' at the end of the d^{th} trading day. $P_{x,d}$ is the price of stock 'x' at the end of the d^{th} trading day and $P_{x,0}$ is the offer price of stock 'x'.

The average raw return is calculated as follows:

$$\overline{R_{x,d}} = \frac{1}{N} \sum_{i=1}^n R_{x,d} \quad [2]$$

This is the sum of the returns on the sample IPOs divided by the number of sample IPOs.

The return on the stock market of the country of the IPOs is used as the benchmark and is calculated as:

$$R_{m,d} = \frac{I_{m,d} - I_{m,0}}{I_{m,0}} \quad [3]$$

Where $R_{m,d}$ is the market return at the close of day 'd'. $I_{m,d}$ is the market index value at the end of the d^{th} trading day and $I_{m,0}$ is the market index value on the offer day of stock 'x'.

The market-adjusted short-run performance (MASRP) for stock 'x' after day 'd' is calculated as follows:

$$MASRP_{x,d} = 100 X \left\{ \frac{(1 + R_{x,d})}{(1 + R_{m,d})} - 1 \right\} \quad [4]$$

The market-adjusted model measures the initial trading returns in excess market return form. This measurement was used in earlier studies on the short-run performance of IPOs by economists such as Aggarwal (1993) on Latin American IPOs and by Sadaqat *et al.* (2011) on IPOs in Pakistan.

The sample mean market-adjusted short-run performance for the d^{th} trading day.

$$\overline{MASRP}_d = \frac{1}{n} \sum_{i=1}^n MASRP_{x,d} \quad [5]$$

This is the sum of the market-adjusted short-run performance of the sample IPOs divided by the number of sample IPOs. Given these calculations, the following hypothesis was tested:

H_0 : The mean market-adjusted short-run performance (\overline{MASRP}_d) is equal to zero.

H_1 : The mean market-adjusted short-run performance (\overline{MASRP}_d) is different from zero.

To test the hypothesis, that \overline{MASRP}_d equals zero, the following t-statistic is calculated:

$$t = \frac{\overline{MASRP}_d}{\frac{s}{\sqrt{n}}} \quad [6]$$

Where 's' is the standard deviation of $MASRP_{x,d}$ for a 'n' number of firms.

3.1.2. Wealth relative model

The performance measurement for a group of IPOs is assessed by the following wealth relative model:

$$WR_d = \frac{1 + \frac{1}{n} \sum_{x=1}^n R_{x,d}}{1 + \frac{1}{n} \sum_{m=1}^n R_{m,d}} \quad [7]$$

Where WR_d is the wealth relative for the d^{th} trading day and 'n' is the total number of IPOs in the sample. A wealth relative of greater than 1.00 can be interpreted as IPOs outperforming the market in that period; a wealth relative of less than 1.00 indicates that IPOs underperformed (Ritter, 2003). The wealth relative model can also be applied to assess the long-run performance.

3.2. LONG-RUN RETURNS

There are two different methods of calculating the long-run returns on IPOs, namely: cumulative market-adjusted long-run performance (CAR) method and the buy-and-hold market-adjusted returns (BHAR) method. These methods have been used in research by Chi and Padgett (2005) on Chinese IPOs, by Keloharju (1993) on Finnish IPOs and Ritter (1991) on U.S. IPOs.

3.2.1. Cumulative market-adjusted method (CAR)

The abnormal initial return, also known as the market-adjusted return, is calculated as follows:

$$AR_{x,t} = R_{x,t} - R_{m,t} \quad [8]$$

Where $AR_{x,t}$ is the abnormal initial return on stock 'x' after month 't'. $R_{x,t}$ is the return on stock 'x' after the t^{th} trading month and $R_{m,t}$ is the return on the market during the same period.

The average market-adjusted return is calculated as follows:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^n AR_{x,t} \quad [9]$$

This is equally-weighted arithmetic average of the benchmark adjusted firms.

The cumulative market-adjusted long-run performance (CAR) is calculated as follows:

$$CAR_{q,s} = \sum_{t=q}^s \overline{AR}_t \quad [10]$$

The CAR from event month 'q' to event month 's' is the summation of the average monthly market-adjusted returns.

Hypothesis:

H_0 : The cumulative market-adjusted long-run performance (CAR) is equal to zero.

H_1 : The cumulative market-adjusted long-run performance (CAR) is different from zero.

To test the hypothesis, that CAR equals zero, the following t-statistic is calculated:

$$t(CAR)_t = \frac{CAR_t \cdot \sqrt{n_t}}{\sqrt{t \cdot var + 2 \cdot (t - 1) \cdot cov}} \quad [11]$$

Where n_t is the number of firms trading each month, t is the event month, var is the average (over 36-months) cross-sectional variance, and cov is the first-order autocovariance of the AR_t series.

If a firm is delisted from the JSE data during the 36-month period, the portfolio return for the next month is the equally-weighted average of the remaining firms in the portfolio. Thus the cumulative market-adjusted return involves constant rebalancing over the 36-month period.

3.2.2. Buy-and-hold market-adjusted returns (BHAR)

BHAR following the first trading month are calculated as follows:

$$BHAR_x = \left[\prod_{t=1}^T (1 + R_{x,t}) - 1 \right] - \left[\prod_{t=1}^T (1 + R_{m,t}) - 1 \right] \quad [12]$$

Where $R_{x,t}$ is the return on stock 'x' after the t^{th} trading month (adjusted for dividends) and $R_{m,t}$ is the return on the market during the same period and T is the number of months.

The BHAR method, also known as the holding period return (HPR), measures the long-run abnormal return from a buy-and-hold strategy where the stock is purchased at the first month closing price after going public, and held until the earlier of (i) its 36-month anniversary or (ii) its delisting.

The mean BHAR for the IPO/SEO portfolio is calculated as follows:

$$\overline{BHAR} = \frac{1}{n} \sum_{t=1}^n BHAR_x \quad [14]$$

Hypothesis:

H_0 : The mean three-year market-adjusted buy-and-hold return \overline{BHAR} is equal to zero.

H_1 : The mean three-year market-adjusted buy-and-hold return \overline{BHAR} is different from zero.

To test the hypothesis, that \overline{BHAR} equals zero, the following t-statistic is calculated:

$$t = \frac{\overline{BHAR}}{\sigma(BHAR_x)/\sqrt{n}} \quad [15]$$

Wealth relatives are computed as performance measures to interpret this 36-month total return.

The wealth relative is defined as:

$$WR = \frac{1 + \text{average 36 month total return on IPOs}}{1 + \text{average 36 month total return on matching firms}} \quad [16]$$

A wealth relative of greater than 1.00 can be interpreted as IPOs outperforming a portfolio of matching firms, a wealth relative of less than 1.00 indicates that IPOs underperformed (Ritter, 1991)

The main difference between the CAR and BHAR methods is the effect of compounding. The BHAR method uses compounding while the CAR method does not (M'kombe and Ward, 2002). Alvarez and Gonzalez (2005) believe that it is more accurate to capture the long-term investor's experience by compounding the short terms returns to calculate the long-term return by using the BHAR method. Barber and Lyon (1977) also advocate the use of BHAR returns instead of CARs. They state that CARs are a biased predictor of long-run BHARs and are therefore subject to a measurement bias. Furthermore they believe that BHARs more accurately measure the underlying parameter of interest. Loughran and Ritter (1995) believe that the BHAR method provides a sharper distinction between portfolios when classifying firms. Spiess and Affleck-Graves (1995) used both methods to calculate the abnormal returns of their IPOs and SEOs. They concluded that buy and hold returns tend to magnify the underperformance.

In this research the performance measures have been calculated without explicitly adjusting for betas. Ibbotson (1975), Chan and Lakonishok (1990), Ritter (1991) and Clarkson and Thompson (1990) all report that the average beta is greater than 1.00, and that average betas decline with the length of time since the IPO. Ritter (1991) noted that his matching firms also had betas greater than 1.00. Ritter (1991) concluded that although the IPO betas are greater than 1.00 on average, the difference in betas between the IPOs and matching firms are too

small to have any economically significant effect on his findings. In the case where the IPO betas were higher than the betas of the matching portfolios, and the adjusted returns were computed without adjusting for beta differences, it resulted in conservative estimates of IPO underperformance when the market premium is positive. This same assumption of the insignificant effect of the betas has been used in this paper. The reader is therefore cautioned that this assumption may result in the IPO underperformance being understated if the difference in betas between IPOs and matching firms are in fact large.

There are two main approaches to assessing the performance of SEO returns, namely: the characteristics-based approach and the factor-based approach. There is no clear preferred method, as each method has its own advantages and drawbacks.

The characteristics-based approach is based on the assumption that equity risk is captured by a set of firm-specific characteristics. These characteristics may include size, book-to-market ratio, earnings-to-price ratio, previous returns, and stock market momentum. If these characteristics are not indicative of the riskiness of the firm, then the firm's riskiness may be misclassified (Barber & Lyon, 1997). M'kombe and Ward, 2002) believe the control firm approach is ideal because it eliminates listing bias by ensuring that both the sample and control firms must be listed in the same month.

Fama (1998a) advocates the use of the factor-based approach when evaluating the performance of SEOs, as it has the potential to capture systematic patterns in average returns. However, Fama (1998a) acknowledges that the factor-based approach might suffer from model misspecification.

A characteristic based approach has been chosen in this study to assess the long performance of IPOs and SEOs. Three different benchmarks have been selected as follows: (i) JSE Small Cap Index (ii) listed non-issuing firms matched by size (iii) listed non-issuing firms matched by industry.

CHAPTER 4: DATA AND RESULTS

4.1. DATA

Data for this study consists of 141 South African IPOs that were listed on the JSE during the period 2001 to 2010. Data was provided by the JSE, which listed the companies' names, offer price, number of shares and their sector in the economy. There appeared to be some data inconsistencies with shares that were listed with an IPO price of one cent. Further research showed that some of these IPOs had in fact gone public for a much higher price. To correct for these data inconsistencies the IPO offer price was extracted from the McGregor BFA database. Subsequent daily share prices as well as the JSE All Share Index and the JSE Small Cap Index were obtained from Thomson DataStream. McGregor BFA provided data on SEOs listed during this period as well as the market capitalization of companies listed on the JSE Mainboard during this period. Due to the lack of data on Alt^x companies, especially those that had delisted during this period, it was decided to carry out the research only on Mainboard listed companies. Therefore the data consists of companies that met the following criteria: (1) JSE Mainboard listing (2) common stock and (3) available data.

Table 2. Gross proceeds of JSE Mainboard IPOs during 2001-2010

<i>Year</i>	<i>Number of IPOs</i>	<i>Gross Proceeds (R millions)</i>	<i>% of 2001-10 Gross proceeds</i>
2001	7	3 470.37	0.34
2002	9	8 161.96	0.80
2003	5	4 499.72	0.44
2004	11	12 400.27	1.21
2005	15	14 415.56	1.41
2006	23	52 932.91	5.18
2007	40	110 949.58	10.86
2008	18	704 418.52	68.97
2009	6	82 628.69	8.09
2010	7	27 525.98	2.69
All	141	1 021 403.57	100.00

Table 2 presents the distribution of the sample of IPOs by year, both in terms of number of offers and the gross proceeds. It shows that the number and value of IPOs were not evenly distributed over the 2001-2010 sample period. There is a dramatic increase in the number of firms listed in the second half of this ten-year period. The number of issues are heavily skewed by the 'hot issue' market in 2007 which ended with the financial crash in 2008. More than 90% of the gross proceeds occurred during the second half of this ten-year period, with almost 69% from 2008 alone.

4.2. SHORT-RUN ANALYSIS

This section provides an analysis of the mean market-adjusted short-run returns and wealth relatives during the period 2001 and 2010 on trading days 1, 5, 10, 15 and 20. Secondly, a sector-wise analysis of IPOs is also provided, followed by an analysis of the number and value of IPOs during this period.

The results for the short-run estimates of the raw return, the average market return, average market-adjusted return, and the wealth relatives are shown in Table 3.

Table 3. Adjusted short-run returns.

	Days	Raw Return (%)	Average market return (%)	Average market adjusted return (%)	t-Statistic	Wealth Relative
2001	1st	4.904	0.721	4.050	0.840	1.042
	5th	5.844	0.395	5.802	0.872	1.054
	10th	5.225	0.348	5.521	0.838	1.049
	15th	-3.089	-0.785	-0.762	-0.096	0.977
	20th	2.549	0.761	2.304	0.623	1.018
2002	1st	-4.474	-0.377	-4.092	-1.021	0.959
	5th	-5.372	-1.286	-4.075	-0.537	0.959
	10th	-8.645	-1.359	-7.074	-0.989	0.926
	15th	-9.105	-1.128	-7.765	-1.047	0.919
	20th	-13.964	-1.574	-12.161	-1.397	0.874
2003	1st	-5.659	0.289	-5.958	-1.381	0.941
	5th	-9.242	-0.132	-9.070	-1.077	0.909
	10th	-12.236	-0.584	-11.667	-0.920	0.883
	15th	-17.829	0.354	-18.282	-1.041	0.819
	20th	-18.716	0.636	-18.966	-1.117	0.808
2004	1st	19.301	-0.415	19.860	1.771	1.198
	5th	25.838	0.611	24.715	1.602	1.251
	10th	21.851	1.119	19.796	1.283	1.205
	15th	23.331	1.576	21.082	1.343	1.214
	20th	22.554	2.301	19.850	1.292	1.198
2005	1st	-1.961	0.261	-2.204	-0.926	0.978
	5th	10.422	1.472	9.595	0.639	1.088
	10th	3.611	2.084	1.668	0.244	1.015
	15th	0.388	3.229	-2.608	-0.467	0.972
	20th	-1.033	3.760	-4.629	-0.927	0.954
2006	1st	-0.209	0.229	5.856	1.117	1.058
	5th	8.756	-0.170	8.015	1.523	1.080
	10th	8.621	1.494	9.996	1.401	1.099
	15th	5.731	2.060	7.508	1.070	1.074
	20th	0.851	2.459	6.742	0.692	1.056
2007	1st	3.184	0.141	3.184	0.926	1.030
	5th	1.880	-0.026	1.992	0.568	1.019
	10th	0.235	0.188	0.190	0.048	1.000
	15th	0.344	0.480	-0.240	-0.059	0.999
	20th	-0.003	0.719	-0.802	-0.182	0.993
2008	1st	5.068	0.293	4.603	1.023	1.045
	5th	4.859	-0.395	5.304	0.944	1.048
	10th	-0.645	-0.563	0.505	0.070	0.997
	15th	-5.858	-1.591	-4.540	-0.706	0.959
	20th	-6.963	-1.442	-5.721	-0.859	0.947
2009	1st	1.848	2.034	0.308	0.066	1.000
	5th	5.719	2.093	4.088	0.371	1.040
	10th	4.992	2.426	2.588	0.284	1.030
	15th	6.588	5.477	1.347	0.146	1.010
	20th	6.514	5.973	0.963	0.106	1.010
2010	1st	15.757	0.011	14.573	1.027	1.140
	5th	18.112	0.012	17.150	1.160	1.170
	10th	8.117	0.009	7.454	1.045	1.070
	15th	3.366	0.003	3.405	0.686	1.030
	20th	6.122	-0.002	6.639	1.207	1.060
2001-2010	1st	4.435	0.287	4.196	2.222**	1.041
	5th	6.321	0.245	6.222	2.300**	1.061
	10th	3.877	0.639	3.374	1.361	1.032
	15th	1.948	0.934	1.030	0.415	1.010
	20th	1.345	1.254	0.282	0.103	1.001

Note: ** Significant at the 5% level

The average IPO value during this period was R14.42 per share, which ranged from R0.03 to R270.00. The JSE All Share Index (ALSI) was selected as the benchmark so as to conform with previous literature. The ALSI ranged from 8050.64 points to 32700.98 points during this ten year period. The average market-adjusted return for the first trading day was 4.196% which ranged from a minimum of -34.3% to a maximum of 101.12% with a standard deviation of 22.42.

Some economists argue that using the first day initial return is not significant as the market may have been irregular on that particular day and may have distorted the results. Therefore, a number of days are used to examine if IPOs are underpriced. Sadaqat *et al.* (2011) used days 1, 5, 10, 15 and 20 in their study. To be consistent with the literature these same days have been selected to conduct the analysis on the South African data.

The average market-adjusted returns for the 1st, 5th, 10th, 15th and 20th trading days were 4.196%, 6.222%, 3.374%, 1.030% and 0.282% respectively. According to the literature the first trading day is said to receive the highest returns. Looking at the results for this period one can see that this is not the case with the 5th trading day showing the highest return followed by the 1st, 10th, 15th and 20th day respectively. Therefore during this period an investors would ideally try to subscribe to an IPO offering and then sell the shares after 5 days to maximise their return. From a company's perspective, these significant returns suggest that company did not maximise its potentials earnings from the offering. However, as mentioned in the literature, there are numerous underlying reasons for a lower offering price such as to entice investors to fulfil the entire offering and/or alternatively to have the option to list seasoned equity offerings at a higher price. Therefore companies appear to be willing to accept less for their initial public offering with a longer term goal in mind.

These results are substantially different to a similar South African paper by van Heerden and Alagidede (2012) on JSE IPOs listed during the period 2006-2010. They reported significantly larger returns for each recorded trading day with trading day 15 showing the largest return at 201.2%. Their analysis was however carried out on all JSE listings which included Alt^X IPOs. Therefore one can conclude that Alt^X listings are vastly underpriced compared to Mainboard listings. This conforms to our *a priori* expectations due to the more lenient listing requirements, and ultimately higher risk associated with firms listed on the Alt^X compared to the Mainboard.

During this ten year period only trading day one and five are significant at the 5% level. The hypothesis can therefore be rejected and one can conclude that the mean market-adjusted short-run performance ($\overline{MASRP_{x,d}}$) is different from zero for trading day one and five.

Taking a more specific look at the results one can make a year-by-year analysis. The only years that showed the 1st trading day with the highest return are 2003 and 2007. All other years show trading day 5 with the highest return, except for 2006 which showed trading day 10 with the highest return.

All trading days in 2002 and 2003 showed negative returns and this could be attributed to the after effects of the dotcom crash. Trading days 15 and 20 in 2007 and 2008 also showed negative returns, which is the exact time period of the global financial crash. In 2005 there was a tightening of monetary policy and as a result there was also a decrease in private investment. This correlates with the negative returns in 2005. Therefore these results conform to our *a priori* expectations due to the strong correlation between business cycles and the stock market. This correlation was also reflected in the low number of IPOs during both of these periods.

The results from our wealth relative model correlate with the results seen from the mean market-adjusted returns. In our ten year summary all trading days have a wealth relative greater than 1.00. A wealth relative greater than 1.00 can be interpreted as the IPOs outperforming the market.

4.2.1. Sector analysis

The JSE is very specific when classifying its companies into sectors and therefore a large number of different sectors exist, making it difficult for a researcher to analyse. These sectors were therefore simplified into three broader categories, namely: financials, mining and 'other' (see Appendix for all sectors). These broad sectors conform to prior literature with the exception of mining which has been substituted for the industrial sector in this study due to its significance and size in South Africa. The results for the sector analysis are displayed in Table 4.

Table 4. Sector-wise analysis of IPOs listed on the JSE

Sector	Number of IPOs	Market adjusted returns (%)				
		1 st	5 th	10 th	15 th	20 th
<i>2001</i>						
Financial	1	-4.456	-7.787	-3.707	2.394	-0.789
Mining	0					
Others	6	5.468	8.066	7.059	-1.288	2.819
<i>2002</i>						
Financial	4	-7.580	-11.447	-14.316	-17.607	-25.929
Mining	1	1.538	1.225	5.266	2.512	-3.204
Others	4	-2.012	1.972	-2.918	-0.493	-0.633
<i>2003</i>						
Financial	1	-4.776	0.528	9.371	-0.930	-7.201
Mining	0					
Others	4	-6.253	-11.470	-16.927	-22.620	-21.907
<i>2004</i>						
Financial	2	0.517	4.471	0.634	-1.087	4.202
Mining	1	83.059	82.362	79.419	77.783	55.711
Others	8	16.796	22.570	17.134	19.536	19.280
<i>2005</i>						
Financial	2	-0.406	-4.641	-7.398	-8.789	-10.927
Mining	5	-5.673	-11.517	-11.205	-13.987	-13.817
Others	8	-0.485	26.349	11.981	6.049	2.688
<i>2006</i>						
Financial	2	-5.837	-5.967	-9.799	-14.989	-15.636
Mining	6	-2.199	4.286	11.909	8.579	-4.246
Others	15	10.636	11.371	11.869	10.079	14.122
<i>2007</i>						
Financial	2	1.358	-7.717	-8.300	-6.951	-8.700
Mining	4	8.944	5.044	4.306	1.862	-5.731
Others	34	2.614	2.205	0.205	-0.092	0.242
<i>2008</i>						
Financial	5	14.468	22.996	10.141	1.364	-0.115
Mining	3	0.682	3.797	1.758	1.237	-2.402
Others	9	0.429	-4.023	-5.267	-9.746	-9.941
<i>2009</i>						
Financial	2	1.810	2.543	3.494	-0.648	-3.237
Mining	3	-1.259	3.996	3.854	3.419	4.447
Others	2	1.157	5.770	-0.216	0.233	-0.065
<i>2010</i>						
Financial	0					
Mining	2	-0.665	-1.026	-3.244	-2.555	-1.605
Others	5	19.602	24.711	13.073	9.520	11.254
<i>2001-2010</i>						
Financial	21	1.318	1.872	-2.078	-6.051	-8.613
Mining	25	3.030	3.729	5.108	3.125	-2.482
Others	95	5.139	7.839	4.124	2.045	2.975

Generally, if an investor had invested in any of the three sectors examined during this ten year period they would have seen positive returns on the first and fifth trading day, with the 'other' sector showing the highest returns on these particular days. After the 10th trading day the financial sector starts to show a negative return which continues to deteriorate over the next

10 trading days. The mining sector also starts to show negative returns after the 20th trading day. The 'other' sector is the only sector to show a positive return on each trading day during this ten year period. Analysing the results year-by-year, there is not a sector that particularly outperforms consistently each year.

These results are similar to Kiyamaz's (2000) study who also found the 'other' sector to be the most underpriced. In Kiyamaz's (2000) study on Istanbul he found the 'other' sector to show the highest return of 16.6%. The financial sector in that study showed an initial return of 16% and the industrial sector showed an initial return of 11.7%.

4.2.2. Size analysis

Studies by Chalk and Peavy (1987) and Ibbotson *et al.* (1994) on U.S. data, in the short-run, reported that underpricing is found to occur more often on smaller offerings than larger offerings. They found that the underpricing phenomenon is therefore overstated in the U.S. as the average initial returns are calculated using equal weights on all IPOs, irrespective of their size. Ibbotson *et al.* (1994) studied 2 439 IPOs during the period 1975 to 1984. They found the average initial return on IPOs with an offering price of \$3.00 or more to be 8.6%, and the average initial return on IPOs with an offering price of less than \$3.00 to be 42.8%. This also illustrates that underpricing is considerably larger on smaller offerings.

M'kombe and Ward (2002) found a similar result in their research on South African IPOs. They found that IPOs with an offer price below 99 cents showed the highest initial returns. These low priced shares are viewed as high risk, so one would expect high returns to be associated with them to compensate for the risk. They found that shares listed between 200 and 400 cents showed moderate initial returns. Therefore, in the short-run these results agreed with those seen in the U.S. that underpricing is greater on lower priced IPOs.

Following these studies, underpricing in relation to size in the JSE is examined in this study. 500 cents was used as the benchmark as it was found to be quite close to the median IPO price during this 10 year period. The results for the short-run analysis are shown in Table 5.

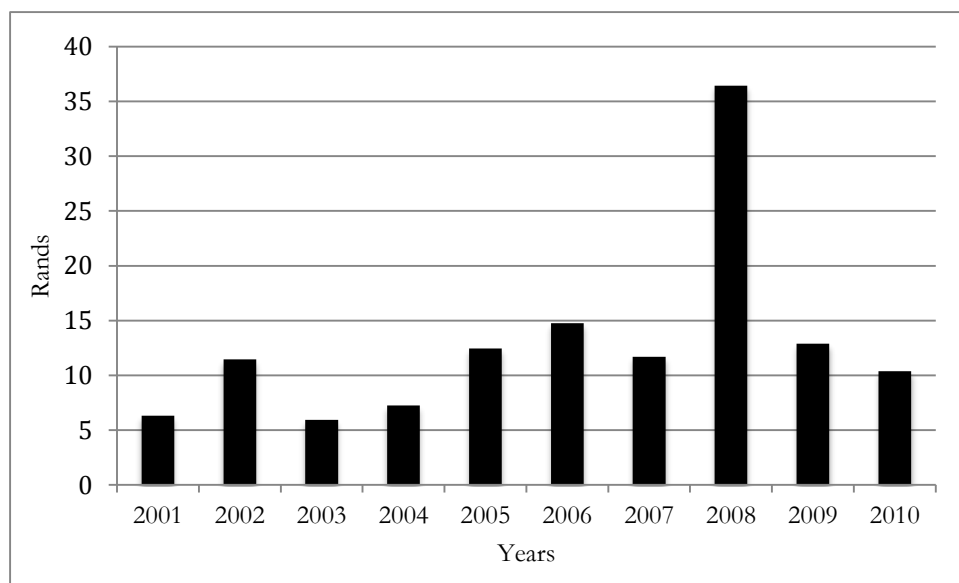
Table 5. Size of IPO shares exceeding 500 cents for the period 2001-2010

	No. Of IPOs	Market adjusted returns (%)				
		1st	5th	10th	15th	20th
2001						
>500c	5	-1.052	0.015	0.736	6.806	2.776
<=500c	2	16.805	20.269	17.483	-19.681	1.124
2002						
>500c	4	1.911	7.132	5.803	3.775	0.399
<=500c	5	-8.895	-13.041	-17.377	-16.998	-22.209
2003						
>500c	4	-6.253	-11.470	-16.927	-22.620	-21.907
<=500c	1	-4.776	0.528	9.371	-0.930	-7.201
2004						
>500c	4	0.600	-0.388	2.287	1.805	3.187
<=500c	7	30.866	39.060	29.801	32.097	29.372
2005						
>500c	7	-5.957	-13.081	-11.578	-14.248	-14.572
<=500c	8	1.081	29.437	13.259	7.577	4.071
2006						
>500c	11	7.616	10.600	13.182	11.149	3.948
<=500c	12	4.242	5.645	7.075	4.170	9.304
2007						
>500c	16	5.788	4.839	3.890	3.419	3.686
<=500c	24	1.448	0.095	-2.277	-2.679	-3.794
2008						
>500c	11	7.255	4.648	2.522	-4.227	-3.184
<=500c	7	-0.260	6.507	-3.195	-5.114	-10.372
2009						
>500c	5	3.599	8.306	5.062	4.631	4.725
<=500c	1	-7.920	-6.459	-3.595	-6.863	-8.443
2010						
>500c	3	-1.145	-1.325	-2.275	0.460	1.802
<=500c	4	26.362	31.006	14.750	5.613	10.266
2001-2010						
>500c	70	2.983	2.462	2.011	0.307	-0.929
<=500c	71	5.391	9.929	4.719	1.744	1.475

The evidence from Table 5 indicates that shares priced below 500 cents during this period are clearly underpriced compared to shares priced above 500 cents. The first trading day showed mean market-adjusted returns of 2.983% for IPOs over 500 cents and 5.391% for IPOs under 500 cents.

Taking a more specific year-by-year approach, one can see from Table 5 that this result is evident in 2001, 2004, 2005 and 2010. The years this pattern is not seen can be explained by the dotcom crash and the global financial crash. It is believed (Ang and Boyer, 2009) that during economic volatile times, investors tend to opt for shares of higher value and try to avoid relatively small, unknown companies that are associated with higher risk. Thus returns on IPOs of small shares tend to lower than for large shares at times of high risk because investors shun these smaller shares post their IPO because of perceived greater risk.

Figure 1. Average JSE Mainboard IPO price during 2001-2010

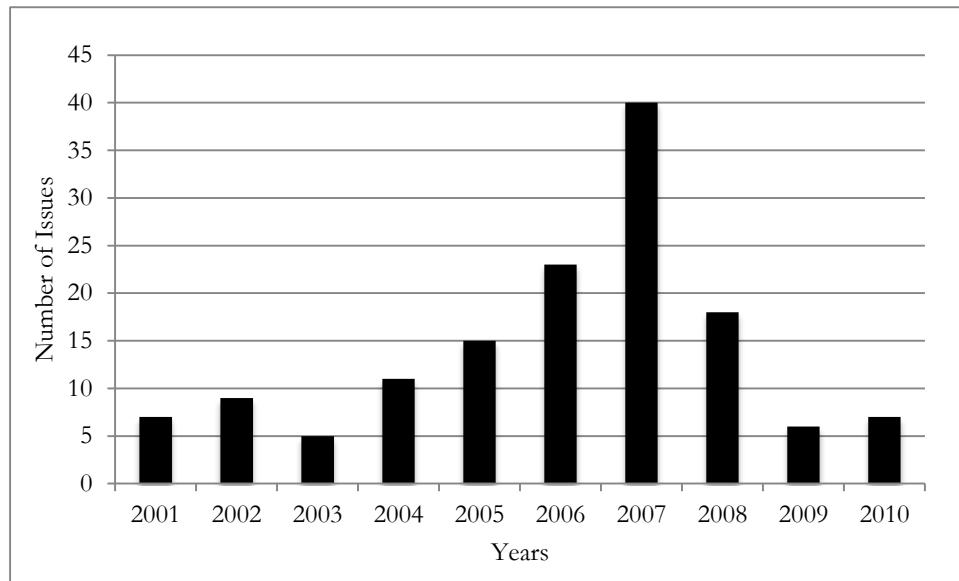


Ang and Boyer (2009) found that the average IPO price increased during a financial crisis, even though the total principal amount had decreased. This could indicate that potential investors were seeking quality companies as the market was only accepting those IPOs of larger more established companies. This increase in the average IPO price is also seen in the South African data during this period. The average IPO price is R36.44 in 2008. This is more than double the next highest average of R14.64 in 2006. It is also interesting to note that there was a slight increase in the average IPO price in 2002 during the dot com crash.

4.2.3. Volume analysis

The U.S. market experienced an equity market crash in 1987, before which the number of IPOs peaked at 708 (Ang and Boyer, 2009). The number of IPOs decreased following the crash, showing numbers below 300 for the first three years. This same pattern is evident in the South African data and is illustrated in Figure 2 below.

Figure 2. Number of JSE Mainboard listings during 2001 – 2010



The number of IPOs peaked at 40 in 2007, during what is now recognised to be a financial bubble. It has dropped dramatically after the crash and by 2010 had failed to bounce back to anywhere near pre-peak numbers.

Table 6 gives an indication of the market-adjusted returns categorised by the volume of shares exceeding 200 000 000.

Table 6. A volume analyse of share issues exceeding 200 000 000.

	No. of IPOs	Market adjusted returns				
		1st	5th	10th	15th	20th
2001						
>200,000,000	0					
≤200,000,000	7	4.050	5.802	5.521	-0.762	2.304
2002						
>200,000,000	1	-0.217	2.672	-0.180	-0.772	-0.186
≤200,000,000	8	-4.577	-4.918	-7.936	-8.639	-13.658
2003						
>200,000,000	2	-2.392	-0.977	2.681	-3.992	-7.398
≤200,000,000	3	-8.335	-14.466	-21.232	-27.808	-26.677
2004						
>200,000,000	3	44.275	62.640	48.238	53.552	53.764
≤200,000,000	8	10.705	10.493	9.130	8.905	7.133
2005						
>200,000,000	2	0.976	65.866	9.472	6.577	0.809
≤200,000,000	13	-2.999	-4.472	-0.283	-4.904	-5.988
2006						
>200,000,000	7	1.161	2.931	1.103	-3.396	-6.928
≤200,000,000	16	7.512	9.809	13.134	11.356	11.567
2007						
>200,000,000	15	2.603	-0.334	-1.931	-2.521	-4.283
≤200,000,000	25	3.659	3.896	1.926	1.626	2.046
2008						
>200,000,000	10	5.743	9.622	1.783	-2.090	-5.463
≤200,000,000	8	2.974	-0.865	-1.322	-8.041	-6.089
2009						
>200,000,000	4	5.770	-0.216	0.233	-0.065	29.341
≤200,000,000	2	-0.510	-7.046	-5.735	-8.499	-7.729
2010						
>200,000,000	6	16.970	19.919	9.261	4.631	7.997
≤200,000,000	1	0.190	0.535	-3.392	-3.952	-1.511
2001-2010						
>200,000,000	50	6.557	12.515	4.885	2.787	1.007
≤200,000,000	91	2.774	2.431	2.465	-0.027	-0.155

It was found that companies with a larger share issue are more underpriced compared to companies with smaller issues. After the first trading day, companies with a share issue of greater than 200 000 000 shares showed a mean market-adjusted return of 6.557%, while those with a share issue of less than or equal to 200 000 000 shares showed a mean market-adjusted return of just 2.774%. This pattern is evident in every year during this ten year period except

for 2006 and 2007 during the financial boom. This result is consistent with another study on South African IPOs by van Heerden and Alagidede (2012) who also found companies with a larger share issue to be more underpriced when compared to companies with a smaller issue.

4.3. LONG-RUN PERFORMANCE OF IPOS AND SEOS

The long-run performance of IPOs and SEOs are calculated in this section using two different methods, namely: the cumulative average return (CAR) method with monthly rebalancing, where the abnormal returns are computed using several different benchmarks; and the buy-and-hold (BHAR) method that calculates the holding period return (HPR) of IPO and SEO firms and a set of matched non-issuing firms.

Following a characteristic based approach, three different benchmarks have been selected to assess the long-run performance of IPOs and SEOs calculated using the two methods mentioned above, namely the CAR and BHAR method. The three selected benchmarks are: (i) JSE Small Cap index (ii) listed non-issuing firms matched by size (iii) listed non-issuing firms matched by industry.

To be consistent with the literature, the same matching firm procedure has been selected as used in papers by Ritter (1991), Levis (1993), Loughran and Ritter (1995) and Page and Reyneke (1997). Matched firms are JSE Mainboard listed companies that have been listed for at least 36-months as well as not having issued seasoned equity offerings in the 36-months prior to be matched with an IPO or SEO firm. To select matched firms, the market capitalization of all companies listed on the JSE Mainboard between 2001 and 2010 were computed on 31 December each year. To avoid survivorship bias, this also included all firms that delisted during this period. This was accomplished by choosing a matching firm regardless of whether it delisted prior to month T, with some matching firms being delisted as soon as one month after the listing date of the IPO firm. In this case a second and sometimes even a third matching firm had to be selected. The replacement firm is chosen from the original ranking list done on the date of the issue. For the size benchmark, IPO and SEO firms were paired with a matching firm with the closest market capitalization on 31 December in the same year as the IPO or SEO listing. The same method was used to match firms within each industry sector. When a matched firm could not be selected within the same industry, the next closest industry was selected. For IPOs that were delisted before the end of the 36-month period, the

returns were calculated up until their delisting date. This is seen by the decreasing number of firms (in Table 8) as the time period increases.

The first month is defined as the first full calendar month of trading. This definition has been chosen for two reasons. IPOs are often oversubscribed due their large demand. Therefore many investors are unable to obtain their full allotment of shares at the offer price and are forced to purchase their shares in the aftermarket. Secondly, different companies issue their IPOs on different days within a month resulting in their first month of trading comprising a different number of days. Therefore in order to establish consistency the first month has been defined as the first calendar month post listing (Page and Reyneke, 1997; Levis, 1993)

Table 7. Delisting pattern of IPO companies listed on the JSE Mainboard during 2001-2010

	<i>IPO companies</i>	<i>Size matched companies</i>	<i>Industry matched companies</i>
Number of companies	141	141	141
Delisting within 36-months	14	6	7
Percentage delisting	9.93%	4.26%	4.96%

Table 7 presents the delisting data for IPO companies and their matched companies based on size and industry. The number of IPO companies delisting within 36 months of their IPO is almost 10%. The number of size and industry matched companies that delisted in the same 36 month period relative to their matched IPO is 4.26% and 4.96% respectively. This is less than half the IPO delistings. This relative higher frequency of IPO delistings is due to their relative infancy. The number of size and industry matched company delistings illustrates that there is little evidence of survivorship bias in this study.

4.3.1. IPO aftermarket performance

Table 8 reports the 36-month cumulative average adjusted returns (CARs) and the change in the holding period returns (HPRs) for IPOs during 2001-2010, for a 36 month horizon, adjusted for the three selected benchmarks, namely: (i) JSE Small Cap Index, (ii) size matched firms, and (iii) industry matched firms. The columns in the table present the time horizon under investigation, the number of issues each month, the monthly benchmark adjusted CARs and BHARS with the asterisks representing their level of significance.

Table 8. Cumulative average adjusted returns (CARs) and holding period returns (HPRs) for IPOs during 2001-2010, excluding initial returns

Month	Number of IPOs	Small Cap Index adjusted		Size adjusted		Industry adjusted	
		CAR (%)	Δ HPR (%)	CAR (%)	Δ HPR (%)	CAR (%)	Δ HPR (%)
1	141	-1.34	-1.34	-1.27	-1.27	-2.08	-2.08
2	141	-1.72	-2.22	-1.24	-1.61	-2.44	-2.77**
3	141	-2.15	-2.47	-1.98	-2.53	-1.01	-1.62
4	141	-1.96	-2.30	-0.84	-1.51	-1.95	-2.47*
5	141	-2.84	-2.86	-2.74	-2.70	-2.38	-2.43
6	141	-3.72	-3.06	-2.76	-2.24	-5.44	-4.57*
7	141	-4.89	-3.59	-3.17	-2.32	-6.22	-4.81*
8	141	-4.87	-4.02	-3.17	-2.64	-4.60	-3.86
9	141	-4.07	-2.99	-3.10	-2.56	-3.82	-3.24
10	140	-2.02	-0.16	-0.27	1.40	-0.49	1.07
11	140	-4.51	-1.20	-2.02	1.13	-1.44	1.49
12	140	-6.18	-4.19	-1.20	0.57	-5.10	-3.51
13	140	-7.97	-4.63	-3.05	-0.66	-5.49	-3.34
14	140	-7.70	-2.63	-3.02	0.76	-5.01	-3.45
15	140	-7.20	-2.43	-1.72	1.92	-5.27	-2.45
16	138	-8.90	-2.94	-1.70	2.44	-6.02	-3.55
17	138	-9.53	-4.83	-3.81	-0.30	-8.17	-7.15**
18	138	-10.09	-6.54	-4.28	-3.03	-8.67	-9.29**
19	136	-13.65**	-8.19	-7.03	-4.24	-10.91	-11.49**
20	135	-14.20**	-10.20	-4.75	-5.17	-10.33	-10.62**
21	135	-16.40**	-12.71	-5.81	-5.96	-12.83	-12.64**
22	135	-16.77**	-15.40*	-5.78	-7.85	-16.39*	-17.33**
23	135	-19.59**	-17.49**	-7.09	-8.94	-16.19	-18.92**
24	135	-20.55**	-18.93**	-6.88	-9.45*	-18.39*	-22.58**
25	134	-20.52**	-18.13**	-6.98	-6.80	-17.37*	-22.07**
26	133	-18.27**	-18.99**	-4.08	-5.98	-14.95	-24.42**
27	133	-18.48**	-17.80*	-4.41	-5.01	-15.27	-20.89**
28	133	-19.57**	-20.75**	-4.89	-6.06	-16.00	-24.22**
29	132	-20.26**	-20.78*	-7.69	-7.63	-16.55	-21.12**
30	130	-21.10**	-20.77*	-8.17	-6.45	-17.29	-21.59**
31	129	-20.14**	-22.34*	-7.84	-6.97	-16.72	-20.99**
32	129	-21.20**	-23.96*	-8.23	-7.00	-16.74	-20.94**
33	128	-20.94**	-22.86*	-9.19	-4.99	-16.36	-16.78**
34	127	-21.62**	-21.95	-9.87	-3.06	-15.53	-13.52
35	127	-19.85**	-21.18	-6.81	-0.57	-13.65	-11.19
36	127	-19.19*	-22.37	-4.18	1.93	-13.27	-11.02

Note: *, ** Significant at the 10% and 5% levels respectively

All three series show a gradual decline in adjusted returns, which accelerates around the 17 month mark. The 36-month CAR for the three benchmarks are -19.19%, -4.18% and -13.27% respectively. These results enable us to form two conclusions. Firstly, these results are consistent with other international studies done by Ritter (1991 and 1995) on U.S. IPOs and Levis (1993) on U.K. IPOs. Secondly, there is a significant difference between the choice of benchmark employed, affecting the magnitude of measured IPO underperformance.

Few of the returns are significant over this period. However, they are clearly predominantly negative for all three benchmarks over a 36-month horizon. The CARs are negative for all three benchmarks at the end of the 36 month period. The JSE Small Cap adjusted returns are the only CARs that are statistically significant at 36 months with an adjusted return of -19.19%. The CAR is also highly significant (at the 5% level) for months 19 through 35 for this benchmark. The size matched adjusted returns show the least underperformance at 36-months with a CAR of -4.18%, however none of the monthly values are statistically significant. The industry adjusted returns have three statistically significant CARs of -16.39%, -18.39% and -17.37% in months 22, 24 and 25 respectively. The 36 month CAR for this benchmark is -13.27%.

As previously mentioned, the JSE has a large number of sectors into which they classify listed companies. Therefore there are sometimes a limited number of companies within certain sectors. Once companies have been excluded for issuing equity within 36 months prior to being matching with an IPO or SEO, this further limits the number of available companies within each sector. Even though the IPO and SEO companies are matched with companies with the closest market capitalization on 31 December during their issuing year, there was sometimes a substantial difference to the market capitalization of the IPO or SEO. Therefore IPO and SEO companies were being matched to companies of very different size, albeit this was the closest match in the sector. This may account for the large difference in the average 36-month CAR for the size and industry matched benchmarks. The Small Cap Index is not an exact match of the size of each IPO and this would explain why this adjustment showed the largest underperformance. Nonetheless, based purely on the CAR data, one can conclude that IPOs do underperform over a 36-month period, but this result is not statistically significant when adjusted for matched non-issuing firms based on size and industry.

There are a number of additional issues one needs to consider when interpreting the CAR results. Most importantly, CARs do not account for compounding. To overcome this limitation, holding period returns were also calculated for this period and adjusted for the same benchmarks listed above. Both the Small Cap adjusted returns and the industry adjusted returns show highly significantly underperformance (at the 5% level) round months 23 to 28. Interestingly, the size adjusted returns show a positive return of 1.93% at 36-months. Therefore, IPOs outperformed similar sized non-issuing companies after 36 months. This result was not expected from the literature and displays the importance of compounding and size adjustment.

Figure 3. Average IPO holding period returns adjusted for three selected benchmarks, during 2001-2010

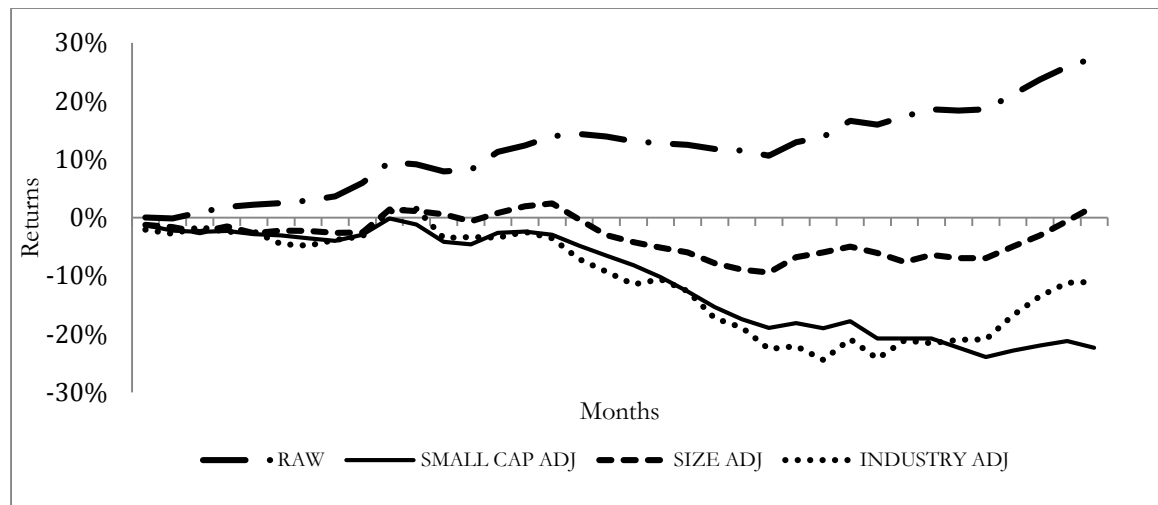


Figure 3 illustrates the average raw monthly holding period return (HPR) of IPO companies and adjusted HPRs for the three selected benchmarks. The benchmark adjusted HPRs are calculated by subtracting the benchmark HPR from the IPO HPR. The four series in order from top to bottom are: (i) raw returns, (ii) size adjusted returns, (iii) industry adjusted returns and (iv) JSE Small Cap Index adjusted returns. It is evident that all series show different performance during this time period. All four series appear to display similar patterns, although the benchmark adjusted returns present much steeper downward slopes. The raw returns remained positive throughout the observation period with the exception of month two that shows a slightly negative return. This consistent gradual increase in returns can be at least partly attributed to the bull market that persisted in 2006 and the first half of 2007, when the majority of the sample IPOs were listed.

The raw return and the size-adjusted returns are the only positive HPRs at the end of the 36-month period. Therefore the long-run performance of IPOs is sensitive to the benchmarks employed. This variation in benchmarks employed is not unusual for studies conducted over long window periods (Levis, 1993). One can conclude that the alternative benchmarks give different results, but the literature is still unclear what constitutes the most appropriate benchmark portfolio.

4.3.2. SEO aftermarket performance

Unfortunately the SEO sample data could not be assessed over the same time period as the IPOs. The SEO data were obtained from the McGregor BFA database and their corporate announcement data goes back only to 2003. However, these measures were conducted over an 8 year period which is still long enough to draw significant conclusions. There were 50 SEOs during this period that met the following criteria: (i) Mainboard listing, (ii) common stock only, and (iii) available data. To be consistent the same benchmarks were employed as were used for the IPO data, with the exception of the JSE Small Cap Index. This benchmark was selected for the IPO data because it was assumed that IPO companies generally have a small market capitalization. However this is not the case with firms issuing SEOs, as some companies are within the top percentile of JSE Mainboard listings with regards to market capitalization.

Table 9 presents the CAR and change in HPR for SEOs listed during 2003-2010 over a 36-month horizon. The columns in the table present the month under investigation, the number of SEOs, the CARs and change in HPRs for our two selected benchmarks, namely: (i) size matched non-issuing firms, and (ii) industry matched non-issuing firms.

Table 9. *Cumulative average adjusted returns (CARs) and holding period returns (HPRs) for SEOs during 2003-2010*

Month	Number of SEOs	Size		Industry	
		CAR (%)	Δ HPR (%)	CAR (%)	Δ HPR (%)
1	50	1.87	1.87**	-0.09	-0.09
2	50	2.79	2.47*	5.60	6.92**
3	50	-0.10	-0.56	-0.73	0.36
4	50	-2.42	-3.19**	-8.78	-6.76
5	50	-4.52	-6.08**	-9.89	-4.59
6	50	-8.14	-10.93**	-8.31	-4.89
7	50	-5.54	-10.02*	-7.54	-1.84
8	50	-9.52	-12.28**	-9.46	-3.41
9	50	-11.64	-9.52**	-5.34	3.76
10	50	-11.18	-13.30**	-4.00	2.39
11	50	-13.30	-16.03*	-5.76	-6.77
12	50	-11.25	-16.45	-3.10	-1.97
13	50	-10.77	-26.60	-2.74	-2.42
14	50	-11.00	-21.04	-3.14	-1.89
15	50	-9.69	-21.61	3.70	1.84
16	50	-3.70	-9.95	5.50	-0.13
17	50	-1.81	-3.40	5.38	-2.00
18	50	-3.23	-1.56	2.55	-15.82
19	50	-5.18	-0.61	-3.66	-21.48
20	50	-7.43	-4.53	-1.66	-13.30
21	50	-8.52	-5.22	-4.07	-14.70
22	50	-10.97	-7.30	-5.46	-14.68
23	50	-15.10	-7.34	-6.75	-27.74
24	50	-13.07	-2.81	-10.80	-20.05
25	50	-13.97	-1.47	-12.30	-17.97
26	50	-13.43	1.87	-7.99	-12.41
27	50	-8.45	7.86	-5.47	-18.12
28	50	-9.55	12.80*	-4.76	-5.95
29	50	-8.52	13.69**	-2.34	-3.69
30	50	-8.70	17.52**	-4.36	2.14
31	50	-8.72	20.83*	-4.03	8.59
32	50	-8.79	19.59	-8.31	-11.37
33	50	-10.80	14.61**	-6.92	-7.92
34	50	-9.92	19.26**	-6.94	-5.03
35	50	-13.65	8.75	-7.30	-9.75
36	50	-12.27	8.79	-5.52	3.36

Note: *, ** Significant at the 10% and 5% levels respectively

Both CAR benchmarks show negative long-run adjusted returns of -12.27% and -5.52% respectively. This return is substantially lower for the size benchmark than the industry benchmark, illustrating once again, that returns over a long window period are sensitive to the benchmark employed. The size adjusted CARs show an initial positive return (months 1 and 2), which rapidly weakens and reaches a low of -13.3% at month 11. The performance improves to -1.81% in month 17 and then reaches its 36-month period low of -13.65% at month 35.

The industry adjusted CARs show a similar pattern with an initial deterioration and subsequent quick improvement that reaches its peak at month 16 with a 5.5% return. This quickly deteriorates again, reaching its lowest adjusted return of -12.3% in month 25 and then gradually starts to improve. It is important to note that although these returns appear to be mostly negative, none are found to be statistically significant. This could be in part due to the relatively low sample number when calculating their t-statistics.

Once again, the CARs have the drawback of failing to take compounding into account. We therefore look at the change in HPRs which present a completely different picture, showing a positive performance for both benchmarks after 36-months, with adjusted returns of 8.79% and 3.36% respectively. There are also a large number of returns that are highly significant when using this method.

The size benchmark illustrates a significant outperformance at the 5% level for SEOs for the first two months. This deteriorates in the 4th month showing a significant underperformance for the next consecutive 8 months. The size adjusted returns reach its minimum value at -26.6% in month 13, after which the SEO performance quickly improves and starts to show highly significant outperformance once again through months 28-34.

The industry benchmark only has one significant return of 6.92% in month two. Once again, the performance shows waves of deterioration and improvement within the 36-month period. The industry-adjusted returns reach their minimum value of -27.74% in month 23, after which the SEO performance improves and ends on a positive adjusted return for the time selection.

The above results indicate that the SEOs outperformed selected non-issuing companies matched on industry and size. A conclusion on whether the patterns regarding the long-term performance of IPO and SEOs are similar depends on the benchmark employed. Based on the size benchmark one can conclude that IPOs and SEOs are similar as they both showed superior long-run performance. However, based on the industry benchmark, the patterns are not alike as the IPOs underperformed while those of SEOs outperformed.

4.4. CROSS-SECTIONAL AND TIME-SERIES PATTERNS IN THE AFTERMARKET PERFORMANCE OF IPO AND SEO FIRMS

In order to quantitatively measure the long-run performance of IPOs and SEOs, some benchmarks need to be employed. Therefore for the remainder of this paper, the wealth relatives, defined as the average gross total returns of the IPO or SEO portfolio divided by the average gross total returns of a benchmark portfolio, will be employed as the primary measure to assess the long-run aftermarket performance of IPOs (Ritter, 1991). Both of these total returns are calculated for the three year period after an IPO or SEO listing, excluding initial returns.

To investigate possible underlying patterns and explanations for the long-run performance of IPOs and SEOs, various cross-sectional and time-series patterns have been calculated and are shown in the sections to follow, namely: IPO and SEO performance by year of issuance, IPO and SEO long-run performance within industry sectors, and IPO aftermarket performance by first day initial returns.

4.4.1 Aftermarket performance categorized by year of issuance

Table 10. Average IPO three-year holding period return and wealth relatives classified by year of issuance

Year	Number of issues	Average three-year holding period return IPOs (%)	Wealth relatives		
			Small Cap Index	Size	Industry
2001	7	53.237	0.546	1.604	0.660
2002	9	298.29	1.773	3.040	1.598
2003	5	115.002	0.553	0.915	0.925
2004	11	143.475	0.703	1.035	0.780
2005	15	2.919	0.074	0.098	0.089
2006	23	12.167	2.474	-0.842	0.669
2007	40	-47.932	4.630	1.905	1.578
2008	18	-15.866	-0.700	-0.337	-0.916
2009	6	11.325	0.207	0.254	0.320
2010	7	65.448	1.229	4.863	2.590

Benchmark	Three-year equal-weighted buy-and-hold returns during 2001-2010			
	IPO (%)	Benchmark (%)	Abnormal (%)	Wealth relative
Small Cap Index	27.36	49.73	-22.37	0.559
Size	27.36	25.43	1.93	1.073
Industry	27.36	38.38	-11.02	0.720

In order to take a closer look at the possible explanations regarding the long-run IPO and SEO performance, Table 10 and Table 11 classify the long-run returns according to their year of

issuance. Table 10 and 11 list the number of issues, the average three-year holding period return and the wealth relatives based on the JSE Small Cap, size and industry benchmarks. Inspection of the tables makes it evident that the wealth relative values depend on both the year of issuance and the benchmark employed for assessing the long-run performance documented in the previous section.

In a study on U.K. IPOs, Levis (1993) reported that most years showed a wealth relative of less than 1.00 with only a few years showing outperformance. While Levis (2003) agrees that his U.K. IPOs also display a variation of long-run performances, illustrated by their wealth relatives according to their year of issuance, he failed to find a relationship between the volume of annual issues and their long-run performance.

This same relationship does not appear to be true for the South African IPO data in this study. 2007 has by far the largest number of issues, and also produced the largest positive wealth relatives for the period analyzed. This result may have been affected by the developing of the global financial bubble during this year. It is noted below that the raw return for 2007 was severely negative and outperformance therefore reflects even more negative performance on the part of benchmark portfolios. Further research is needed to explain this outcome.

After further inspection of Table 10 it is noticeable that the wealth relatives are consistently greater than 1.00 for all three benchmarks only in 2002, 2007 and 2010. Although 2007 had all wealth relatives greater than one, indicating that the IPOs outperformed the market, the IPO raw return was still negative. Therefore the market would have experienced larger losses compared to the IPO portfolio. To be consistent and enable comparisons with other studies, the size adjusted benchmark will be the focus for yearly IPO interpretations. Focusing on this single benchmark, 5 of the 10 years show superior aftermarket performance. Therefore these results show mixed evidence of the well-documented incidence of poor aftermarket performance. Due to the large volume of IPOs listed during 2007, and their relative superior aftermarket performance, the 3-year holding period wealth relative for the ten year sample period using the size adjusted benchmark is 1.073 when the issues are equally weighted.

Loughran and Ritter (1995) suggested that if private firms are successful at selling stock at a premium to overoptimistic investors who subsequently realize low returns in the long term, it is expected that publicly traded firms have an equal opportunity to do the same. They found that most literature focused on the initial SEO price run ups, but that the post issue

performance had been relatively underexplored. They reported a wealth relative of 0.69 for their sample of SEOs over a 5-year holding period, which is virtually identical to the 0.7 wealth relative they reported for their IPO sample over the same period. Therefore they concluded that the underperformance patterns are not unique to IPOs and that the same underperformance is seen with already publicly traded firms issuing subsequent equity.

In Table 11 we report the 36-month buy-and-hold returns and wealth relatives for our SEO sample firms issuing equity between 2003 and 2010. Although both the size and industry benchmarks have been shown to be consistent with the literature and with the IPO data, the size benchmark will be the focus for interpretation purposes. The wealth relatives indicate underperformance for 4 of the 8 years under observation. Interestingly, these four years, namely, 2006-2009, show the lowest 3-year holding period returns with 2006 and 2007 showing negative returns. The mean wealth relative for the 8 year sample period is 1.0667. This value is greater than 1.00 indicating a superior performance for the period as a whole.

The underperformance for the 2006-2009 four year sub-period is consistent with the IPO results with the exception of 2007 where the IPO portfolio showed superior performance. The wealth relatives, although conducted over slightly different sample periods for the IPO and SEO portfolios due to data restraints, are very similar, with 1.072 and 1.067 respectively.

These results conform to the literature in that the similar patterns can be seen between the SEO and IPO portfolios. However, both these portfolios contradict international evidence by showing superior performance over a three year horizon when assessed using a size adjusted benchmark. However, this finding may have been affected by the results for 2007.

Table 11. Average SEO three-year holding period return and wealth relatives classified by year of issuance

Year	Number of issues	Average three-year holding period return IPOs (%)	Wealth relatives	
			Size	Industry
2003	1	169.80	1.538	1.902
2004	2	272.56	1.173	1.210
2005	3	97.97	1.076	0.394
2006	6	-18.0	0.692	1.653
2007	3	-46.24	0.588	0.631
2008	11	4.63	0.909	1.066
2009	12	10.30	0.698	0.882
2010	12	90.60	2.133	1.569

Three-year equal-weighted buy-and-hold returns during 2003-2010				
Benchmark	SEO (%)	Benchmark (%)	Abnormal (%)	Wealth relative
Size	40.47	31.68	8.79	1.067
Industry	40.47	37.11	3.36	1.025

4.4.2 Aftermarket performance categorized by initial return quintiles

Barlow and Sparks (1986) interviewed merchant bankers involved in public offerings and found that numerous respondents believed that a relatively large opening premium was necessary to ensure a successful post issue performance. Bradfield and Hampton (1989) provided some further empirical evidence to support this belief in South Africa. These merchant bankers' beliefs are in direct contraction to numerous international studies relating the initial premia of IPOs to their aftermarket performance.

De Bondt and Thaler (1985) presented evidence for low-capitalization stocks that showed a negative correlation between past and subsequent abnormal returns on individual securities using holding periods of one year or more. They interpreted this result as evidence of market overreaction. Ritter (1991) agreed and found there is some tendency for firms with high initial returns to have a poor long-run performance. He found this pattern to be more pronounced for smaller issues compared to larger issues and concluded that his evidence is mildly supportive of the overreaction hypothesis.

Levis (1993) found in his study on U.K. IPOs during 1980-1988 that some industry sectors with the highest average first day returns are amongst the worst long-run performers. He took a similar approach in his study by examining IPOs within initial premia categories. He again found that the wealth relatives show that high IPO initial returns are not a good indicator of their long-run performance. The only initial return category to outperform against all three selected benchmarks contained moderate returns, which ranged between 5.8% and 12.1%. He

agrees with Ritter (1991) that investors are over optimistic at the time of issue about the earning potential of newly issued equity.

In order to investigate the relationship between the IPO first day initial return and its long-term performance over a three year period, mean aftermarket returns for quintiles of initial returns were computed. Table 12 illustrates the long-run behaviour of IPOs relative to their first day initial return, showing the quintile range, the number of issues within each quintile, the average three-year holding period return and the wealth relatives of the IPOs for the three different benchmarks. Table 12 shows that there appears to be a negative relationship between IPOs first day initial returns and their 36-month performance. The 3 largest quintiles, which range in total from 0% to 100%, have wealth relatives of less than 1.00 for all three benchmarks. This improves for the second quintile, which ranges from -4.55% to 0%, and has a wealth relative of 1.492 and 1.054 for the size and industry benchmarks, respectively. The first quintile is the most conclusive, showing wealth relatives greater than 1.00 for all three benchmarks. The JSE Small Cap, size and industry benchmark wealth relatives are 1.089, 1.322, and 1.250 respectively.

Table 12. Long-run performance by first day initial return categories for IPOs during 2001-2010, excluding initial returns

<i>First initial day return quintile (%)</i>	<i>Number of issues</i>	<i>Average three-year holding period return (%)</i>	<i>Wealth Relatives</i>		
			<i>Small Cap</i>	<i>Size</i>	<i>Industry</i>
4.38 < IR ≤ 100.00	28	7.597	0.796	0.881	0.773
0.00 < IR ≤ 4.38	24	-0.054	0.680	0.891	0.924
IR=0.00	38	49.419	0.801	0.852	0.807
-4.55 < IR < 0.00	24	37.051	0.960	1.492	1.054
-34.61 < IR ≤ -4.55	27	32.547	1.089	1.322	1.250

4.4.3 Aftermarket performance by industry

Ritter (1991) found long-run underperformance in 11 out of 14 industry categories for his study on U.S. IPOs. The financial industry, which benefitted from a large drop in interest rates during the sample period, was the industry with the best long-run performance. He believed that the general underperformance of the IPO industry portfolios relative to their matched non-issuing industry portfolios is more consistent with a “fads” explanation rather than just bad luck.

Barlow and Sparks (1986) studied IPO initial premiums for South Africa and focused on the risk characteristics of various sectors within the JSE. They found modest evidence to suggest that initial returns may vary across industry type.

Aggarwal (1993) found a similar negative relation for his study on Brazilian IPOs. He suggested that investors tend to buy shares at an overvalued price on day 1 and later realize poor returns on their investment. He, however, failed to find this same result for Chile and Mexico.

Page and Reyneke (1997) found little evidence in their study on South African IPOs during 1980-1991 to suggest that the long-run performance of IPOs is related to the listing premium. They categorized their initial premiums into three groups and found wealth relatives of less than 1.00 for all three categories, with premiums less than 5% and greater than 36%, significant at the 5% level. They concluded that their results do not conform to the belief of merchant bankers in Barlow and Spark's (1986) study as they found IPO post-issue performances to be uncorrelated with their initial listing success.

This study has extended their research by investigating the long-run performance of IPO and SEOs characterized by their industry. Table 13 reports the long-run performance for IPOs and SEOs categorized by three broad industry groupings. Due to the large number of JSE industry categories, and to be consistent with the short-run analysis, three broad industries have been created, namely: financial, mining and 'other'. Although all three benchmark wealth relatives have been calculated for each industry, the literature assumes it is more accurate to make conclusions based on the industry adjusted returns when focusing on industry performance (Ritter, 1991; Spiess and Affeck-Graves, 1995). The IPO wealth relatives point to marked differences in the long-run performance of individual industries. The mining industry has a wealth relative of 1.027 which indicates a slightly superior performance over a three-year horizon. The financial and 'other' sector both underperform in the long-run with wealth relatives of 0.783 and 0.943 respectively.

Table 13. Long-run performance of IPOs during 2001-2010 categorized by industry

	Number of issues	Average first day returns (%)	Average three-year holding period return (%)	Wealth relatives		
				Small Cap Index	Size	Industry
Financial	21	1.318	60.248	0.866	0.972	0.783
Mining	25	3.030	19.392	0.933	1.054	1.027
Other	95	5.139	22.183	0.828	1.019	0.943

Page and Reyneke (1997) studied South African IPOs for the period 1980 to 1991. They classified their industries into three similar broad categories, namely: financial, industrial and mining and ‘other’. They found long-run underperformance in all three industries when their returns were adjusted for a size benchmark consisting of non-issuing firms. They found the worst performance to be the “mining and others” sectors with a wealth relative of 0.256 and the best long-run performer to be the financial sector with a wealth relative of 0.793. They found that their results were consistent with an increase of volatility across the sectors within the JSE and concluded that the long-run performance of IPOs is positively related to the industry volatility within each industry sector.

Using the same size adjusted benchmark in this study as that used by Page and Reyneke (1997), the financial sector was the only sector in Table 13 to underperform in the long-run, and this was only ever so slightly with a wealth relative of 0.972. According to Page and Reyneke’s (1997) conclusion, this should have been the sector to have the best long-run performance. This sector is also the worst performer when assessed with an industry-benchmark and the second worst when assessed with the JSE Small Cap index. We therefore question Page and Reyneke’s (1997) conclusion and suggest their result was biased by their sample period.

Table 14. Long-run performance of SEOs during 2003-2010 categorized by industry

Sector	Number of issues	Average three-year holding period return (%)	Wealth relatives	
			Size	Industry
Financial	7	58.281	0.762	0.567
Mining	13	-0.498	0.943	1.145
Other	30	54.073	1.245	1.274

Assessing whether the same patterns are evident within our SEO sample data, the SEO firms are segmented into the same industry categories as mentioned above. Again investigating the performance based on the industry benchmark, it can be concluded that only the financial sector underperformed over a three-year holding period with a poor wealth relative of 0.567.

Both the mining and the 'other' sector outperformed their non-issuing matched industry portfolio with wealth relatives of 1.145 and 1.274 respectively. The results of the SEO sample therefore appear to be more extreme, showing more conclusive wealth relative values. The results of our IPO and SEO analysis are consistent with regards to the financial and mining sector when assessed using the industry benchmark, however they do differ slightly with regards to the 'other' sector.

4.5. IMPLICATIONS FOR INVESTORS AND ISSUING COMPANIES

These results suggests that there was an opportunity during 2001-2010 for investors to buy equity at their initial offering price, and then sell the stock after 5-days to maximize their profit. The return was found to be significantly different from the offering price at the 5% level, however, the investors would still have made a profit if they decided to hold the equity up until its 20th day. The IPO market displayed poor short-run returns during 2002 and 2003, which was mostly due to a lack of risk appetite following the dot-com crash where a number of investors most likely experienced significant losses.

More specifically, if an investor wanted to maximize their return during this period, they could have avoided the mining or financial sector, as well as tried to identify stocks that listed for less than 500 cents. Stocks being listed for a lower price are perceived as carrying a higher risk, and during this time period the investors were rewarded for this risk with higher returns. Once again, trading day 5 showed the optimal return for stocks with these characteristics.

The question then remains why companies are willing to list for a value deemed to be significantly less than the market is willing to bid for the stock in the first few days following the issue. Numerous theories exist, and these are discussed thoroughly within the literature review. However, no conclusive theory has been proposed in the literature and it would be difficult to interpret a conclusion based on the analysis done within this study. Various regression techniques exist to arrive at such results, but this was outside the scope of this study.

This study extended the time frame of IPO analysis to investigate the long-run performance of these issues during the same 2001-2010 time period. Although the literature suggests that IPOs underperform in the long-run when compared to various benchmarks, this study found this not to be the case for the JSE under the time frame investigated. The results are highly

skewed by the test statistic and benchmark employed, but when assessing the data with debatable the more appropriate BHAR test statistic, and comparing the IPOs to like-sized public companies, IPOs did in fact not underperform over a 3 year horizon. Therefore investors could have felt comfortable buying an IPO during this time period with the view to hold onto it for a period of 3 years. More specifically, an investor could have maximized their long term return by identifying an IPO that did not deviate by more than 4% from its IPO listing price on the first trading day. Investors that selected the mining sector for long-term returns would also have outperformed those investing within other industries.

Comparing the long-run performance of SEOs to IPOs, the study found that SEOs also performed favorably when assessed using the BHAR test statistic. However, unlike IPOs, this return was positive over a 3 year period when assessed using both a size and industry adjusted benchmark. Therefore, an investor could have benefitted from buying SEOs with a view to hold onto them for period of three years, more so than if they had invested in IPOs for the same time period.

Conclusions from the results of this study follow in the next Chapter.

CHAPTER 5: CONCLUSION

The market for newly issued shares is subject to a variety of well-known idiosyncratic patterns, not least the tendency for IPOs to appear underpriced on the first few days of trading. A large amount of theoretical and empirical research over the past three decades has focused on documenting evidence of underpricing and advancing possible reasons for this anomaly. This paper examined underpricing in the Johannesburg Stock Exchange using a sample of 141 Mainboard listed IPOs issued during the period 2001 to 2010.

Using the average mean market-adjusted method and the wealth relative model to analyse the short-run performance of new issues, this study showed significant short-run underpricing of IPOs on the first and fifth trading days with returns of 4,19% and 6,22% respectively. A sector wise analysis indicated that there was not a sector that particularly outperformed consistently each year. All sectors showed a positive return on trading days one and five, but the 'other' sector was the only sector to show a positive return on each trading day during this ten year period.

It was also found that the average IPO price increased dramatically during the financial crash in 2008, even though the total proceeds had decreased; a signal that investment bankers may try to protect their reputations in times of trouble and only opt for more well-known established firms. A value and size analysis of the new issues showed that shares priced below 500 cents and IPO share volumes greater than 200 000 000 are associated with higher underpricing.

This study also showed that IPOs in South Africa underperformed two benchmarks in 36 full months post listing, namely the JSE Small Cap Index and a portfolio of non-issuing industry matched firms. However, the IPOs did show superior performance over this time horizon when assessed using a benchmark of non-issuing size matched firms. SEOs also showed superior performance over a 36-month period when assessed using a size and industry adjusted benchmark.

Whether the patterns regarding the long-term performance of IPOs and SEOs are similar depends on the benchmark employed. Based on the size benchmark one can conclude that IPOs and SEOs are similar as they both showed superior long-run performance. However, based on the industry benchmark, the patterns are not alike as the IPOs underperformed while those of SEOs outperformed.

A sector-wise analysis of IPOs over the long-run showed that the mining sector was the only sector to show superior performance over a 36-month period post listing. The financial sector showed the worst performance, which is consistent with the long-run results of the SEO data which also showed the financial sector to be the only sector that showed underperformance.

There was also an interesting relationship noted between the short-run and long-run performances of IPOs listed during this time period. There appeared to be a negative relationship between first day initial returns and the long-run performance, with IPOs with the highest underpricing showing the worst long-run performance.

In conclusion these results conform to international literature, illustrating IPO short-run underpricing and long-run underperformance. However, SEOs showed superior performance and their similarities to the long-run performance of IPOs depends on the benchmark employed.

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APPENDIX A: Sector classification

<i>New Sub-sector</i>	<i>JSE sector classification</i>
Mining	Coal
	Diamonds & Gemstones
	General Mining
	Gold Mining
	Platinum & Precious Metals
Financials	Asset management
	Consumer finance
	General finance
	Investment instrument
	Investment Services
	Mortgage finance
	Real estate investment and services
	Speciality finance
Other	Airlines
	Aluminium
	Building materials and fixtures
	Business support services
	Business training and employment agencies
	Computer services
	Constructions and materials
	Diversified industrials
	Electrical components and equipment
	Electricity
	Electronic equipment
	Farming and fishing
	Food producers
	General retailers
	Health care equipment and services
	Heavy construction
	Hotels
	Industrial Metals
	Industrial suppliers
	Medical suppliers
	Mobile telecommunications
	Other securities
	Personal products
	Pharmaceuticals
	Preference shares
	Real estate holdings
	Real estate holdings and development
	Restaurants and bars
	Software
	Speciality chemicals
	Speciality retailers
	Support services
	Telecommunication equipment
	Telecommunications
	Tobacco
	Travel and leisure
	Waste and disposal services